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Memo

To	Janine Tulloch-Reid, David Smith – PADEP
From	Energy Transfer Marketing & Terminals, ERM
Date	03 April 2023
Reference	Plan Approval 23-0119K Application
Subject	Request for Additional Information on the Application for PSD Plan Approval No. 23-0119K for Energy Transfer Marketing & Terminals, L.P.—Marcus Hook Terminal

In response to the request for additional information on the application for PSD Plan Approval No. 23-0119K for Energy Transfer Marketing & Terminals, L.P. (ETMT) - Marcus Hook Terminal (MHT) provided to ETMT and ERM on 3/10/2023, the following responses and attached analyses are being provided to the Department. Updated analyses of the project emissions are provided at the Department's request for informational purposes only and are not intended to replace the corresponding analyses in the original application.

- An updated Best Available Technology analysis for the existing and proposed cold flares at the MHT (Source IDs C01, C02, and C04).

BAT Determination

In accordance with 25 PA Code §127.12, an applicant for Plan Approval must demonstrate that the emissions from a new source will be the minimum attainable through use of the Best Available Technology (BAT). BAT is defined as equipment, devices, methods or techniques as determined by the Department that will prevent, reduce or control emissions of air contaminants to the maximum degree possible and that are available, or can be made available, to the facility.

ETMT conducted a BAT analysis for the Ethane Chilling Expansion Project. This analysis considers BAT determinations for the C01, C02, and C04 Cold Flares. In this analysis, ETMT reviewed information from various databases to determine recent requirements and emission limits for the new sources associated with this Project, including:

- USEPA's New Source Review website;
- USEPA's RACT/BACT/LAER Clearinghouse (RBLC) database;
- Various state air quality regulations and websites;
- Control technology vendors' information;
- Technical books and articles; and
- State and federal guidance documents.

Note that BAT is a pollutant-specific determination. Based on a review of established emission limits in permits, the following sections document the results of the source and pollutant specific BAT determinations.

C01, C02, and C04 Cold Flare Systems

As the Ethane Chilling Expansion Project will involve the addition of several flows to the existing air-assisted C01 Cold Flare high-pressure (HP) and low-pressure (LP) flare tips and the C04 Cold Flare low-pressure (LP) flare tip, a BAT analysis for the existing and proposed cold flares at the MHT facility was conducted, utilizing information determined from a LAER analysis previously conducted by ETMT for Cold Flare Systems at the Marcus Hook facility in the applications for Plan Approvals 23-0119E and 23-0119J.

The prior plan approval analysis determined LAER and BAT for elevated flares with gas flows consisting of hydrocarbons with three carbons or more as 98% Destruction and Removal Efficiency (DRE) together with compliance with the design and operating requirements of 40 CFR §60.18. LAER and BAT for elevated flares with gas flows consisting of hydrocarbons with three carbons or less was determined to be a DRE of 99%.

Consistent with the Departments evaluation presented in the plan approval review memorandums for Plan Approvals 23-0119E and 23-0119J, ETMT proposes a DRE of 99% be applied for the flows to the C01 Cold Flare LP tip and C04 Cold Flare since the portion of VOCs containing more than three carbon atoms is less than or equal to 1%. For flows to the C01 HP tip and C02 cold flare, which primarily consist of compounds with three carbons or more, ETMT proposes a DRE of 98%, consistent with 40 CFR §60.18 guidance. ETMT proposes that the design and operating requirements of 40 CFR §60.18 satisfy BAT requirements for VOC for all of the elevated flares proposed to control process vent emissions resulting from the Ethane Chilling project.

Open flares cannot be source tested due to the open flame and absence of a stack. Consequently, the default emission factorsfrom USEPA's AP-42 Compilation of Air Pollutant Emission Factors is used to calculate NOx, CO, and SO_2 emissions from the flare. This is the lowest NOx limit achieved in practice for open flares.

ETMT will comply with 40 CFR §60.18 to satisfy BAT requirements for NO_x, CO, and SO_2.

- A detailed description of the non-refrigerated marine vessel loading process (Source ID 115), with an emphasis on how emissions are controlled/fugitive emissions are minimized.

