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

Jim Justice, Governor
Austin Caperton, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3351
Plant ID No.:	039-00669
Applicant:	US Methanol LLC
Facility Name:	Liberty One Methanol Plant
Location:	Institute, Kanawha County
SIC/NAICS Code:	2869/325199
Application Type:	Construction
Received Date:	November 28, 2016
Engineer Assigned:	Joe Kessler
Fee Amount:	$2,000
Date Received:	November 29, 2016
Complete Date:	December 21, 2016
Due Date:	March 21, 2017
Applicant's Ad Date:	November 29, 2016
Newspaper:	*Charleston Gazette-Mail*
UTM's:	431.696 km Easting • 4,249.108 km Northing • Zone 17
Latitude/Longitude:	38.38766/-81.78122
Description:	Construction of a 580 tons/day natural gas-to-methanol plant.

DESCRIPTION OF PROCESS

US Methanol LLC (USM) is proposing to construct a 580 tons-methanol/day natural gas-to-methanol plant in a portion of the Dow Chemical Company (Dow) facility located in Institute, Kanawha County, WV. The process sections of the plant (reformers, air separation unit, methanol synthesis, and methanol distillation) are existing and shall be purchased and moved from a location near Rio De Janeiro, Brazil. Other portions of the plant (storage tanks, loading racks, etc.) are being constructed new at the facility. USM has purchased the property where the proposed facility will be located and there is no corporate or management affiliation with Dow.

The facility will receive up to a maximum of 15.35 $mmft^3$/day of pipeline natural gas and , after compression in electric compressor engines, convert it first into raw synthetic gas (syngas) in

the 310 tons-Methanol/day Steam Reforming Unit (SMR - Unit 1000) and the 270 tons-Methanol/day Auto Thermal Reforming Unit (ATR - Unit-10000). Heat is provided in the reforming units by gas-fired heaters: a large heater (103.0 mmBtu/hr) for the SMR (1S) and a small pre-heater (3.331 mmBtu/hr) for the ATR (2S). The SMR heater (Heater H-1101) is fired by natural gas on startup and then switches to combustion of hydrogen-rich syngas during normal operations. The ATR heater (Heater H-10101) is always fired on natural gas.

Additionally, during startup, raw syngas (not yet of sufficient quality to synthesize into methanol) from the SMR is combusted in a non-assisted 145 feet high elevated flare (15S, 4C). There are no startup emissions generated in the ATR. USM has estimated a maximum of fifteen (15) hours of startup flaring operations per year. During shutdown operations (when the facility would go from full operation to a cold stop), when the pressure in the system drops to a certain level, all remaining syngas is vented to the flare from various points in the process. USM has estimated a maximum of nine (9) hours of shutdown flaring operations per year.

Raw syngas from both the SMR and ATR are sent to the Methanol Synthesis Unit (3S: MSU - Unit 2000). In the MSU, syngas is compressed using four electric compressors before entering the three methanol converters (in series). Each converter uses seventeen (17) cubic meters of methanol synthesis catalyst that, under proper temperature and pressure conditions, convert the raw syngas into crude methanol.

From the MSU, the crude methanol is sent to the Methanol Distillation Unit (4S: MDU - Unit 3000). Crude methanol enters the distillation unit with a composition of about 75% methanol, 24% water, and some dissolved gases. The MDU is a high thermal-efficiency, three-column system capable of distilling from the crude methanol feedstock approximately 580 tons-methanol/day using standard distillation column techniques. Purge gas removed from the crude methanol leaving the column overheads is sent back to the reformer feed stream for re-processing. Undesirable liquids are removed from the columns and either recycled or sent to the appropriate storage tank. The final pure methanol product leaves with a purity of 99.959% with 0.028% water and 0.013% ethanol.

There are eight (8) storage tanks proposed for the facility. The tanks will be located in two distinct areas of the plant: “Area 4," which is storage located at the main plant area and “Area 12," which is the barge loading storage area. Area 4 has the following tanks: two (2) 75,000 gallon run-down tanks (5S, 6S), which are where the methanol first enters after leaving the MDU, one (1) 12,000 gallons fusel oil tank (7S), two (2) 1,200,000 gallons methanol sales storage tanks (8S, 9S), and a 150,000 gallons slop tank for off-grade methanol (10S). Area 12 has two (2) 1,200,000 gallons methanol loading tanks (12S, 13S) in the barge loading area. The tanks in Area 12 will not be installed during the initial facility construction and will be constructed at a later date. Therefore, barges will be loaded directly from Area 4 tanks until Area 12 tanks are installed. The product and sales methanol tanks will be equipped with internal floating roofs and vapors from all storage tanks are controlled by standard packed-bed water scrubbers (2C - Area 4, 3C - Area 12).

