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Subject: Technical Review Memo
Prevention of Significant Deterioration of Air Quality Plan Approval No. 23-0119K
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Energy Transfer Marketing & Terminals, L.P.—Marcus Hook Terminal
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I. Introduction/Purpose of Authorization

Energy Transfer Marketing & Terminals, L.P. (ETMT), owns and operates the Marcus Hook Terminal (MHT), its natural gas liquids (NGLs) processing, storage, and distribution facility located in Marcus Hook Borough, Delaware County. ETMT operates the MHT under Title V Operating Permit (TVOP) No. 23-00119 and Plan Approval Nos. 23-0119E (revised) and 23-0119J. The MHT is an existing major facility for Prevention of Significant Deterioration of Air Quality (PSD) and New Source Review (NSR) purposes (see the *PSD Analysis* and *NSR Analysis* sections, below, for further discussion). The purpose of this authorization is to install and temporarily operate equipment to expand the ethane chilling capacity at the MHT from approximately 75,000 *bbl/day* to approximately 85,000 *bbl/day* (see the *Ethane Chilling Expansion Project Description* section, below, for further discussion).

In accordance with the Pennsylvania Department of Environmental Protection's (DEP's) Environmental Justice (EJ) Public Participation Policy (Document No. 012-0501-002), effective April 24, 2004, and based on 2015 data from the United States Census Bureau, the MHT is located within an EJ Community.

II. Relevant Facility Permitting History

[Note: See the *Single Aggregated Project Description* section of DEP's technical review memo for Plan Approval No. 23-0119E (revised), dated February 5, 2021, for a comprehensive listing of all authorizations related to the NGLs processing, storage, and distribution operations at the MHT that DEP issued or approved from 2013–2020, including Sub-section H pertaining to (the original) Plan Approval No. 23-0119E.]

On April 29, 2016, Clean Air Council (CAC) appealed (the original) Plan Approval No. 23-0119E to the Environmental Hearing Board (EHB; under Docket No. 2016-073-L), arguing, among other things, that DEP erred in considering the sources and equipment permitted under (the original) Plan Approval No. 23-0119E as a stand-alone project (i.e., versus as a larger project with the other sources and equipment related to the NGLs processing, storage, and distribution operations at the MHT that DEP permitted or authorized up to that point).

On January 9, 2019, Judge Bernard A. Labuskes, Jr., of the EHB, remanded Plan Approval No. 23-0119E to DEP for the reevaluation of all past and future authorizations for sources and equipment related to the NGLs processing, storage, and distribution operations at the MHT as a single aggregated project to determine the applicability of PSD and NSR requirements.

On February 12, 2021, DEP concurrently issued Plan Approval No. 23 0119J to Sunoco Partners Marketing & Terminals, L.P. (SPMT) for Project Phoenix (see the Project Phoenix Description section of DEP's technical review memo for Plan Approval No. 23-0119J, dated February 5, 2021, for further discussion) and Plan Approval No. 23-0119E (revised) to SPMT for the single aggregated project.

On May 13, 2021, DEP approved Request for Determination of Changes of Minor Significance and Exemption from Plan Approval/Operating Permit (RFD) No. 9156 for the installation of new flare connections and associated fugitive components for four propane and three butane loading and unloading stations (i.e., fourteen total stations) at the existing H5 truck rack. (Each loading and unloading station includes an operational connection to the West Warm Flare (Source ID C03) installed under Plan Approval No. 23-0119H and permitted under the TVOP instead of venting uncontrolled VOCs from disconnections to the outdoor atmosphere.)

On May 19, 2021, SPMT notified DEP of a de minimis emissions increase relating to the replacement of two 50 P 206C ethane recycle pumps with a new design that has its casings vented (of ethane vapor during operational (i.e., startup) and maintenance activities) to the West Cold Flare (Source ID C01) permitted under the TVOP and Plan Approval No. 23-0119E (revised).

On September 3, 2021, DEP approved RFD No. 9332 for the installation of a new butane truck loading station and associated fugitive components for the H5 truck rack. (As with the equipment authorized under RFD No. 9156, the new equipment includes an operational connection to the West Warm Flare.)

On January 4, 2022, SPMT notified DEP of a de minimis emissions increase1 relating to the installation of new YZ light liquid sampler systems and associated fugitive components for the product rerun lines of the depropanizer and debutanizer (Source IDs 091 and 092, respectively) installed under (the original) Plan Approval No. 23-0119E and permitted under the TVOP and Plan Approval No. 23-0119E (revised). (Each sampling system includes an operational connection to the West Warm Flare.)

III. PSD Plan Approval Application Package Submittal and Updates

On February 14, 2022, DEP received an electronic PSD Plan Approval application package from Environmental Resources Management (ERM), on behalf of SPMT, for the installation and temporary operation of equipment to expand the ethane chilling capacity at the MHT. The PSD Plan Approval application package included the Plan Approval application, general information form (GIF), compliance review form [25 Pa. Code § 127.12(a)(11)], and copies of the notifications to the municipality and county [71 P.S. § 510-5 (Act 14 of 1984); 25 Pa. Code §§ 127.12(a)(8) and 127.43a]. All applicable sections of the PSD Plan Approval application were completed. However, DEP was not able to access the air dispersion modeling files SPMT included with the PSD Plan Approval application, which are reviewed by DEP's Air Quality Modeling Section.

On February 15, 2022, ERM, on behalf of SPMT, resubmitted the air dispersion modeling files in a format that DEP was able to access.

On February 16, 2022, DEP received monies of $42,500 for the PSD Plan Approval application fees [25 Pa. Code § 127.702(a)], as follows:

- A fee of $2,500 for the base Plan Approval application [25 Pa. Code § 127.702(b)(2)].
- A fee of $2,500 for each applicable New Source Performance Standard (NSPS) [40 CFR Part 60], National Emission Standard for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], or Maximum Achievable Control Technology (MACT) [40 CFR Part 63] standard, up to a maximum of three standards [25 Pa. Code § 127.702(d)(2)]. The various sources and equipment related to the NGLs processing, storage, and distribution operations at the MHT are subject to NSPS Subparts Db, Kb, VV, and VVa; and MACT Subparts Y and DDDDD. Therefore, the fee is capped at $7,500.
- A fee of $32,500 for a source(s) subject to PSD requirements [25 Pa. Code § 127.702(f)(2)].

On March 1, 2022, DEP received proofs of receipt for the notifications to the municipality and county made in accordance with 71 P.S. § 510-5 (Act 14 of 1984) and 25 Pa. Code § 127.43a.

On March 4, 2022, DEP's Air Quality Modeling Section considered the Air Quality Modeling Report included with the PSD Plan Approval application to be administratively complete.

On March 9, 2022, DEP received Change of Ownership and Compliance Review forms indicating that, effective March 1, 2022, SPMT changed its company name to ETMT. [Note: Hereinafter, DEP refers to the company as ETMT, even when discussing authorizations or events that occurred prior to March 1, 2022.]

Also on March 9, 2022, DEP received additional information from ERM, on behalf of ETMT, pertaining to the design and plant layout of the ethane chiller train and boil-off gas (BOG) system proposed to be installed as part of the expansion.

Therefore, DEP considers the entire PSD Plan Approval application administratively complete as of the latest date [25 Pa. Code § 127.12d(b)]. Coordination with other programs is not required.

On June 8, 2022, DEP hosted an informational meeting in Marcus Hook Borough, in which DEP gave a presentation on the permit review process for the PSD Plan Approval application and answered related questions from the public. In addition, representatives from ETMT gave a presentation on the Ethane Chilling Expansion Project and answered related questions from the public.

On August 12, 2022, DEP's Air Quality Modeling Section submitted to ETMT its comments on the Air Quality Modeling Report included with the PSD Plan Approval application.

On February 27, 2023, ERM, on behalf of ETMT, submitted a response to the comments from DEP's Air Quality Modeling Section, along with a revised Air Quality Modeling Report and air dispersion modeling.

On March 10, 2023, DEP requested additional information from ETMT in order to complete the technical review of the PSD Plan Approval application.

On March 31, 2023, ERM, on behalf of ETMT, submitted an addendum to the PSD Plan Approval application.

On April 3, 2023, ERM, on behalf of ETMT, submitted additional information requested by DEP for the PSD Plan Approval application.

Due to the long lead time involved with the construction and shakedown of the equipment of the Ethane Chilling Expansion Project, ETMT has requested that DEP issue the initial Plan Approval for a term of 36 months. To this end, DEP requested that ETMT provide an updated construction timeline justifying the extended timeframe. On

June 21, 2023, ETMT provided the requested construction timeline (see *Attachment #1*). DEP consents to ETMT's request.