Marine Vessel Loading Source Description

The non-refrigerated Marine Vessel Loading process is an existing marine vessel loading dock previously permitted under the former Marcus Hook Refinery and listed in the Title V Operating Permit as Source ID 115. The loading and unloading of natural gas liquids products and the control of emissions from the source was detailed in Plan Approval 23-00119B. The Plan Approval 23-00119B review memo indicates that the off-loading petroleum products may occur at docks specified under the Marine Vessel Loading source. Petroleum products may be off-loaded from Dock 3A, and light naphtha fraction are off-loaded using the existing Marine Vessel Loading at Dock 3B.

As a part of the disconnection process, residual liquids are drained from the lines using a vacuum truck. All of the vapors are routed to the vapor recovery unit (VRU) during this process. According to the procedure, liquid arm is pumped free of liquid, then the liquid and vapor line are disconnected and immediately blanked. All VOC vapors that result from the loading of petroleum products with a Reid Vapor Pressure greater than 4.0 psia on Dock 3A, shall be processed through the VRU located on Dock 3B, which has a destruction efficiency of 99%. The collected vapors from the VRU are required to be routed to the auxiliary boilers.

During loading, the marine vapor recovery (MVR) unit is used to recover hydrocarbons. Following loading, the MVR is swept with natural gas, and the combination of recovered hydrocarbons and natural gas is routed to the boilers, to ensure that no product remains in the system. Air emissions from the marine vessel loading rack will be controlled by an existing permitted vapor recovery system located at Dock 3B.

The facility's Leak Detection and Repair (LDAR) program is utilized to find and correct fugitive equipment leaks on piping associated with the marine vessel loading source. Annually during loading/unloading, fugitive emissions components are monitored using EPA Method 21.

- Updated LDAR screening values (i.e., based on the most recent eight quarters of available MHT data). The screening values in the present application are the same as those included in the application for Plan Approval No. 23-0119J, and are based on 2nd quarter 2017–1st quarter 2019 data.

All fugitive emissions were estimated using methodologies presented in United States Environmental Protection Agency's (USEPA) Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017. For those components in VOC service, screening methodology was used, which utilizes an average leak concentration for each component type, a Screening Value Emission Factor (Tables 2-10, 2-12, and 2-14 of the USEPA Protocol), and component count to determine VOC and CO_2e emissions. At PADEP's request, the approximately two-years of leak concentration data from the facility's LDAR program data used to determine the average leak concentrations per component type were updated to reflect program performance for calendar years 2021 & 2022. As this method uses data pertaining to facility-specific leak rates, the methodology is more refined and accurate as stated in Section 2.2.1 of the referenced USEPA's Protocol (EPA 453/R-95-017).

A detailed review of the updated fugitives analysis is attached as **Attachment A** to this submittal for informational purposes only. As shown in **Attachment A** and below, the estimated potential fugitive emissions from equipment which will be subject to the facility's LDAR monitoring program are less than the corresponding estimate provided with the original Plan Approval 23-0119K application.

Pollutant	Analysis	Fluid 2 Propane (TPY)	Fluid 4 MR Vapor (TPY)	Fluid 5 MR Liquid (TPY)	Total (TPY)
Total VOC Emissions (TPY)	Updated	1.88	0.17	0.14	2.18
	Original	2.68	0.21	0.28	3.17
	Difference	*-0.80*	*-0.04*	*-0.14*	*-0.98*
Total CO2e Emissions (TPY)	Updated	0.00	2.07	0.04	2.11
	Original	0.00	2.61	0.08	2.69
	Difference	*0.00*	*-0.54*	*-0.04*	*-0.58*

- Updated emission factors for the auxiliary boilers (i.e., based on boiler performance data from 2014 through the most recent calendar year available, with a 20% margin). The emission factors in the present application are the same as those updated as part of DEP's review of the applications for Plan Approval Nos. 23-0119E [revised] and 23-0119J, and are based on 2014–2019 boiler performance data (with a 20% margin).

At PADEP's request, ETMT has reevaluated the emission factors presented in the original plan approval 23-0119K to account for boiler performance in the years since 2019. This updated analysis is presented as **Attachment B** to this submittal for informational purposes only.

As shown in **Attachment B**, for most pollutants, updated boiler emission factors are less than the corresponding factors submitted with the prior 23-0119K, 23-0119J, and 23-0119E applications.