Methanol will be shipped via barge on the Kanawha River from Area 4 and then, later when constructed, the methanol product tanks in Area 12. The maximum methanol loadout rate is estimated to be 1,000 gallons/minute and 61,500,000 gallons/year. Fusel oil (a mixture of several

by-product alcohols) will be loaded to trucks for shipment off-site from Area 4 at a maximum rate of 100 gallons/minute and 225,000 gallons/year. Barge and Truck Loading emissions are both controlled by standard packed-bed water scrubbers (2C and 3C, respectively).

Additionally, located at the site is a 160 ton/day Air Separation Unit (ASU). This unit will supply pure oxygen to the ATR and will also produce 430 ton/day of pure nitrogen for various purging operations. There are no sources of air emissions in the ASU.

Startup steam, water, electric, and wastewater treatment activities will be purchased from other facilities. Firewater service will be supplied by Dow's existing water system; therefore, no fire pumps (with engines) are required. There are also no emergency generators proposed for the facility. The facility will have a separate gated entrance for plant operators but visitors and deliveries will come through Dow's existing security system.

SITE INSPECTION

On January 12, 2017, the writer conducted an inspection of the proposed location of the Liberty One Methanol Plant. The proposed site is located in the northwest portion of the Dow facility located in Institute, Kanawha County, WV. The writer was accompanied on the inspection by Mr. Richard Wolfli, Chief Operating Officer of USM, and Mr Jeff Beverly, also an employee of USM. Observations from the inspection include:

- The proposed facility will be located in "Area 4" (and, possibly in the future, Area 12) of the Dow's Institute facility. With the exception of several small buildings, no significant demolition activities will be required to prepare the Area 4 site. This location - which is being purchased from Dow by USM - is bounded on the north by State Route (SR) 25, and on all other sides by Dow owned property;

- At the time of the inspection, there was no significant activity on-going at the site and it appeared no significant activity had yet taken place preparing the site for construction; and

- The occupied residences located nearest to the proposed site are approximately 0.50 miles east of the proposed site across SR 25. A structure that looks like it used to be a single family home is located approximately 0.25 west of the proposed site of the facility across of SR 25. However, it appears to now be used as part of a business. WV State University lies just east of the Dow Institute facility and will be approximately 0.75 miles east of the proposed USM facility.

Directions: [Latitude: 38.38766, Longitude: -81.78.122] From the Institute exit (Exit 50) on I-64, merge right onto SR 25 West. Travel approximately 0.50 miles to the new (as yet not constructed) facility access road on the left.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

USM included in Attachment N of the permit application air emissions calculations for the proposed Liberty One Methanol Plant. The following will summarize the calculation methodologies used by USM to calculate the potential-to-emit (PTE) of the proposed facility.

*SMR/ATR Heater*s

Natural Gas Combustion

During start-up of the 103.00 mmBtu/hr SMR Heater (1E: estimated to be a maximum of 15 hours/year), and at all times the 3.31 mmBtu/hr ATR Heater is operating (2E: both start-up and steady-state), the units will combust natural gas. Combustion emissions from the heaters when combusting natural gas were based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4. Maximum hourly emissions were based on the maximum design heat input (MDHI) of the units and a natural gas heat content value of 1,020 Btu/ft^3 was used in the calculations. As the ATR Heater only combusts natural gas, the PTE of the unit was based on operation (while combusting natural gas) for 8,760 hours/year.

Syngas Combustion

After start-up is completed, the SMR will begin to combust hydrogen-rich syngas with natural gas until finally converting to combustion of all syngas. USM calculated the potential emissions (1E) from the combustion of all syngas in the 103.00 mmBtu/hr SMR heater (containing thirty-five (35) individual 2.94 mmBtu/hr burners) based on calculations provided from Lanemark Combustion Engineering Limited: the company that is replacing the burners on the unit after transfer from Brazil. According to information in the permit application, the SMR heater "employs optimized heat transfer designs, advanced low-NO_x burners, and employs controlled excess air forced inlet flow and draft flows to minimize NO_x emissions eliminating the need for fuel gas treatment."