IV. Ethane Chilling Expansion Project Description

ETMT has proposed to expand the ethane chilling capacity at the MHT from approximately 75,000 *bbl/day* to approximately 85,000 *bbl/day*. To this end, ETMT has proposed the following (hereinafter collectively referred to as the "Ethane Chilling Expansion Project"):

- The installation of the following ethane chilling process equipment:
  - A new (fourth) ethane chiller train, consisting of a mixed refrigerant (MR) liquid compressor and heat exchanger, ethane chiller, and related equipment, in parallel with the three ethane chiller trains installed under Plan Approval Nos. 23-0119A and 23-0119D.
  - A new BOG system, consisting of a compressor, chiller, and related equipment.
  - New piping, fugitive emissions components, and process vents associated with the new ethane chiller train and BOG system.
  - Updated piping and fugitive emissions components for certain ethane chilling process equipment installed under Plan Approval Nos. 23-0119A and 23-0119D (i.e., the feed metering, feed heating, amine treatment, and demethanizer off-gas systems).
- Operational, maintenance, and emergency connections from the new ethane chiller train to the West Cold Flare (Source ID C01) installed under Plan Approval No. 23-0119 and permitted under the TVOP and Plan Approval No. 23-0119E (revised).
- Operational, maintenance, and emergency connections from the new BOG system to the Project Phoenix Cold Flare (Source ID C04) authorized under Plan Approval No. 23-0119J.
- Additional steam demand (~23,673 *lbs/hr*) on the three existing auxiliary boilers (1 and 3–4; Source IDs 031 and 033–034) permitted under the TVOP and Plan Approval No. 23-0119E (revised) by certain ethane chilling process equipment installed under Plan Approval Nos. 23-0119A and 23-0119D (i.e., the dehydrators and water/ethylene glycol (WEG) system utility), as well as for maintenance purposes, to support the additional ethane throughput through new and existing ethane chilling process equipment.[1]

With the Ethane Chilling Expansion Project, ETMT has not proposed to alter the general ethane chilling process at the MHT[2] or add any new stand-alone sources. However, the new ethane chiller train and BOG system, and

[1] During a July 17, 2023, telephone conversation with DEP, Kevin Smith, Senior Specialist – Environmental Compliance, ETMT, confirmed the ethane chilling process equipment and utilities requiring steam from the auxiliary boilers.

[2] The general ethane chilling process at the MHT consists of the following steps (in order):

- The delivery of ethane feedstock to the MHT via pipeline.
- The metering, heating, and filtering of the ethane feedstock prior to any processing.
- The removal of carbon dioxide [CO_2] from the ethane feedstock via an amine treatment system.
- The removal of sulfur from the ethane feedstock via sulfur treat beds.
- The removal of water from the ethane feedstock via molecular sieve desiccant dehydrators.
- Additional filtering of the ethane feedstock to remove any entrained desiccant beads from the dehydrators.
- The removal of methane [CH_4] from dry ethane via the demethanizer (Source ID 106A) installed under Plan Approval No. 23-0119A and permitted under the TVOP and Plan Approval No. 23-0119E (revised). The methane off-gas from the demethanizer is pulled to the fuel gas system, proceeds to the existing 15-2B gas plant, and is ultimately consumed by the existing auxiliary boilers.

previously-installed feed metering, feed heating, amine treatment, and demethanizer off-gas systems, are proposed to include new piping and fugitive emissions components, including valves, pump seals, compressor seals, pressure relief valves, flanges/connectors, and an open-ended line, that are expected to result in emissions increases of greenhouse gases (GHGs) and volatile organic compounds (VOCs) (see the *PSD Analysis* and *NSR Analysis* sections, below, for further discussion). Based on the preliminary engineering design, ETMT has conservatively estimated the fugitive emissions component count for the Ethane Chilling Expansion Project (see *Attachment #2*).

Similarly, the new ethane chiller train and BOG system are proposed to include new process vent connections to the West Cold Flare and Project Phoenix Cold Flare, respectively, that are expected to result in incremental emissions increases of carbon monoxide [CO], GHG, nitrogen oxides [NO_x],[3] sulfur dioxide [SO_2], and VOCs (see the *PSD Analysis* and *NSR Analysis* sections, below, for further discussion).

Based on the preliminary engineering design with a margin of 20%,[4] ETMT has conservatively estimated the expected incremental process vent flows from the new ethane chiller train and BOG system to the West Cold Flare and Project Phoenix Cold Flare, respectively. These process vent flows are listed in Tables 1 and 2, below:

Table 1
Expected Incremental Process Vent Flows from the New Ethane Chiller Train to the West Cold Flare (*lbs/yr*)

Flare Tip	Flow Type(s)[5]	Methane	Ethane	Propane	Pentane	**Totals**
High-Pressure	Sweep	190,530	0	0	0	**190,530**
	Operational	0	0	0	0	**0**
	Maintenance	1	4	1	1	**8**
Low-Pressure	Operational	42,815	123,407	45,333	40,296	**251,850**
	Maintenance	0	0	0	0	**0**
	Totals	**233,846**	**123,410**	**45,334**	**40,297**	**442,388**

- The chilling of treated, dry ethane via any of the chiller trains.
- The routing of refrigerated ethane to the refrigerated ethane storage tanks (Source IDs 101 and 117) installed under Plan Approval Nos. 23-0119 and 23-0119D, respectively, and permitted under the TVOP and Plan Approval No. 23-0119E (revised). Moreover, upon installation, DEP may route refrigerated ethane to the refrigerated ethane storage tanks (Source IDs 124–125) authorized under Plan Approval No. 23-0119J. The BOG from the storage tanks is also pulled to the fuel gas system to be consumed by the auxiliary boilers.
- The transfer of refrigerated ethane offsite via the existing marine vessel loading (refrigerated) (Source ID 104) installed under Plan Approval No. 23-0119 and permitted under the TVOP and Plan Approval No. 23-0119E (revised).

[3] All NO_x is expressed as nitrogen dioxide [NO_2].

[4] During a July 13, 2023, telephone conversation with DEP, Kevin Smith of ETMT confirmed that the process vent flows included this margin.

[5] ETMT has proposed to introduce an additional 300 standard cubic feet per hour (*scfh*) flow of sweep gas (natural gas) into the header of the West Cold Flare on a continuous basis to prevent explosive conditions within the piping. Operational flows occur on a regular, routine, or continuous basis. Maintenance flows occur at various intervals depending on maintenance and operational schedules and the condition of the respective equipment.

In addition, a purpose of both the West Cold Flare and Project Phoenix Cold Flare is to provide safe and reliable control and destruction of process gases during emergency situations. ETMT has considered emergency flows in the design of both flares.

Table 2
Expected Incremental Process Vent Flows from the New BOG System to the Project Phoenix Cold Flare (*lbs/yr*)

Flare Tip	Flow Type(s)[2]	Methane	Ethane	Propane	Butane	**Totals**
High-Pressure	Operational	2,663	8,516	9,604	97	**20,880**
	Maintenance	5	161	334	3	**503**
	Totals	**2,668**	**8,677**	**9,937**	**101**	**21,383**

V. PSD Analysis

In accordance with the EHB's adjudication decision, DEP has evaluated the Ethane Chilling Expansion Project and all past authorizations for sources and equipment related to the NGLs processing, storage, and distribution operations at the MHT, as indicated in the *Relevant Facility Permitting History* section, above, as a single aggregated project (hereinafter referred to as the "expanded single aggregated project" to avoid confusion with the single aggregated project that DEP previously reevaluated under Plan Approval No. 23-0119E (revised)) to determine the applicability of PSD and NSR requirements.

As indicated in 40 CFR § 52.21(a)(2)(i), the provisions of 40 CFR § 52.21 (incorporated by reference at 25 Pa. Code § 127.83) "apply to the construction[6] of any new major stationary source[6] … or any project at an existing major stationary source in an area designated as attainment." As the MHT is an existing major stationary source, in accordance with 40 CFR § 52.21(a)(2)(iv), DEP is required to perform a PSD analysis to determine whether the expanded single aggregated project constitutes a major modification[6] for a regulated NSR pollutant[6] and subject to PSD requirements. The regulated NSR pollutants Delaware County is currently designated as attainment (or maintenance) for and are relevant to the PSD analysis are CO, lead [Pb], NO_2/NO_x,[7] particulate matter [PM], PM less than 10 μm in aerodynamic diameter [PM_{10}], PM less than 2.5 μm in aerodynamic diameter [$PM_{2.5}$], SO_2, and sulfuric acid mist [H_2SO_4]. [Note: For the sake of fully characterizing the emissions increases of all pollutants for the respective authorizations of the expanded single aggregated project in one place, the PSD analysis also includes discussion of VOCs. However, as indicated in Footnote 7, below, these emissions increases are relevant only to the NSR analysis (see the *NSR Analysis* section, below, for further discussion).]

As indicated in 40 CFR § 52.21(a)(2)(iv)(*a*), "a project is a major modification for a regulated NSR pollutant if it causes two types of emissions increases—a significant emissions increase[6] … and a significant[7] net emissions increase.[6] … The project is not a major modification if it does not cause a significant emissions increase. If the project causes a significant emissions increase, then the project is a major modification only if it also results in a significant net emissions increase." In addition, in accordance with 40 CFR § 52.21(b)(49)(iii)–(iv), greenhouse gases (GHGs)[6] are significant and subject to regulation[6] only when a project is already a major modification for a regulated NSR pollutant.

Before beginning the PSD analysis, it is critical to define the project and establish the associated timeframes (i.e., based on the dates that DEP received a complete application, construction actually/is anticipated to commence,[6] and operation actually/is anticipated to commence). DEP has defined the project as the expanded single aggregated project. While establishing the associated timeframes for a project is normally a straightforward exercise, in this case, the actual and anticipated dates for the commencement of construction and operation for the sources and equipment of the expanded single aggregated project range from calendar years 2013–2026. Since DEP previously reevaluated most of the sources and equipment of the expanded single aggregated project under Plan Approval No. 23-0119E (revised) to determine the applicability of PSD and NSR requirements, DEP does not consider it appropriate to reassess or change the emissions increases previously determined for these sources and equipment or, consequently, establish the timeframes based on that or earlier

[6] As the term is defined in 40 CFR § 52.21(b).

[7] Since Delaware County is designated as nonattainment for ozone, and NO_x and VOCs are precursors to ozone, NO_x is also relevant to the NSR analysis.

Plan Approvals. Therefore, DEP has chosen to establish the timeframes for the expanded single aggregated project based on the dates that DEP received the complete application for Plan Approval No. 23-0119K, and ETMT proposes to commence construction and operation of the equipment of the Ethane Chilling Expansion Project (i.e., March 9, 2022, October 31, 2023,[8] and April 30, 2026,[8] respectively).