ATTACHMENT A UPDATED FUGITIVES EMISSIONS ANALYSIS

April 2023

Energy Transfer Marketing & Terminals
Ethane Chilling Expansion Project
April 2023
Fugitive Component Emissions, Screening Methodology

New Fugitive Equipment Component Counts (total for each)				
Component Category	**Component**	**Component Counts (Units/Streams in VOC service and in LDAR Program)**		
		Fluid 2 Propane	**Fluid 4 MR Vapor**	**Fluid 5 MR Liquid**
Valves	Gas Valves	541	140	0
	Light Liquid Valves	267	0	66
	Pump Seal Valves	0	0	8
Reliefs	Pressure Relief Valves	10	4	0
Connectors	Connectors	2,073	452	224
	Analyzer Connectors	0	26	0
	Pump Seal Connectors	0	0	16
Compressor Seals	Compressor Seals	6	1	0
Pump Seals	Pump Seals	1	0	2
Open-ended Lines	Open-ended Lines	0	1	0

LDAR Screening Values[1]					
	Default 0	0-500	500-1,000	1,001-10,000	>10,000
Leak Concentration		8	777	2406	33495
Leak Rate - Gas Valves	6.78%	92.66%	0.23%	0.32%	0.01%
Leak Rate - Light Liquid Valves	10.11%	89.77%	0.03%	0.08%	0.01%
Leak Rate - Pump Seals	80.96%	18.26%	0.10%	0.57%	0.11%
Leak Rate - Connectors	0.64%	98.47%	0.36%	0.49%	0.05%
Leak Rate - Others	15.68%	65.59%	4.14%	13.14%	1.46%

1 - Based on MHIC data for the two year period from second quarter 2017 through first quarter 2019.

Screening Value Emission Factors[1]					
Component Type	**Leak Rate (kg/hr)**				
Gas Valve	6.60E-07	1.158E-05	6.243E-04	1.674E-03	2.400E-02
Light Liquid Valve	4.90E-07	6.032E-06	5.119E-08	6.514E-08	3.600E-02
Pump Seals	7.50E-06	1.062E-04	4.578E-03	1.161E-02	1.400E-01
Connectors	6.10E-07	2.222E-05	1.266E-03	3.439E-03	4.400E-02
Others[2]	7.50E-06	1.06E-04	4.58E-03	1.16E-02	1.40E-01
	Table 2-11[1]	Table 2-9[1]	Table 2-9[1]	Table 2-9[1]	Table 2-13[1]

1 - Source: "Protocol for Equipment Leak Emission Estimates", EPA-453/R-95-017

2 - The correlation for light liquid pumps can be applied to compressors, pressure relief valves, agitators, and heavy liquid pumps.

Energy Transfer Marketing & Terminals
Ethane Chilling Expansion Project
April 2023
Fugitive Component Emissions, Screening Methodology

Total Emissions Due to Fugitive Equipment (lbs)								
Component	Leak Rate (lb/yr)					Total (lbs/day)	Total (lbs/year)	Total (tons/year)
	Default 0	0-500	500-1,000	1,001-10,000	>10,000			
Gas Valves	1	141	19	70	43	**0.75**	**273.71**	**0.14**
Light Liquid Valve	0	36	0	0	22	**0.16**	**58.14**	**0.03**
Pump Seals	0	1	0	4	9	**0.04**	**14.50**	**0.01**
Connectors	0	1180	245	906	1182	**9.62**	**3513.00**	**1.76**
Others	0	28	77	619	829	**4.26**	**1553.16**	**0.78**
Total (all components)	**2**	**1386.09**	**341.07**	**1597.80**	**2085.59**	**14.83**	**5412.51**	**2.71**

Percent (%) of Total Components per Unit			
	Fluid 2 Propane	Fluid 4 MR Vapor	Fluid 5 MR Liquid
Gas Valves	79.4%	20.6%	0.0%
Light Liquid Valve	78.3%	0.0%	21.7%
Pump Seals	33.3%	0.0%	66.7%
Connectors	74.2%	17.2%	8.6%
Others	76.2%	23.8%	0.0%
Total (all components)	75.5%	16.3%	8.2%

Gas Speciation for New Fugitive Equipment			
Speciation	Fluid 2 Propane	Fluid 4 MR Vapor	Fluid 5 MR Liquid
Methane	0%	17%	1%
Ethane	2%	49%	15%
Propane	97%	18%	15%
i-Butane	1%	0%	0%
i-Pentane	0%	16%	69%
Total VOC	**98%**	**34%**	**84%**
Total GHG	**0%**	**17%**	**1%**