Based on information from Lanemark, the emissions of NO_x and CO (the primary pollutants produced from combustion of the syngas) will not exceed 110 ppm_v and 20 ppm_v, respectively. Emissions of VOCs and particulate matter are expected to be small and are based on an emission factor of 0.312 lb/$mmft^3$-flue gas. As there are no sulfur compounds in the syngas (it is important to note that the feedstock natural gas will not contain mercaptan), there will be no emissions of SO_2 from the combustion of the syngas. All hourly emissions are based on the heater operating at maximum hourly capacity.

SMR Heater PTE

The hourly PTE of the SMR Heater was based on the worst-case hourly emissions by pollutant and the annual PTE was based on operation of the unit for 8,760 hours/year. In calculating the PTE in this manner, the emission limits represent the worst-case emissions of the unit regardless of the fuel being combusted.

Flaring

As noted above, flaring (5E) occurs during the following situations:

- During cold startup (before syngas of sufficient quality is produced), at first natural gas and then produced syngas is sent to the flare for destruction. This scenario occurs a maximum of fifteen (15) hours per year. To estimate emissions during this scenario, USM estimated that all the flared gas was natural gas and based the calculations on emission factors obtained from AP-42, Section 1.4 (particulate matter, SO_2, and Hazardous Air Pollutants (HAPs)) and AP-42, Section 13.5 (CO, NO_x, and VOCs). Hourly emissions were based on the expected maximum flow rate of the gas of 300,000 ft^3/hr and a natural gas heat content of 1,020 Btu/ft^3. Annual emissions were based on a maximum of fifteen (15) hours/year of startup flaring;

- During plant shutdown, as the various processes are purged with nitrogen, the syngas remaining in the system is sent to the flare for destruction. This scenario occurs a maximum of nine (9) hours per year. To estimate emissions during this scenario, USM based the calculations on emission factors again obtained from AP-42, Section 1.4 (particulate matter and SO_2) and AP-42, Section 13.5 (CO, NO_x). As the syngas does not contain any substantive amounts of VOCs, there was no estimate of emissions for pass-through VOCs or HAPs. Hourly emissions were based on the expected maximum flow rate of the gas of 300,000 ft^3/hr and a syngas heat content of 273 Btu/ft^3. Annual emissions were based on a maximum of nine (9) hours/year of startup flaring; and

- In addition to the above, four (4) plant pressure relief valves (PRV) that service syngas lines are connected to the flare. In the event of an over-pressure event, these PRVs will release syngas and it will be captured and sent to the flare for destruction. While these events should be rare, USM conservatively estimated a maximum of fifteen (15) hours per year of syngas flaring occurring during PRV events. To estimate emissions during this scenario, USM based the calculations on emission factors again obtained from AP-42, Section 1.4 (particulate matter and SO_2) and AP-42, Section 13.5 (CO, NO_x). As the syngas does not contain any substantive amounts of VOCs, there was no estimate of emissions for pass-through VOCs or HAPs. Hourly emissions were based on the expected maximum flow rate of the gas of each of the PRVs and an estimated syngas heat content that varies depending on the PRV source. Annual emissions were based on a maximum of fifteen (15) hours/year of startup flaring;

The emissions generated by the flare's 0.0255 mmBtu/hr natural-gas pilot light are considered negligible. Additionally, while PRVs in the natural gas and methanol systems are also hooked up to the flare, due to the low volume of gas potentially sent to the flare for destruction from these PRVs, combustion emissions from these sources are considered negligible. However, VOC pass-through emissions from these sources are included in the fugitive emission calculations for component leaks.

Storage Tanks

USM provided an estimate of the uncontrolled and controlled VOC emissions produced from each of the storage tanks using the TANKS 4.09d program as provided under AP-42, Section 7. The total emissions from each fixed roof storage tank are the combination of the calculated "breathing loss" and "working loss." The breathing loss refers to the loss of vapors as a result of tank vapor space breathing (resulting from temperature and pressure differences) that occurs continuously when the tank is storing liquid. The working loss refers to the loss of vapors as a result of tank filling or emptying operations. Breathing losses are independent of storage tank throughput while working losses are dependent on throughput. The total emissions losses from each floating roof are the combination of the calculated "rim seal," "withdrawal," "deck fitting," and "deck seam" losses.