The first step of the PSD analysis is to determine whether the expanded single aggregated project causes a significant emissions increase of a regulated NSR pollutant. This is based on the sum of the emissions increases for each emissions unit,[6] and, as indicated in 40 CFR § 52.21(a)(2)(iv)(*d*) and (*c*), is determined differently based on whether the emissions unit is new or existing, respectively, as follows:

- Actual-to-potential test: For each new emissions unit, the emissions increase of a regulated NSR pollutant is the difference between the potential to emit[6] (PTE) and the baseline actual emissions[6] (BAE), the latter of which is generally zero.
- Actual-to-projected actual test: For each existing emissions unit, the emissions increase of a regulated NSR pollutant is the difference between the projected actual emissions[6] (PAE) and the BAE.

In addition, though not directly addressed in 40 CFR § 52.21, DEP also considers in the PSD analysis the "incremental emissions increase" of each regulated NSR pollutant for the sources and equipment of the expanded single aggregated project that have not undergone construction[6] (i.e., "any physical change or change in the method of operation"), but which have experienced an increase in utilization. This approach is consistent with United States Environmental Protection Agency (EPA) guidance (see *Attachment #3a–3c*, as highlighted).

Except for one of the depropanizers (Source ID 090) previously authorized under (the original) Plan Approval No. 23-0119E, and the sources and equipment authorized under Plan Approval No. 23-0119J, all the sources and equipment that DEP previously reevaluated under Plan Approval No. 23-0119E (revised)) have already been installed and commenced operation more than 2 years ago. Therefore, DEP considers all installed sources and equipment of the expanded single aggregated project to be existing emissions units.

DEP has performed the first step of the PSD analysis for each of the authorizations comprising the expanded single aggregated project, as discussed below (in reverse chronological order):

A. Ethane Chilling Expansion Project (under Plan Approval No. 23-0119K)

While the ethane chiller train that ETMT has proposed to install as part of the Ethane Chilling Expansion Project will be newly constructed, it will also share tie-point connections with and utilize much of the same ethane chilling process equipment as the other existing ethane chiller trains at the MHT.[9] Similarly, while the BOG system that ETMT has proposed to install as part of the Ethane Chilling Expansion Project will be newly constructed and associated with one of the refrigerated ethane storage tanks (Source ID 124) authorized under Plan Approval No. 23-0119J), it may ultimately process ethane that went through any of the ethane chiller trains. Lastly, as part of the Ethane Chilling Expansion Project, ETMT has proposed to install new piping and fugitive emissions components for the ethane chiller train and BOG system, as well as for the existing feed metering, feed heating, amine treatment, and demethanizer off-gas systems. Accordingly, DEP considers the installation of the ethane chilling process equipment proposed as part of the Ethane Chilling Expansion Project to constitute construction[6] of an existing emissions unit.

[8] In the updated construction timeline provided by ETMT (*Attachment #1*), ETMT only lists the calendar months for the various milestones for the Ethane Chilling Expansion Project, including the commencement of construction and operation. DEP has chosen the last day of the month for these milestones based on the earliest potential issuance date of Plan Approval No. 23-0119K and its understanding that ETMT intends to commence construction immediately upon issuance of the Plan Approval.

[9] During a July 17, 2023, telephone conversation with DEP, Kevin Smith of ETMT confirmed that the ethane chiller trains installed under Plan Approval Nos. 23-0119A and 23-0119D share tie-point connections, and that the new ethane chiller train will share tie-point connections with these ethane chiller trains as well.

However, historically, the various ethane chilling process equipment at the MHT have not been considered as discrete sources or emissions units from a permitting perspective, but as part of a larger grouping of fugitive emissions components at the MHT subject to various leak detection and repair (LDAR) requirements. As such, the fugitive emissions from the existing ethane chilling process equipment are not readily quantifiable, and ERM, on behalf of ETMT, did not apply the actual-to-projected actual test specified in 40 CFR § 52.21(a)(2)(iv)(*c*). Rather, using the calculation methodologies presented in EPA's Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017 (hereinafter referred to as "the EPA Protocol"), a component count based on the preliminary engineering design, and assuming continuous operation (i.e., 8,760 *hrs/yr*), ERM, on behalf of ETMT, has determined the GHG PTE, expressed as carbon dioxide equivalents [CO_2e], and VOC PTE for the new piping and fugitive emissions components, as follows:

- For the piping and fugitive emissions components that are not in VOC service[10] (i.e., those proposed to handle ethane, natural gas/fuel gas, and flare gas), ETMT multiplied the following values for each fluid type (see *Attachment #4a*):
  - The component counts for each component type.
  - The corresponding emission factors for each component type from Table 2-1 of the EPA Protocol.
  - The methane/GHG or VOC contents based on an engineering estimate of the speciated composition.
  - The global warming potential of methane from 40 CFR Part 98, Table A-1 (as applicable).

  [Note: Since these piping and fugitive emissions components are not in VOC service, ETMT did not apply any LDAR control effectiveness reductions.]

- For the piping and fugitive emissions components that are in VOC service (i.e., those proposed to handle propane, MR vapor,[11] and MR liquid), ERM, on behalf of ETMT, multiplied the following values for each fluid type (see *Attachment #4b*):
  - The component counts for each component type.
  - The corresponding leak rate emission factors for each component type from Tables 2-9,[12] 2-11, or 2-13 of the EPA Protocol.
  - The methane/GHG or VOC contents based on an engineering estimate of the speciated composition.
  - The global warming potential of methane from 40 CFR Part 98, Table A-1 (as applicable).

Since this approach is conservative as compared to the actual-to-projected actual test, DEP consents to this approach. However, as previously discussed in the *Emissions/Regulatory Analysis* section of DEP's technical review memo for the application for Plan Approval No. 23-0119J, dated February 5, 2021, DEP does not concur with the speciated composition information of 90% methane/GHGs and 0% VOCs indicated for the natural gas/fuel gas and flare gas fluid types in the PSD Plan Approval application. As part of DEP's review of the PSD Plan Approval application, DEP requested that ETMT submit daily average gas chromatograph (GC) data for the natural gas used at the MHT over the 12 most recent calendar months (i.e., July 2022–June 2023). On July 14, 2023, ETMT submitted the requested daily average GC data for the natural gas from Williams Pipeline Co., the natural gas supplier. From this data, DEP calculated average methane/GHG and VOC contents for the natural gas of 97.138% and 0.114%, respectively (see *Attachment #5*). Using these

[10] As the term is defined in 40 CFR § 60.481a (i.e., "contains or contacts a process fluid that is at least 10[%] VOC by weight"). By the same criteria, the piping and fugitive emissions components are in GHG service.

[11] The MR vapor piping and fugitive emissions components are also in GHG service.

[12] The leak rate emission factors from Table 2-9 of the EPA Protocol are correlated with the updated LDAR screening values provided by ERM, on behalf of ETMT, as part of the additional information requested by DEP for the PSD Plan Approval application. The LDAR screening values are based on actual leak concentration data from ETMT's LDAR program for the MHT for calendar years 2021–2022 (as opposed to the timeframe indicated in Footnote 1 of the "LDAR Screening Values" table).

higher methane/GHG and VOC contents for the natural gas/fuel gas and flare gas fluid types, DEP has calculated GHG and VOC PTEs for the new piping and fugitive emissions components not in VOC service of 555.24 and 2.06 *tons/yr*, respectively (see *Attachment #6*).

DEP considers the routing of process vent flows from the ethane chiller train and BOG system to the West Cold Flare and Project Phoenix Cold Flare, respectively, to solely constitute an increase in utilization of the flares. Along these lines, ERM, on behalf of ETMT, has determined the incremental emissions increases of CO, GHGs, NO_x, SO_2, and VOCs associated with the process vent connections to the West Cold Flare and Project Phoenix Cold Flare (see *Attachment #7*), as follows:

- CO, NO_x, and SO_2: By multiplying the expected process vent flows to the flares, as listed in Tables 1 and 2, above (at the end of the *Ethane Chilling Expansion Project Description* section), by the higher heating values of the respective constituents (i.e., methane/natural gas, ethane, propane, butane, and pentane), and the CO, NO_x, and SO_2 emission factors for flares (0.31 *lbs/mmBtu*, 0.068 *lbs/mmBtu*, and 0.0006 *lbs/mmBtu*, respectively) from EPA's Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I (AP-42), Table 13.5-1.
- GHGs: Using the calculation methodology specified in 40 CFR § 98.233.
- VOCs: By multiplying the expected process vent flows of methane/natural gas, propane, butane, and pentane to the flares, as listed in Tables 1 and 2, above, by their higher heating values (and, for methane/natural gas, an assumed VOC content of 1%[13]), and a proposed VOC destruction and removal efficiencies (DREs) of either 98% (for flows with more than three carbons) or 99.0% (for flows with three or fewer carbons).

DEP considers the steam demand on the three auxiliary boilers by the existing dehydrators and WEG system, and for maintenance purposes, to solely constitute an increase in utilization of the auxiliary boilers. Along these lines, ERM, on behalf of ETMT, has determined the incremental emissions increases of CO, GHGs, H_2SO_4, NO_x, Pb, PM, PM_{10}, $PM_{2.5}$, SO_2, and VOCs associated with the steam demand on the three auxiliary boilers by the new ethane chiller train and BOG system using updated emission factors, based on 2018–2022 performance with a margin of 20%, as part of the additional information requested by DEP for the PSD Plan Approval application (see *Attachment #8*).