Emissions Summary by Component Type				
Components	Total (tons/year)	Fluid 2 Propane (TPY)	Fluid 4 MR Vapor (TPY)	Fluid 5 MR Liquid (TPY)
Gas Valves	0.14	0.11	0.03	0.00
Light Liquid Valve	0.03	0.02	0.00	0.01
Pump Seals	0.01	0.00	0.00	0.00
Connectors	1.76	1.30	0.30	0.15
Others	0.78	0.59	0.18	0.00
Total (all components)	**2.71**	**1.92**	**0.49**	**0.16**

Total VOC Percentage By Unit Stream (%)	98%	34%	84%
Total VOC Emissions By Unit Stream (TPY)	1.88	0.17	0.14

Total CO_2e Percentage By Unit Stream (%)	0%	17%	1%
Total CO_2e Emissions By Unit Stream (TPY)	0.00	2.07	0.04

Total VOC Emissions (TPY)	**1.88**	**0.17**	**0.14**
Total CO_2e Emissions (TPY)	**0.00**	**2.07**	**0.04**

ATTACHMENT B UPDATED BOILERS EMISSIONS ANALYSIS

April 2023

Energy Transfer Marketing & Terminals
Ethane Chilling Expansion
April 2023
Auxiliary Boiler Analysis - Projected Emissions

Boiler Load Analysis (PADEP Totals)

Auxiliary Boiler Steam Demand	Annualized Demand
	lbs steam/hr
Prior Aggregated Project Boiler Demand	233,535
Non-Aggregated MHIC Boiler Steam Demand (Baseload)	181,765
Total MHIC Boiler Steam Demand	**415,300**

Projected Future Steam Demands

Case	Boiler Demand (LB/HR)
Ethane Chilling Expansion	23,673

Auxiliary Boiler Emission Factors

Pollutant	2014 - 2019 Emission Factor (lb / lb steam)[1]	2018 - 2022 Emission Factor (lb / lb steam)[2]	Basis
CO	7.55E-06	4.15E-06	CEMS
NOx	3.74E-05	3.64E-05	CEMS
VOC	2.73E-06	6.90E-07	Stack Test
SO_x	4.15E-06	4.38E-06	40 CFR 75, Appendix D[2]
$PM/PM_{10}/PM_{2.5}$	1.37E-06	1.59E-06	Stack Test
H_2SO_4	5.61E-08	6.54E-08	Stack Test
CO_2e	1.89E-01	1.56E-01	40 CFR 98
Lead	6.69E-09	1.13E-08	WebFIRE
HAP	2.53E-06	3.60E-06	WebFIRE

1 - Based on the 2014-2019 boiler performance.

2 - Based on the 2018-2022 boiler performance.

3 - SOx emission factors for all units are derived from the 40 CFR 75 Appendix D pipeline natural gas default (0.0006 lb/mmbtu) and 40 CFR 75 Appendix D, Eqn. D-1h for process gas combustion

Future Expected Auxiliary Boiler Annual Emissions
Aggregated Project Incremental Emissions

Pollutant	Baseload + Prior Projects 2014 - 2019 EF (tpy)	Baseload + Prior Projects 2018 - 2022 EF (tpy)	Ethane Chilling Incremental Emissions 2014 - 2019 EF (tpy)	Ethane Chilling Incremental Emissions 2018 - 2022 EF (tpy)	Future Expected Emissions 2014 - 2019 EF (tpy)	Future Expected Emissions 2018 - 2022 EF (tpy)	Emissions Limit (tpy)
CO	6.01	3.30	0.78	0.43	14.52	7.98	27.23
NOx	29.79	29.01	3.88	3.78	71.95	70.06	92.71
VOC	2.17	0.55	0.28	0.07	5.25	1.33	5.49
SO_x	3.30	3.49	0.43	0.45	7.97	8.42	41.40
$PM/PM_{10}/PM_{2.5}$	1.09	1.26	0.14	0.16	2.63	3.05	21.94
H_2SO_4	0.04	0.05	0.01	0.01	0.11	0.13	3.15
CO_2e	150,464.24	124,116.84	19,596.39	16,164.92	363,379.65	299,749.20	NA
Lead	0.01	0.01	0.00	0.00	0.01	0.02	NA
HAP	2.01	2.86	0.26	0.37	4.85	6.92	NA

Note that the future expected emissions above represent projected utilization of the boilers for the permitted MHIC and Ethane Chilling Expansion Project. These totals do not represent the Potential to Emit (PTE) of the auxiliary boilers.