Maximum hourly emissions (not calculated by TANKS) were based on a maximum of one (1) complete tank turnover per hour. Annual emissions were as calculated by the TANKS program and based on specific maximum throughputs of each tank. As vapors from all storage tanks are captured and sent to a scrubber (3E and 4E) for control, the controlled emissions from the storage tanks were based on a scrubber control percentage of 98%.

Truck/Barge Loadouts

Uncontrolled VOC emissions from barge loading of methanol and truck loading of fusel oil occur as emissions generated by displacement of vapors when loading barges/trucks. The emission factors used to generate the VOC emissions is based on Equation (1) of AP-42 Section 5.2-4. In this equation, USM used variables specific to the liquids loaded and to the method of loading. Additionally, worst-case annual emissions were based on a maximum loading rate of 61,500,00 gal/year of methanol and 225,000 gal/year of fusel oil. Maximum hourly emissions for barge and truck loading were based on a maximum loading rate of 100 and 1,000 gallons/minute, respectively. As vapors from all loading operations are captured and sent to a scrubber (3E and 4E) for control, the controlled emissions from the loading operations were based on a hood collection efficiency of 99% and a scrubber control percentage of 98%.

Fugitives

Equipment Leaks

USM based their uncontrolled VOC fugitive equipment leak calculations on emission factors taken from the document EPA-453/R-95-017 - "Protocol for Equipment Leak Emission Estimates" Table 2-5. No control efficiencies, as based on a Leak Detection and Repair (LDAR) protocol, were applied. However, the emission factors used assume an LDAR screening threshold of 10,000 ppm_v Component counts were given and shall be limited in the draft permit. VOC by-weight percentages were based on the lines being serviced by the components. Controlled emissions from PRVs that are captured and sent to the flare are based on a flare control percentage of 98%.

Vehicle Activity

USM included in their application an estimate of fugitive emissions created by truck traffic (fusel oil loading and other miscellaneous trucking) at the facility. As all the roadways around the

building shall be paved, USM used the equation given in Section 13.2.1 of AP-42 and appropriate variables to estimate potential emissions.

Emissions Summary

Based on the above estimation methodology as submitted in Attachment N of the permit application, the facility-wide PTE of the proposed Liberty One Methanol Plant is given in Attachment A.

REGULATORY APPLICABILITY

The proposed Liberty One Methanol Plant is subject to the following substantive state and federal air quality rules and regulations: 45CSR2, 45CSR6, 45CSR7, 45CSR10, 45CSR13, and 40 CFR 60 Subparts Kb, VVa, NNN, and RRR. Each applicable rule and USM's compliance therewith will be discussed in detail below.

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

Pursuant to the definition of "fuel burning unit" under 45CSR2 ("producing heat or power by indirect heat transfer"), 45CSR2 will apply to the proposed 103.00 mmBtu/hr SMR Heater and the 3.31 mmBtu/hr ATR Heater and they are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the ATR Heater 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. Each substantive 45CSR2 requirement is discussed below.

45CSR2 Opacity Standard - Section 3.1

Pursuant to 45CSR2, Section 3.1, both heaters are subject to an opacity limit of 10%. Proper maintenance and operation of the heaters (and the use of natural gas/syngas as fuel) should keep the opacity of the units well below 10% during normal operations.

45CSR2 Weight Emission Standard - Section 4.1(b)

The allowable particulate matter (non-condensable total particulate matter) emission rate for the SMR Heater, identified as a Type "b" fuel burning unit, per 45CSR2, Section 4.1.a, is the product of 0.09 and the total design heat input of the heater in million Btu per hour. The maximum aggregate design heat input (short-term) of the SMR Heater will be 103.00 mmBtu/hr. Using the above equation, the 45CSR2 particulate matter emission limit of the heater will be 10.17 lb/hr. The maximum potential hourly PM emissions (including condensables) from the heater is estimated to be 0.77 lb/hr. This emission rate is 7.57% of the 45CSR2 limit.

45CSR2 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 2 requires testing for initial compliance with the limits therein, monitoring for continued compliance, and keeping records of that compliance. The TMR&R requirements are clarified under 45CSR2A and discussed below.