As discussed in Sub-sections A. and H. of the *Project Phoenix Description* section of DEP's technical review memo for Plan Approval No. 23-0119J, dated February 5, 2021, the refrigerated ethane storage tanks and the marine vessel loading (refrigerated), respectively, that the chilled ethane proceeds through are designed to have zero emissions (outside of fugitive emissions from piping and fugitive emissions components, as already considered above). This statement also applies to the refrigerated ethane storage tanks permitted under the TVOP and Plan Approval No. 23-0119E (revised). Therefore, there is no emissions increase for the refrigerated ethane storage tanks and marine vessel loading (refrigerated), and they are not considered further in the PSD analysis.

Based on the PTEs for the new ethane chiller train and BOG system, as well as the incremental emissions increases associated with the increases in utilization of the West Cold Flare, Project Phoenix Cold Flare, and auxiliary boilers, DEP has determined the emissions increases of CO, GHGs, H_2SO_4, NO_x, Pb, PM, PM_{10},

[13] Though the maximum daily VOC content of the natural gas used at the MHT over the 12 most recent calendar months, as indicated in the daily average GC data from Williams Pipeline Co. (*Attachment #4*), was 0.348%.

$PM_{2.5}$, SO_2, and VOCs for the Ethane Chilling Expansion Project. These emissions increases are listed in Table 3, below:

Table 3
Emissions Increases for the Ethane Chilling Expansion Project (*tons/yr*)

Equipment/Source	CO	GHGs	H_2SO_4	NO_x	Pb	$PM/PM_{10}/PM_{2.5}$	SO_2	VOCs
Piping and Fugitive Emissions Components	0	557.35	0	0	0	0	0	4.25
Cold Flares	1.603	721.76	0	0.3516	0	0	0.0013	0.488
Auxiliary Boilers	0.430	16,175	0.00678	3.774	0.00117	0.165	0.454	0.0715
Totals	2.033	17,454	0.00678	4.126	0.00117	0.165	0.455	4.809

B. De Minimis Emissions Increase (written notice received January 4, 2022)

While the product rerun lines of the depropanizer and debutanizer are existing equipment, DEP considers the installation of new YZ light liquid sampler systems and associated fugitive emissions components for the product rerun lines to be new emissions units.[14] Along these lines, ETMT has previously determined a VOC PTE of 0.0716 *tons/yr* for the new fugitive emissions components.

As with the flare connections proposed by ETMT as part of the Ethane Chilling Expansion Project, DEP considers the flare connections for the YZ light liquid sampler systems to the West Warm Flare to solely constitute an increase in utilization of the flare. Along these lines, ETMT has previously determined the incremental emissions increases of CO, GHGs, NO_x, and VOCs for the flare connections. These incremental emissions increases are listed in Table 4, below:

Table 4
Incremental Emissions Increases Authorized by De Minimis Emissions Increase (*tons/yr*)

CO	GHGs	NO_x	VOCs
0.0059	2.5063	0.0013	0.0178

C. RFD No. 9332

While the H5 truck rack is an existing emissions unit, DEP considers the installation of a new butane truck loading station and associated fugitive emissions components at the H5 truck rack to be a new emissions unit. Along these lines, ETMT has previously determined a VOC PTE of 0.024 *tons/yr* for the new fugitive emissions components.

As with the flare connections proposed by ETMT as part of the Ethane Chilling Expansion Project, DEP considers the flare connection for the butane loading station at the H5 truck rack to the West Warm Flare to solely constitute an increase in utilization of the flare. Along these lines, ETMT has previously determined the incremental emissions increases of CO, GHGs, NO_x, and VOCs for the flare connection. These incremental emissions increases are listed in Table 5, below:

Table 5
Incremental Emissions Increases Authorized Under RFD No. 9332 (*tons/yr*)

CO	GHGs	NO_x	VOCs
0.015	6.28	0.0033	0.045

[14] It bears mention that, pursuant to 25 Pa. Code § 127.203(b)(2)–(3), a de minimis emissions increase does not constitute a modification.

D. De Minimis Emissions Increase (written notice received May 19, 2021)

The replacement of two ethane recycle pumps constitutes construction[6] of existing emissions units. However, the only emissions increases associated with the replacement are for the routing of ethane vapors from the pump casings directly to the West Cold Flare (i.e., without any fugitive emissions components).

As with the flare connections proposed by ETMT as part of the Ethane Chilling Expansion Project, DEP considers the flare connection for the pump casings to the West Cold Flare to solely constitute an increase in utilization of the flare. Along these lines, ETMT has previously determined the incremental emissions increases of CO, NO_x, and VOCs for the flare connection. These incremental emissions increases are listed in Table 6, below:

Table 6
Incremental Emissions Increases Authorized by De Minimis Emissions Increase (*tons/yr*)

CO	NO_x	VOCs
0.00016	0.000035	0.00

E. RFD No. 9156

While the H5 truck rack is an existing emissions unit, DEP does not consider the installation of new fugitive emissions components associated with flare connections for the propane and butane loading and unloading stations at the H5 truck rack to constitute construction[6] because the change resulted in an emissions decrease of VOCs due to uncontrolled VOCs from disconnections being routed to the West Warm Flare instead of vented to the outdoor atmosphere. Therefore, the fugitive emissions components are not considered further in the PSD analysis.

As with the flare connections proposed by ETMT as part of the Ethane Chilling Expansion Project, DEP considers the flare connections for the propane and butane loading and unloading stations at the H5 truck rack to the West Warm Flare to solely constitute an increase in utilization of the flare. Along these lines, ETMT has previously determined the incremental emissions increases of CO, GHGs, NO_x, and VOCs for the flare connections. These incremental emissions increases are listed in Table 7, below:

Table 7
Incremental Emissions Increases Authorized Under RFD No. 9156 (*tons/yr*)

CO	GHGs	NO_x	VOCs
0.0782	32.5175	0.0172	0.2266

F. Plan Approval No. 23-0119E (revised)

As stated above, DEP does not consider it appropriate to reassess or change the emissions increases it previously determined for the sources and equipment reevaluated under Plan Approval No. 23-0119E (revised). DEP has previously determined the emissions increases of CO, GHGs, H_2SO_4, NO_x, Pb, PM, PM_{10}, $PM_{2.5}$, SO_2, and VOCs for the sources and equipment reevaluated under Plan Approval No. 23-0119E (revised). These emissions increases are listed in Table 8, below:

Table 8
Emissions Increases for the Sources and Equipment Reevaluated
Under Plan Approval No. 23-0119E (revised) (*tons/yr*)

CO	GHGs	H_2SO_4	NO_x	Pb	PM	PM_{10}	$PM_{2.5}$	SO_2	VOCs
101.13	243,261	0.0574	58.89	0.00684	3.87	3.66	1.82	17.49	177.22

DEP has summed the emissions increases of CO, GHGs, H_2SO_4, NO_x, Pb, PM, PM_{10}, $PM_{2.5}$, SO_2, and VOCs for the respective authorizations of the expanded single aggregated project discussed above, and compared these to the associated significant emissions rates (see *Attachment #9*). These emissions increases and associated significant emissions rates are also listed in Table 9, below:

Table 9
Emissions Increases for the Expanded Single Aggregated Project & Significant Emissions Rates (*tons/yr*)
40 CFR § 52.21(a)(2)(iv)(*c*)–(*d*) and (b)(40)

	CO	GHGs	H_2SO_4	NO_x	Pb	PM	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Emissions Increases	**103.26**	**260,756**	0.0642	**63.04**	0.00801	4.039	3.829	**1.983**	17.94	182.41
Significant Emissions Rates	100	75,000	7	40	0.6	25	15	10[15]	40	N/A

As indicated in Table 9, above, DEP has determined that the expanded single aggregated project results in significant emissions increases of CO, GHGs, NO_x, and $PM_{2.5}$ (the latter based on NO_x being a precursor to $PM_{2.5}$). Therefore, the next step is to perform a netting analysis to determine whether the expanded single aggregated project also results in significant net emissions increases of CO, GHGs, NO_x, and $PM_{2.5}$.

As indicated in 40 CFR § 52.21(b)(3)(i)–(ii), the net emissions increase is the sum of "[t]he increase in emissions from a particular physical change or change in the method of operation" (i.e., the significant emissions increases of CO, GHGs, and NO_x determined above) and "any other increases and decreases in actual emissions … that are contemporaneous with the particular change and are otherwise creditable," where the contemporaneous period "occurs between: (a) The date five years before construction on the particular change commences; and (b) The date that the increase from the particular change occurs." In line with the discussion in the fourth paragraph of this section and the updated construction timeline provided by ETMT (*Attachment #1*), DEP has chosen to set the date that construction on "the particular change" (i.e., the expanded single aggregated project) commences as October 31, 2023, the earliest potential issuance date of Plan Approval No. 23-0119K. Similarly, DEP has chosen to set the date that the increase from "the particular change" occurs as April 30, 2026, the date that operation of the equipment of the Ethane Chilling Expansion Project is indicated to commence. Therefore, DEP has used October 31, 2018–April 30, 2026, as the contemporaneous period to determine whether the expanded single aggregated project also results in significant net emissions increases of CO, GHGs, and NO_x.