45CSR2A Applicability - Section 3

Pursuant to §45-2A-3, as an individual applicable "fuel burning unit" under 45CSR2 with an MDHI less than 100 mmBtu/hr, the ATR Heater is not subject to the Testing and MRR Requirements under 45CSR2A. Additionally, pursuant to §45-2A-3.1(a), a "fuel burning unit(s) which combusts only natural gas shall be exempt from sections 5 and 6." Per the Director's discretion, as the SMR Heater only combusts natural gas and syngas (made from natural gas) with a very low potential for particulate matter emissions, the unit will be exempt from sections 5 and 6. The SMR Heater must, however, meet the applicable record-keeping and reporting requirements under Section 7.

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

USM has proposed flaring for control of various waste gas streams (see above). The flare meets the definition of an "incinerator" under 45CSR6 and is, therefore, subject to the requirements therein. The substantive requirements applicable to the enclosed flare 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:

Emissions (lb/hr) = F x 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

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

Based on the flare's maximum listed hourly flow rate in the emissions calculations of 31,222 scfm (1,873,298 ft^3/hour), and using the density of methane (0.0422 lb/scf), the maximum capacity of the flare in lbs/hr would be, at a minimum, approximately 79,053 lbs/hour (39.53 tons/hr). Using this value in the above equation produces a PM emission limit of 107.51 lb/hr. When operating correctly, there is expected to be only trace amounts of particulate matter from the flare and, therefore, the flare shall easily meet this limit. However, to be conservative, and using natural gas emission factors, USM estimated that up to a worst-case of 16.16 lbs/hour of particulate matter emissions could be emitted during flaring. This is far below the 45CSR6 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 will have a 20% limit on opacity during operation. Proper design and operation of the flare should prevent any substantive opacity from the unit.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

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. Both the SMR Heater and ATR Heater are defined as a "fuel burning unit" ("producing heat or power by indirect heat transfer") under 45CSR10 and are, therefore, potentially subject to the applicable requirements therein. However, pursuant to the exemption given under §45-10-10.1, as the MDHI of the ATR Heater is less than 10 mmBtu/hr, the unit is not subject to the limitations on fuel burning units under 45CSR10.

45CSR10 Fuel Burning Units - Section 3

The allowable SO_2 emission rate for the SMR Heater (located in Region III), identified as a Type "b" fuel burning unit, per 45CSR10, Section 3.3(f), is the product of 3.2 and the total design heat input of the heater in million Btu per hour. The maximum aggregate design heat input (short-term) of the heater will be 103.00 mmBtu/hr. Using the above equation, the 45CSR10 SO_2 emission limit of the heater will be 361.60 lb/hr. The maximum potential hourly SO_2 emissions from the heater is estimated to be 0.06 lb/hr (during startup operations when combusting natural gas). This emission rate is only a trace of the 45CSR10 limit.

45CSR10 Process Gas Stream Combustion - Section 5

Section 5.1 of 45CSR10 prohibits the combustion of any "refinery process gas stream" that contains H_2S in excess of 50 grains for every 100 cubic feet of tail gas consumed. The syngas stream that is combusted in the SMR Heater could be defined as a refinery process gas stream. However, according to information in the permit application, after the de-sulfurization process applied to the feedstock natural gas (which does not contain mercaptan), there is no measurable amount of H_2S in the syngas stream.

45CSR10 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 10 requires to test for initial compliance with the limits therein, monitor for continued compliance, and keep records of that compliance. The TMR&R requirements are clarified under 45CSR10A and discussed below.

45CSR10A Applicability - Section 3

Pursuant to §45-10-3, as an individual applicable "fuel burning unit" under 45CSR10 with an MDHI less than 100 mmBtu/hr, the ATR Heater is not subject to the Testing and MRR Requirements under 45CSR10A. Pursuant to §45-10A-3.1(b), for heaters that combust "natural gas,

wood or distillate oil, alone or in combination," the units are not subject to the Testing and MRR Requirements under 45CSR10A. Similar to the discussion above under the 45CSR2, per the Director's discretion, as the SMR Heater only combust natural gas and syngas cleaned of any substantive amount of sulfur compounds, no SO_2-specific testing, monitoring or record-keeping of the cracking furnaces will be required.

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 construction of the Liberty One Methanol Plant has the potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY (see Attachment A) and, therefore, pursuant to §45-13-2.24, the proposed 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, USM is required to obtain a permit under 45CSR13 for the construction and operation of the proposed facility.

As required under §45-13-8.3 ("Notice Level A"), USM placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on November 29, 2016 in the *Charleston Gazette-Mail* and the affidavit of publication for this legal advertisement was submitted on December 5, 2016.

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

The proposed Liberty One Methanol Plant is a source listed under §45-14-2.43.a (Chemical Process Plants) and, therefore pursuant to 2.43.b., is defined as a "major stationary source" if any regulated pollutant has a potential-to-emit in excess of 100 TPY. The facility does not have a potential-to-emit of any regulated pollutant in excess of 100 TPY and is, therefore, not defined as a major stationary source and 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 proposed Liberty One Methanol Plant 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. The proposed facility-wide PTE (see Attachment A) of any regulated pollutant does not exceed 100 TPY. Additionally, the facility-wide PTE does not exceed 10 TPY of any individual HAP or 25 TPY of aggregate HAPs.

However, as the facility is subject to various New Source Performance Standards (NSPS) - 40 CFR 60, Subpart Dc that do not contain a Title V permitting exemption, the proposed facility is

subject to Title V as a non-major source. Non-major sources subject to Title V, pursuant to DAQ policy, are deferred from having to submit a Title V application but still pay annual fees pursuant to submission of a Certified Emissions Sheet (CES).

40 CFR 60, Subpart Db: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units - (NON APPLICABILITY)

40 CFR 60 Subpart Dc is the New Source Performance Standard (NSPS) for industrial-commercial-institutional steam generating units for which construction, modification, or reconstruction is commenced after June 19, 1984 and that have a maximum design heat input capacity greater than 100 mmBtu/hr. The definition of "steam generating unit," however, specifically exempts "process heaters." The definition of process heaters means "a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst." The SMR Heater meets this definition of a process heater and is, therefore, not subject to Subpart Db.

40 CFR 60, 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.

USM is proposing eight (8) storage tanks for the facility. The tanks will be located in two distinct areas of the plant: "Area 4," which is storage located at the main plant area and "Area 12," which is the barge loading storage area. Area 4 has the following tanks: two (2) 75,000 gallon run-down tanks which are where the methanol first enters after leaving the MDU, one (1) 12,000 gallons fusel oil tank, two (2) 1,200,000 gallons methanol sales storage tanks, and a 150,000 gallons slop tank for off-grade methanol. Area 12 will have two (2) 1,200,000 gallons methanol loading tanks in the barge loading area. The tanks in Area 12 will not be installed during the initial facility construction and will be constructed at a later date. Methanol and the other derivative liquids are defined as VOLs and have vapor pressures in excess of 3.5 kPa (and less than 76.6 kPa) and, with the exception of the fusel oil tank, all storage tanks are larger than 39,890 gallons. Therefore, all storage tanks, with the exception of the fusel oil tank, are subject to the VOC standards as given under §60.112b.

Pursuant to §60.112b(a), Subpart Kb requires storage tanks with capacities in excess of 39,890 gallons and which store a VOL with a vapor pressure between 5.2 kPa and 76.6 kPa to comply with one of three control options:

(1) A fixed roof in combination with an internal floating roof;

(2) An external floating roof; or

(3) A closed vent system and control device designed and operated to reduce inlet VOC emissions by 95 percent or greater.

USM has proposed to meet these requirements by installing internal floating roofs for the Sales and Product methanol tanks and venting vapors from all storage tanks to scrubbers designed to remove a minium of 98% of VOC emissions from the inlet VOC stream.

40 CFR 60, Subpart VVa: Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

Subpart VVa applies to "affected facilities in the synthetic organic chemicals manufacturing industry." "Synthetic organic chemicals manufacturing industry" is defined in VVa as an "industry that produces, as intermediates or final products, one or more of the chemicals listed in §60.489." §60.489 lists methanol as an applicable product.

Subpart VVa contains Leak Detection and Repair (LDAR) requirements for all affected facilities at the proposed facility; these affected facilities are defined under Subpart VVa as "the components assembled and connected by pipes or ducts to process raw materials and . . . includes any feed, intermediate and final product storage vessels (except as specified in §60.482–1a(g)), product transfer racks, and connected ducts and piping." USM will be required to meet the various applicable standards under VVa.