In addition to the authorizations comprising the expanded single aggregated project, DEP has authorized other increases in actual emissions of CO, GHGs, NO_x, and VOCs during the contemporaneous period, via a de minimis emissions increase and three RFDs, for sources and equipment that are not related to the NGLs processing, storage, and distribution operations at the MHT. These other increases in actual emissions meet the criteria specified in 40 CFR § 52.21(b)(3)(iii)–(viii) for being creditable, and are listed in Table 10, below:

Table 10
Other Increases in Actual Emissions Authorized During the Contemporaneous Period (*tons/yr*)

Authorization (Date)	CO	GHGs	NO_x	VOCs
De Minimis Emissions Increase (written notice received March 22, 2019)	0.0010	0	0.00022	0.00301
RFD No. 7548 (approved April 11, 2019)	0.0679	30.39	0.0149	0.2090
RFD No. 9446 (approved July 14, 2022)	0.2336	27.79	0.0429	0.6000
RFD No. 9668 (approved May 23, 2022)	0.3388	40.07	0.0623	0.8650
Totals	0.6413	98.25	0.1203	1.6770

[15] The significant emissions rate for $PM_{2.5}$ is 10 *tons/yr* for direct $PM_{2.5}$, but 40 *tons/yr* for NO_x or SO_2 as precursors to $PM_{2.5}$.

DEP has determined the net emissions increases of CO, GHGs, and NO_x for the expanded single aggregated project by summing the emissions increases and other increases in actual emissions of these regulated NSR pollutants listed in Tables 9 and 10, above, respectively, and compared these to the associated significant emissions rates (see *Attachment #9*). These net emissions increases and associated significant emissions rates are also listed in Table 11, below:

Table 11
Net Emissions Increases for the Expanded Single Aggregated Project & Significant Net Emissions Rates (*tons/yr*)
40 CFR § 52.21(a)(2)(iv)(*c*)–(*d*), (b)(3), and (b)(23)

	CO	GHGs	NO_x
Net Emissions Increases	**103.90**	**260,855**	**63.16**
Significant Net Emissions Rates	100	75,000	40

As indicated in Table 11, above, and by Footnote 15, above, DEP has determined that the expanded single aggregated project results in significant net emissions increases of CO, GHGs, NO_x, and $PM_{2.5}$ (the latter based on NO_x being a precursor to $PM_{2.5}$). Therefore, the expanded single aggregated project is a major modification subject to the PSD requirements of 40 CFR § 52.21, adopted in their entirety by DEP and incorporated by reference under 25 Pa. Code § 127.83, for these regulated NSR pollutants (see *PSD Requirements* section, below, for further discussion).

VI. PSD Requirements

As a major modification, the expanded single aggregated project is required to meet all applicable PSD requirements specified in 40 CFR § 52.21(j)–(p), as discussed below:

A. 40 CFR § 52.21(j)(1): The expanded single aggregated project is required to "meet each applicable emissions limitation under the State Implementation Plan and each applicable [NSPS, NESHAP, or MACT emissions standard]". All applicable emissions limitations and standards for the sources and equipment of the expanded single aggregated project, including NSPS Subparts Db, Kb, VV, and VVa; and MACT Subparts Y and DDDDD, have been previously included in TVOP No. 23-00119 and Plan Approval Nos. 23-0119E (revised) and 23-0119J, and/or are addressed under Plan Approval No. 23-0119K.

B. 40 CFR § 52.21(j)(3): The expanded single aggregated project is required to meet "best available control technology [(BACT) requirements] for each [directly-emitted] regulated NSR pollutant [that] result[s] in a significant net emissions increase.[16] … This requirement applies to each proposed emissions unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operation." Accordingly, the sources and equipment of the expanded single aggregated project that are required to meet BACT are all new and existing emissions units that underwent construction and contribute to the significant net emissions increases of CO, GHGs, and NO_x. DEP has addressed BACT requirements for these sources and equipment, as follows:

   1. West Cold Flare, East Cold Flare, and Project Phoenix Cold Flare (Source IDs C01–C02 and C04, respectively): ETMT installed the West Cold Flare and East Cold Flare under Plan Approval Nos. 23-0119 and 23-0119D, respectively, both of which DEP previously reevaluated under Plan Approval No. 23-0119E (revised). ETMT is authorized to install and temporarily operate the Project Phoenix Cold Flare under Plan Approval No. 23-0119J. As indicated in *Attachment #3* of DEP's technical review memo for Plan Approval No. 23-0119E (revised), dated February 5, 2021, each of the cold flares is a source of CO, GHGs, and NO_x emissions. ETMT did not include in the PSD Plan Approval application a BACT analysis for the West Cold Flare and Project Phoenix Cold Flare which are proposed to have new process vent connections from the new ethane chiller train and BOG system of the

[16] The position that BACT limitations only apply to directly-emitted NAAQS and/or precursor pollutants is consistent with EPA policy and was affirmed *In re Footprint Power Salem Harbor Development, LP*, PSD Appeal No. 14-02 (EAB 2014).

expanded single aggregated project. However, as part of the additional information requested by DEP for the PSD Plan Approval application, ERM, on behalf of ETMT, submitted a best available technology (BAT) analysis for the cold flares for CO, NO_x, and VOCs to demonstrate that they still (will) meet the current BAT. Based on the BAT analysis, the cold flares continue to/will meet Lowest Achievable Emission Rate (LAER) and BAT for these pollutants, which, in conformance with 25 Pa. Code § 127.205(7), DEP considers to be at least as stringent as BACT.

Since there are no established BAT emission limitations for GHGs for the cold flares, ETMT did not address GHGs in its BAT analysis. Nonetheless, DEP has reviewed EPA's RACT/BACT/LAER Clearinghouse (RBLC) and PSD permits for GHG precedents for flares, and the only potentially applicable GHG control techniques are the following:

- Good flare design and combustion practices.
- The use of pipeline-quality natural gas as a pilot fuel.
- Minimizing the flows to the flares.
- Fuel gas recovery systems.

The first three GHG control techniques are feasible, and ETMT has implemented/will implement these for the cold flares, as follows:

- The cold flares are/will be designed and operated in compliance with the requirements for flares specified in 40 CFR § 60.18.
- The cold flares (will) use pipeline-quality natural gas exclusively as the pilot fuel.
- ETMT has stated in the Plan Approval applications for the sources and equipment of the expanded single aggregated project that the projects have been designed to minimize overall emissions.

However, as discussed in Sub-section A.3. of the *NSR Requirements* section of DEP's technical review memo for Plan Approval No. 23-0119E (revised), dated February 5, 2021, a fuel gas recovery system is not feasible for the cold flares. Therefore, DEP considers the GHG emissions from the cold flares to meet BACT.

2. Piping and fugitive emissions components in GHG service: ETMT has included in the PSD Plan Approval application a GHG BACT analysis for the fugitive emissions components of the Ethane Chilling Expansion Project in GHG service. In the BACT analysis, ETMT has proposed to meet BACT by performing auditory, visual, and/or olfactory (AVO) inspections for these fugitive emissions components on a weekly basis. DEP does not object to ETMT's determination of performing AVO inspections to meet BACT. However, DEP's review of EPA's RBLC and PSD permits for GHG precedents for piping and fugitive emissions components has revealed multiple examples where AVO inspections for these are required to be performed on a daily basis.[17] Therefore, DEP has added requirements to the PSD Plan Approval (under Source ID 501) pertaining to the performance of AVO inspections for the piping and fugitive emissions components in GHG service on a daily basis. Moreover, since the PSD requirements are applicable to the expanded single aggregated project, not only the Ethane Chilling Expansion Project, DEP has applied the requirements specified under Source ID 501 to all the piping and fugitive emissions components in GHG service installed as part of the expanded single aggregated project.

[17] Examples of PSD permits requiring AVO inspections of fugitive emissions components in GHG service on a daily basis include:

- Virginia Electric and Power Co.—Greensville County Power Station: PSD Permit No. 52525, issued July 2, 2021.
- NTE Carolinas II, LLC—Reidsville Energy Center: PSD Permit No. 10494R00, issued July 14, 2017.
- Enterprise Products Operating LLC—Mont Belvieu: PSD Permit No. PSD-TX-1336-GHG, issued April 16, 2014.

C. 40 CFR § 52.21(k)–(n): ETMT has included with the PSD Plan Approval application, and submitted revised versions of, the Air Quality Modeling Report and air dispersion modeling for the expanded single aggregated project. As presented in the Air Quality Modeling Report, ETMT performed air quality analyses of the net emissions increases of CO, NO_2/NO_x, and $PM_{2.5}$ for the expanded single aggregated project. DEP's Air Quality Modeling Section has reviewed the air quality analyses and air dispersion modeling (see *Attachment #10*).

D. 40 CFR § 52.21(o)(1): ETMT has included with the PSD Plan Approval application, and submitted revised versions of, the Air Quality Modeling Report and air dispersion modeling for the expanded single aggregated project. As presented in the Air Quality Modeling Report, ETMT performed additional impact analyses of the impairment to visibility, soils, and vegetation for the expanded single aggregated project. DEP's Air Quality Modeling Section has reviewed these additional impact analyses (see *Attachment #10*).

E. 40 CFR § 52.21(o)(2): Moreover, ETMT has provided an analysis of air quality impacts projected for the area from general commercial, residential, industrial and other growth associated with the expanded single aggregated project. DEP concurs with ETMT that such additional air quality impacts are expected to be negligible.

F. 40 CFR § 52.21(p): ETMT has provided written notice of the PSD Plan Approval application to the Federal Land Managers of nearby federal Class I areas, along with initial screening calculations. DEP's Air Quality Modeling Section has reviewed these additional impact analyses (see *Attachment #10*).

VII. NSR Analysis

Pursuant to 25 Pa. Code § 127.201(f), the MHT is "considered a major facility[18] and … subject to the requirements applicable to a major facility located in a severe nonattainment area[18] for ozone." Therefore, in accordance with 25 Pa. Code §§ 127.203a and 127.203(b)(1)(i)–(ii), DEP is required to perform an NSR analysis to determine whether the aggregated emissions increases of NO_x or VOCs (i.e., the sum of the emissions increases for the expanded single aggregated project and either of the following) exceed 25 *tons/yr*:

- "[T]he other increases in net emissions occurring over a consecutive 5 calendar-year period, which includes the calendar year of the modification or addition which results in the emissions increase.
- [The] other increases and decreases in net emissions occurring within 10 years prior to the date of submission of a complete Plan Approval application."