40 CFR, 60, Subpart NNN: Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations

Pursuant to §60.660, 40 CFR 60, Subpart NNN applies to “each affected facility designated in paragraph (b) of this section that is part of a process unit that produces any of the chemicals listed in §60.667 as a product, co-product, by-product, or intermediate, except as provided in paragraph (c).” The chemicals listed in §60.667 include methanol and, therefore, Subpart NNN applies to the proposed USM facility (which includes a distillation unit). The substantive requirements of Subpart NNN are given under §60.662 and apply to “each vent stream on and after the date on which the initial performance test required by §60.8 and §60.664 is completed.” Vent stream is defined as “any gas stream discharged directly from a distillation facility to the atmosphere or indirectly to the atmosphere after diversion through other process equipment. The vent stream excludes relief valve discharges and equipment leaks including, but not limited to, pumps, compressors, and valves. The requirements under §60.662 are to:

(a) Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to a TOC (less methane and ethane) concentration of 20 ppmv, on a dry basis corrected

to 3 percent oxygen, whichever is less stringent. If a boiler or process heater is used to comply with this paragraph, then the vent stream shall be introduced into the flame zone of the boiler or process heater;

(b) Combust the emissions in a flare that meets the requirements of §60.18; or

(c) Maintain a TRE index value greater than 1.0 without use of VOC emission control devices.

The vented syngas streams are considered a "vent stream" under Subpart NNN and subject to one of the requirements under §60.662(a) through (c). USM has proposed compliance with the above requirements by combusting excess syngas in the SMR heater (during steady-state operations) and flare (during start-up/shutdown operations). All other vent streams are recycled back into the reformer feed lines for processing.

40 CFR 60, Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes

Pursuant to §60.700, 40 CFR 60, Subpart RRR applies to "each affected facility designated in paragraph (b) of this section that is part of a process unit that produces any of the chemicals listed in §60.707 as a product, co-product, by-product, or intermediate, except as provided in paragraph (c)." The chemicals listed in §60.667 include methanol and, therefore, Subpart RRR applies to the proposed USM facility. The substantive requirements of Subpart RRR are given under §60.702 and apply to "each vent stream on and after the date on which the initial performance test required by §60.8 and §60.704 is completed." Vent stream is defined as "any gas stream discharged directly from a distillation facility to the atmosphere or indirectly to the atmosphere after diversion through other process equipment. The vent stream excludes relief valve discharges and equipment leaks including, but not limited to, pumps, compressors, and valves. The requirements under §60.702 are to:

(a) Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to a TOC (less methane and ethane) concentration of 20 ppmv, on a dry basis corrected to 3 percent oxygen, whichever is less stringent. If a boiler or process heater is used to comply with this paragraph, then the vent stream shall be introduced into the flame zone of the boiler or process heater;

(b) Combust the emissions in a flare that meets the requirements of §60.18; or

(c) Maintain a TRE index value greater than 1.0 without use of VOC emission control devices.

The vented syngas streams are considered a "vent stream" under Subpart RRR and subject to one of the requirements under §60.662(a) through (c). USM has proposed compliance with the above requirements by combusting excess syngas in the SMR heater (during steady-state operations) and flare (during start-up/shutdown operations). All other vent streams are recycled back into the reformer feed lines for processing.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed Liberty One Methanol Plant 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 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) 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. According to information in the permit application, the only HAP that will be emitted in any substantive amount at the proposed USM facility is methanol. The following table lists the carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 1: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Methanol	VOC	No	Not Assessed

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* and summarized in the IRIS document in the application file.

AIR QUALITY IMPACT ANALYSIS

The estimated maximum emissions of the proposed facility are less than applicability thresholds that would define the proposed facility as "major" under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature and location of the proposed source, an air quality impacts modeling analysis was not required under §45-13-7.

MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS

Refer to Section 4.2 of the draft permit for the unit-specific monitoring, compliance demonstration, reporting, and record-keeping requirements (MRR).

PERFORMANCE TESTING OF OPERATIONS

Refer to Section 4.3 of the draft permit for the unit-specific performance testing requirements.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of a Permit Number R13-3351 to US Methanol LLC for the proposed construction and operation of the Liberty One Methanol Plant located in Institute, Kanawha County, WV.

Joe Kessler, PE
Engineer

Date