As with the PSD analysis, before beginning the NSR analysis, it is critical to define the project and establish the associated timeframes. As with the PSD analysis, DEP has defined the project as the expanded single aggregated project and has chosen to establish the timeframes for the expanded single aggregated project based on the actual dates that DEP received the complete application for Plan Approval No. 23-0119K, and ETMT proposes to commence construction and operation of the equipment of the Ethane Chilling Expansion Project.

First, DEP has determined the emissions increases of NO_x and VOCs for the expanded single aggregated project. As with the PSD analysis, these are based on the sum of the emissions increases for each emissions unit,[18] and, as indicated in 25 Pa. Code § 127.203a(a)(1)(i)(B) and (A), is determined differently based on whether the emissions unit is new or existing, respectively, as follows:

- "For new emissions units, the emissions increase of a regulated NSR pollutant[6,18] will be the potential to emit[18] [(PTE)] from each new emissions unit."
- "For existing emissions units, an emissions increase of a regulated NSR pollutant is the difference between the projected actual emissions[18] [(PAE)] and the baseline actual emissions[18] [(BAE)] for each unit."

[18] As the term is defined in 25 Pa. Code § 121.1.

In addition, though not directly addressed in 25 Pa. Code §§ 127.203 and 127.203a, DEP also considers in the NSR analysis the "incremental emissions increase" of NO_x and VOCs from the sources and equipment of the expanded single aggregated project that have not undergone a modification,[18] but which have experienced an increase in utilization.

As with the PSD analysis, DEP considers all installed sources and equipment of the expanded single aggregated project to be existing emissions units.

Accordingly, the emissions increases of NO_x and VOCs from the respective sources and equipment of the expanded single aggregated project, as presented in the *PSD Analysis* section, above, are the same for the NSR analysis. The emissions increases of NO_x and VOCs for the expanded single aggregated project are indicated in Table 9, of the *PSD Analysis* section, above.

Next, DEP has determined the other increases in net emissions of NO_x and VOCs occurring over a consecutive 5 calendar-year period. Similar to the PSD analysis, DEP has chosen to set the date of "the modification or addition which results in the emissions increase" as April 30, 2026, the date that operation of the equipment of the Ethane Chilling Expansion Project is proposed to commence. Therefore, DEP has used the 2022–2026 timeframe as the consecutive 5 calendar-year period for which to determine the other increases in net emissions of NO_x and VOCs. The other increases in net emissions of NO_x and VOCs are those associated with RFD Nos. 9446 and 9668, as indicated in Table 10, of the *PSD Analysis* section, above.

DEP has determined the aggregated emissions increases of NO_x and VOCs for the expanded single aggregated project by summing the emissions increases and other increases in net emissions of these pollutants listed in Tables 9 and 10, of the *PSD Analysis* section, above, respectively (see *Attachment #9*). These aggregated emissions increases are also listed in Table 12, below:

Table 12
Aggregated Emissions Increases for the Expanded Single Aggregated Project (*tons/yr*)
25 Pa. Code § 127.203(b)(1)(i)

	NO_x	VOCs
Aggregated Emissions Increases	**63.15**	**183.88**
Significant[16] Emissions Rates	25	25

Since the aggregated emissions increases of both NO_x and VOCs for the expanded single aggregated project exceed 25 *tons/yr*, the aggregated emissions increases are significant[6,18] for both pollutants. Therefore, the expanded single aggregated project is subject to the NSR requirements of 25 Pa. Code Chapter 127, Subchapter E, for both NO_x and VOCs, and there is no need to determine the aggregated emissions increase in accordance with 25 Pa. Code § 127.203(b)(1)(ii). ETMT is required to implement LAER for NO_x and VOCs in accordance with 25 Pa. Code §§ 127.203(b)(2) and 127.205(1), and offset the aggregated emissions increases of NO_x and VOCs in accordance with 25 Pa. Code §§ 127.201(d) and 127.210(a) (see *NSR Requirements* section, below, for further discussion).

VIII. NSR Requirements

The expanded single aggregated project is required to meet the following NSR requirements, as indicated in 25 Pa. Code § 127.205(1)–(5), respectively:

- Implement a level of pollution control that meets LAER.
- Certify that each facility located within the Commonwealth that is owned, operated, or controlled by ETMT and subject to NSR requirements and emission restrictions, is in compliance, or are on a schedule of compliance, with all applicable emission restrictions and standards.

- Obtain and surrender the required emission offsets, at the required offset ratio, prior to commencement of operation of the affected source(s), from other sources that impact a nonattainment area in the same or lower nonattainment classification area than the one in which they were generated.

- Demonstrate through an analysis of alternative sites, sizes, production processes, and environmental control techniques that the benefits of the proposed project significantly outweigh the environmental and social costs imposed on the Commonwealth as a result of its location, construction, or modification.

A. 25 Pa. Code § 127.205(1)

ETMT has included in the PSD Plan Approval application a LAER evaluation of the Ethane Chilling Expansion Project in accordance with EPA's guidance in the October 1990 draft NSR Workshop Manual and applicable federal and Commonwealth regulations. As indicated in 25 Pa. Code § 127.205(1), "only sources which are new or which are modified shall be required to implement LAER." Except as discussed below, DEP has previously and fully addressed LAER for the new and modified sources and equipment of the expanded single aggregated project reevaluated under Plan Approval No. 23-0119E (revised). The following sources and equipment of the expanded single aggregated project are required to meet LAER:

1. Piping and fugitive emissions components in VOC service: The piping and fugitive emissions components of the expanded single aggregated project in VOC service that DEP reevaluated under Plan Approval No. 23-0119E (revised), and authorized under Plan Approval No. 23-0119J, are currently subjected to the NSPS for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006 [40 CFR Part 60, Subpart VVa], including leak levels and the use of an approved LDAR program. In its LAER evaluation, ETMT has proposed that these requirements be extended to the new piping and fugitive emissions components of the Ethane Chilling Expansion Project in VOC service, and that they likewise constitute LAER. While DEP previously considered ETMT's LDAR program for the piping and fugitive emissions components of the expanded single aggregated project, as permitted in the TVOP and Plan Approval Nos. 23-0119E (revised) and 23-0119J (under Source ID 103), to meet LAER,[19] this is no longer the case for the following reasons:

    - ETMT's recent compliance history regarding its LDAR program:

        - On December 14, 2020, and February 4, 2021, DEP issued Notices of Violation (NOVs) to ETMT for multiple LDAR-related violations, including failure to monitor numerous fugitive emissions components per regulatory requirements. On November 12, 2021, DEP and ETMT entered into a Consent Assessment of Civil Penalty (CACP) to address these violations.

        - On October 5, 2021, and February 22, 2022, DEP issued NOVs to ETMT for multiple LDAR-related violations, including further instances of failing to monitor fugitive emissions components per regulatory requirements. On September 12, 2022, DEP and ETMT entered into a separate CACP to address these violations.

        - On February 16, 2023, DEP issued an NOV to ETMT for further instances of failing to monitor fugitive emissions components per regulatory requirements. DEP referred these violations for enforcement action. (This enforcement action is pending.)

    - DEP mistakenly considered ETMT's LDAR program to be a fully directed maintenance program, in which ETMT uses a gas analyzer in conjunction with the repair or maintenance of leaking fugitive emissions components. However, during a May 17, 2023, telephone conversation with DEP, Kevin Smith of ETMT confirmed that this is currently only the case for simple repairs (e.g., tightening a nut or fitting, etc.) that can be performed by the third-party contractor that performs all the monitoring with the gas analyzer. For more extensive repairs (and replacements), Mr. Smith stated that ETMT

[19] See Sub-section A.2. of the *NSR Requirements* section of DEP's technical review memo for Plan Approval No. 23-0119E (revised), dated February 5, 2021, for further discussion.

has a separate maintenance crew that handles these but does not perform any simultaneous monitoring with the gas analyzer.

Rather, DEP considers compliance with the LDAR requirements indicated in the Texas Commission on Environmental Quality's (TCEQ's) 28LAER program as LAER. Therefore, DEP has added all necessary requirements to the PSD Plan Approval (under Source ID 401) for ETMT's LDAR program to meet (or exceed) the 28LAER criteria. Similar to the requirements added under Source ID 501 for the piping and fugitive emissions components in GHG service, DEP has applied the requirements added under Source ID 401 to all the piping and fugitive emissions components installed as part of the expanded single aggregated project.

2. Non-refrigerated marine vessel loading (Source ID 115): DEP previously reevaluated the existing non-refrigerated marine vessel loading under Plan Approval No. 23-0119E (revised). As discussed in the *NSR Analysis* section of the associated technical review memo, dated February 5, 2021, DEP calculated an emissions increase of VOCs for the non-refrigerated marine vessel loading based on an increase in actual average throughput as compared to the average historical throughput. This increase in utilization of the non-refrigerated marine vessel loading represents a modification (i.e., the PAE for the non-refrigerated marine vessel loading is greater than the BAE). However, in the technical review memo, DEP inadvertently included the non-refrigerated marine vessel loading with other sources and equipment that did not undergo a modification. Therefore, DEP did not address whether the non-refrigerated marine vessel loading meets LAER.

   To this end, as part of the additional information requested by DEP for the PSD Plan Approval application, ERM, on behalf of ETMT, submitted a source description for the existing non-refrigerated marine vessel loading that details how VOC emissions are controlled and fugitive emissions are minimized.[20] Loading arms on the marine vapor recovery (MVR) skid at Dock 3B are connected to marine vessels for the loading of petroleum products with a Reid Vapor Pressure greater than 4.0 *psia* and/or a hazardous air pollutant (HAP) content of greater than 0.5*%* at Dock 3A, with the displaced hydrocarbon vapors in the marine vessels ultimately being routed to the existing auxiliary boilers, as follows:

   - Hydrocarbon vapors in the marine vessel displaced during the loading of petroleum products are pulled through the vapor lines in the loading arms to an MVR unit on the skid to be condensed/ recovered.
   - Following the loading:
     - The liquid lines in the loading arms are pumped free of petroleum products by a vacuum truck, then the liquid and vapor lines are disconnected and immediately blanked.
     - The MVR unit is swept with natural gas, and the combination of recovered hydrocarbons and natural gas (i.e. fuel gas) is routed to process gas vessel V282 in the existing 15-2B gas plant.
   - Natural gas is injected into process gas vessel V282 to push the fuel gas to the auxiliary boilers to be consumed.

   The non-refrigerated marine vessel loading is subject to the provisions of MACT Subpart Y, including the following:

   - Confirmation of vapor tightness for each marine vessel loaded, via either documentation or leak testing during loading using EPA Method 21.
   - The reduction of VOCs and HAPs from marine vessel loading, via the combustion of recovered hydrocarbons by the auxiliary boilers, of 98*%, by weight*, and 97*%, by weight*, respectively.

[20] During May 17, 2023, and July 28, 2023, telephone conversations with DEP, Kevin Smith of ETMT provided additional information for the marine vessel loading.

- Annual and ongoing LDAR for the vapor collection system (i.e., piping, fugitive emissions components, and flow inducing devices) and control devices (i.e., the MVR unit and auxiliary boilers) using EPA Method 21.

As indicated in the source description submitted by ERM, on behalf of ETMT, the auxiliary boilers have a VOC and HAP destruction efficiency of 99%.

ETMT currently follows the LDAR requirements of MACT Subpart Y for the MVR unit and all portions of the vapor collection system up to process gas vessel V282. However, based on the facts that process gas vessel V282 receives fuel gas flows from sources and equipment that are part of the expanded single aggregated project, and the VOC content of the fuel gas has the potential to exceed 10%, ETMT currently follows the LDAR requirements of NSPS Subpart VVa for the piping and fugitive emissions components leading from process gas vessel V282 to the existing auxiliary boilers.[21]

Based on the facts that the non-refrigerated marine vessel loading is used only occasionally and does not have a history of leaks, DEP consents to ETMT following the LDAR requirements of MACT Subpart Y for the portion of the vapor collection system between the MVR unit and process gas vessel V282. Therefore, except for applying the additional requirements under Source ID 401 for the piping and fugitive emissions components leading from process gas vessel V282 to the existing auxiliary boilers, as discussed in Sub-section A.1. of the *NSR Requirements* section, above, DEP considers ETMT's LDAR program for the non-refrigerated marine vessel loading to constitute LAER.

B. 25 Pa. Code § 127.205(2)

To ETMT's knowledge, all existing sources located within the Commonwealth that are owned, operated, or controlled by ETMT are in compliance with applicable local, state, and federal regulations and consent decree requirements, or are on a compliance schedule.

C. 25 Pa. Code § 127.205(3)–(4)

Pursuant to 25 Pa. Code § 127.201(f), the MHT is subject to the requirements applicable to a major facility located in a severe nonattainment area for ozone. Therefore, as indicated in 25 Pa. Code § 127.210(a), ETMT is required to offset the aggregated emissions increases of NO_x and VOCs at the offset ratio of 1.3:1. Based on the significant aggregated emissions increases of NO_x and VOCs indicated in Table 12, of the *NSR Analysis* section, above, and the required offset ratio, ETMT is required to surrender 82.09 tons of NO_x Emission Reduction Credits (ERCs) and 239.04 tons of VOC ERCs. ETMT has previously surrendered, and DEP has previously retired, 79.15 tons of NO_x ERCs and 193.79 tons of VOC ERCs under previously-issued Plan Approvals for certain sources and equipment of the expanded single aggregated project. Moreover, ETMT is still required to surrender 49.93 tons of VOC ERCs under Plan Approval No. 23-0119J prior to the commencement of operation of the sources and equipment under that Plan Approval. Therefore, to fully offset the aggregated emissions increases of NO_x, ETMT is required to surrender an additional 2.94 tons of NO_x ERCs for the expanded single aggregated project (see *Attachment #9*).[22] ETMT has stated in the PSD Plan Approval application that it intends to secure the required NO_x ERCs.

D. 25 Pa. Code § 127.205(5)

ETMT has conducted an analysis of alternative sites, sizes, production processes, and environmental control techniques to demonstrate that the benefits of the MHT significantly outweigh the environmental and social costs imposed on the Commonwealth as a result of its location, construction, or modification. Except for the

[21] The remaining piping and fugitive emissions components of the existing 15-2B gas plant, which is not part of the expanded single aggregated project, are subjected to the NSPS for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006 [40 CFR Part 60, Subpart VV], as permitted in the TVOP (under Source ID 801).

[22] Based on differences with the timeframes DEP used to determine the other increases in net emissions of VOCs between Plan Approval No. 23-0119E (revised) and Plan Approval No. 23-0119K, ETMT is not required to surrender any additional VOC ERCs.

equipment proposed to be installed as part of the Ethane Chilling Expansion Project, the sources and equipment authorized under Plan Approval No. 23-0119J, and one of the depropanizers (Source ID 090) authorized under the original Plan Approval No. 23-0119E, all the sources and equipment of the expanded single aggregated project have already commenced operation and rely upon existing equipment and utilities at the MHT, including pipeline infrastructure that terminates at the MHT and marine vessel loading docks. Furthermore, ETMT has stated that "equipment sizing and production processes were determined in order to meet technical requirements and business demands of the [MHT]," and contends that "[r]elocating, replacing, or rerouting this pipeline infrastructure outside of existing right-of-ways would create an unnecessary net environmental and community disturbance." Lastly, ETMT contends that, because of the MHT's location in an area subject to the requirements applicable to a severe nonattainment area for ozone, the sources and equipment of the expanded single aggregated project have been/will be designed to minimize overall emissions and meet associated NSR, LAER, and ERC requirements, which may not be the same for a suitable alternate industrial location. Based on the above, DEP concurs that the benefits of the MHT significantly outweigh the environmental and social costs imposed on the Commonwealth as a result of its location, construction, or modification.

IX. Recommendation

Based on a review of the following, I recommend that DEP issue Plan Approval No. 23-0119K to ETMT for the Ethane Chilling Expansion Project and all piping and fugitive emissions components installed as part of the expanded single aggregated project, as discussed herein:

- The PSD Plan Approval application, including the addendum and additional requested information.
- Plan Approval Nos. 23-0119E (revised), 23-0119J, and the other previously-issued Plan Approvals for the sources and equipment of the expanded single aggregated project, as well as the associated applications and technical review memos.
- RFD Nos. 5597, 7548, 9156, 9332, 9446, and 9668, as well as the associated applications.
- The de minimis emissions increases written notices received on March 22, 2019, May 19, 2021, and January 4, 2022.
- TVOP No. 23-00119.
- EPA's RBLC.

Smith, David S

From: Smith, Kevin W <kevin.smith2@energytransfer.com>
Sent: Wednesday, June 21, 2023 12:52 PM
To: Smith, David S
Cc: Garcia, Lisa M
Subject: [External] Construction Timeline
Attachments: Construction Timeline.docx

Dave,

The 36 month construction timeline you requested is attached. If you need anything else, please let me know.

Thanks,
Kevin

ENERGY TRANSFER
Moving America's Energy

Kevin W. Smith
Sr. Specialist – Env. Compliance
Energy Transfer

O: 610.859.1279
C: 215.817.3361

Attachment #1

Construction Timeline

- October 2023 – Detailed engineering design.
- November 2023 – Begin bidding process and place purchase orders for critical equipment (tower internals, exchangers, pumps).
- July 2024 – Complete detailed civil, structural, and mechanical engineering design. Begin bidding process.
- August 2024 – Complete piping design. Begin bidding process.
- September 2024 – Begin civil and structural construction.
- December 2024 – Complete electrical and instrumentation design. Begin bidding process.
- January 2025 – Begin mechanical and piping construction.
- March 2025 – Start electrical and instrumentation construction.
- March 2026 – Testing and pre-commissioning
- April 2026 – Start-up and shakedown of sources

Table 3-1: Potential Fugitive VOC and CO_2e Emissions

New Fugitive Components	Number of Components	VOC Emissions[1] (TPY)	CO_2e Emissions (TPY)
Valves	1,814	1.00	274.65
Pump Seals	3	0.04	0.01
Compressor Seals	15	0.35	13.21
Pressure Relief Valves	34	0.40	15.06
Flanges/Connectors	5,187	3.36	219.73
Other	1	0.05	0.07
Total Fugitive Emissions		**5.20**	**522.74**

[1] Potential fugitive emissions are estimated based on USEPA guidance correlations ("Protocol for Equipment Leak Emission Estimates", EPA-453/R-95-017).

3.2 Incremental Steam Demand Emissions

The expected annual average steam demand for the MHIC as a result from expanding the ethane chilling process is approximately 23,673 pounds per hour of steam (lb/hr) as shown in **Appendix D**. The Auxiliary Boilers will not be modified in any way to produce the incremental steam required for this Project. As shown in **Table 3-2** below, the expected annual average steam demand (approximately 23,673 lb/hr) is below the combined steam production capacity of the Auxiliary Boilers and this steam demand can be accommodated within the existing Title V Operating Permit emissions limits[4]. Therefore, the incremental steam demand emissions for this Ethane Chilling Expansion Project from the Auxiliary Boilers have already been previously permitted; however, these emissions increases are conservatively included as project emissions increases.

[4] The emission limits were originally established for four Auxiliary Boilers with Plan Approval 23-0119B. The emissions limits for the remaining three Auxiliary Boilers were revised with the removal of Auxiliary Boiler 2 (Source ID 032) as part of the major operating permit modification to TVOP 23-00119 in December 2016. The annual emission limit for CO was reduced as a part of a minor modification to the Title V Operating Permit 23-00119 in August 2019.

September 17, 1993

Mr. Larry Devillier
Supervisor, Permit Section
Office of Air Quality and Radiation
Protection
Louisiana Department of
Environmental Quality
P.O. Box 82135
Baton Rouge, Louisiana 70884-2135

Re: Union Carbide Chemicals and Plastics Company, Inc.
PSD Applicability

Dear Mr. Devillier:

We have reviewed the application dated May 18, 1993, from Union Carbide Chemicals and Plastics Company, Inc. concerning a permit to construct and operate a new polyethylene (PE) production facility at its Taft/Star Complex located near Taft, St. Charles Parish Louisiana.

The new PE production facility will require steam from an existing power system consisting of four boilers. The boilers will increase emissions as a result of the PE project. This increase must be included in the net emission increase for the PE project. You have suggested the following methodology for computing the net emissions increase. The potential emissions from the new PE facility at maximum production capacity plus the increased emissions from the existing boilers attributable to the new facility operating at maximum capacity will be the increase attributable to the proposed change. For this specific situation, where the existing boilers are not being modified and the demand from the new PE unit on the existing boilers can be specifically quantified, the emissions increase from the existing boilers that occurs as a direct result of the proposed PE project should be based on the maximum utilization for which the new PE unit would be permitted. At present, we agree that this methodology is applicable to this proposed project.

I trust this answers the question that you posed in your August 10, 1993 letter regarding net emission increase. If you have any questions, please call Mr. Reverdie Daron Page of my staff at (214) 655-7222.

Sincerely yours,

ORIGINAL SIGNED BY
JOLE C. LUEHRS
Jole C. Luehrs
Chief
New Source Review Section (6T-AN)

cc: David Solomon

6T-AN:PAGE:X7222:dp: 09/13/93 DOC.F:UNIONCRB4.LET

7-25-01

Ms. Bliss Higgins
Assistant Secretary
Environmental Services Division
Louisiana Department of Environmental Quality
P. O. Box 82135
Baton Rouge, LA 70884-2135

RE: Motiva Enterprises, LLC
Low Sulfur Gasoline (LSG) Project – Related Emission Increase Methodology

Dear Ms. Higgins:

On April 10, 2001, we received a copy of a proposal sent to you by Motiva's two Louisiana refineries (see enclosure). Motiva's concern relates to the acceptable method to calculate emission increases resulting from their proposed LSG project. The company proposes to install new desulfurization equipment at their refineries designed to comply with the Environmental Protection Agency's (EPA) Tier 2 LSG regulation. The new equipment will result in increased utilization of existing equipment at the refineries. The existing equipment at which increased utilization is expected to occur as a result of the new desulfurization equipment will likely include steam boilers, hydrogen plants, sulfur recovery units, and flare systems. Motiva proposes to calculate emission increases from the existing equipment which will support the new desulfurization equipment based on what they term the "proposed potential increase in utilization" caused by the need to support the new equipment.

As you are aware, EPA's regulations define a "major modification" as one in which a physical change or change in the method of operation of a major stationary source results in a significant net emissions increase (see 40 Code of Federal Regulations section 52.21(b)(2)). In determining whether a proposed change will be a major modification, it is necessary to first calculate the total increase in emissions that will result from the proposed changes at the source. This calculation includes (1) increases occurring at all new or modified units, and (2) any other increases at existing emissions units not being modified which could experience emission increases that will

result from the change. (It is important to note that emission decreases that may be associated with a proposed project are not considered in this initial step. They may, however, be considered if the source wishes to net the project out of major new source review by considering all increases and decreases in emissions that are contemporaneous with the project and otherwise creditable.) The existing equipment described above by Motiva are examples of units which will not be modified as part of the change, but could nonetheless experience emission increases as a result of the operation of the new desulfurization equipment.

For the new and modified units associated with the new desulfurization unit, actual emission increases are calculated by subtracting the actual emissions at those units averaged over the preceding two years (or other more representative period) from the emission levels at maximum allowed production capacity of the units. In the case of the existing equipment not undergoing a change, but whose emission levels could be affected by the change at the facility (e.g., because of increased demand for steam and other products), emissions increases should be calculated as the worst case increases that could occur at those existing units if the new or modified units were to operate at their maximum permitted capacity. The company should provide conclusive evidence that all potential emissions increases associated with the operation of the project are accounted for within the New Source Review application provided to you for review.

If you have questions or comments concerning this matter, please feel free to contact me at (214) 665-6656 or Mr. Rick Barrett of my staff at (214) 665-7227.

Sincerely yours,

Rebecca Weber
Associate Director for Air
Multimedia Planning and
Permits Division

Enclosure

February 24, 2005

(AR-18J)

Steve Dunn
NSR Team Leader
Wisconsin Department of Natural Resources
Bureau of Air Management
101 South Webster Street
Box 7921
Madison, Wisconsin 53707-7921

Re: Request for a PSD Applicability Determination for Murphy Oil, Superior, Wisconsin

Dear Mr. Dunn:

Thank you for your letter dated August 14, 2003, regarding the regulatory aspects of a potential project at the Murphy Oil USA (Murphy) facility in Superior, Wisconsin.

Your letter requests the United States Environmental Protection Agency (EPA) to provide guidance on how to calculate the net emissions increase from the boilers from a proposed project at the Murphy facility, which is a major source under the Part 70 and Prevention of Significant Deterioration (PSD) programs. The situation at the facility is described in your letter as follows:

> Murphy presently operates four oil/gas fired boilers at the Superior refinery with a reported steam capacity of slightly less than 140,000 pounds steam/hour. The minimum steam load required to operate the refinery processes is 80,000 pounds steam per hour with additional steam being primarily used in cold weather to keep process units and other equipment warm. Additionally, Murphy presently has in-place steam turbine back-ups for many electric pumps which could, if all were operated, use an additional 80,000 pounds steam per hour. The refinery reports that the boilers have, in the past 24 months, operated at full-capacity producing 140,000 pounds of steam per hour. This operation has been due to both cold weather and decisions by Murphy to operate additional steam turbines.

At issue is the method for calculating the “net emissions increase” resulting from increased utilization of upstream boilers due to projects that Murphy may undertake at the

facility. You characterize the project as "a non-exempt physical change (i.e. modification) to a process unit which does not involve any physical changes to the boiler," and point out that the proposed project would increase the steam needed to operate a process unit, and thus increase the minimum steam load at the refinery. Your request attaches a letter from Murphy which cites various site-specific evaluations by EPA, but provides few details on the actual proposed project at issue. In its letter, Murphy discusses their views regarding the de-bottlenecking concept, and argues that what it proposes constitutes "increased utilization" that would ignore emissions increases from the boilers.

We communicated with your office and with Murphy in November 2004, about the lack of specific information that the company has provided concerning the proposed project. We recently received some additional information from Murphy, as well as a copy of Wisconsin Department of Natural Resource's (WDNR) February 26, 2003 determination that Murphy's application is subject to review under the PSD program (ch. NR 405, Wis. Adm. Code). It is our understanding that Murphy disagrees with your determination, and has asked WDNR to seek EPA's input on the case. Accordingly, we provide you with the guidance below.

As a preliminary matter, we note that air emissions from Murphy's facility are governed by the Wisconsin State Implementation Plan (SIP) approved PSD program. The Wisconsin PSD program was approved by EPA on May 27, 1999, and does not include later federal changes to the New Source Review (NSR) regulations. Under the Wisconsin SIP, future emissions of modified non-electric utility steam generating units are calculated using the "actual to potential to emit" (PTE) method. We emphasize that NSR/PSD applicability calculations are governed by the applicability criteria in the currently approved and applicable SIPs, and recognize that States have the primary responsibility for determining how the SIP-approved NSR/PSD program applies to facilities within their jurisdiction. While EPA is providing input and guidance, we will defer to WDNR's final decision as long as it comports with applicable law, regulations and Agency guidance.

EPA provides site-specific responses on permitting issues[1]. We

[1] The prior EPA analyses cited in Murphy's letter were also specific to the facilities and projects presented to the Agency in those cases. In one case, the Agency modified its determination when it became aware of new information about the facility at issue: the April 10, 1992 determination for the Hoechst Celanese facility was superseded by a March 14, 1997 letter that stressed the need for details on

note that the actual project submitted to WDNR for determination may differ from the project hypothetically described in the correspondence from Murphy attached to your August 14, 2003 letter. Murphy's letter does not provide sufficient details about the history of the current operations or the proposed changes and project(s) that are needed in order to make a determination.[2] Among other things, the submittal lacks information on the following: the affected units at the facility; the permit and/or other limits that apply; the duration and frequency of operation at maximum capacity of the steam generating units involved; current and historical production levels; other equipment, pumps, structures and processes that have been and will be involved or affected, and their history; the past and proposed emissions; the pollutants; and how the steam is being re-allocated. The details of the proposed project need to be fleshed out in order to make a determination. Based on what we have been presented, EPA generally agrees with WDNR's analysis in this matter, and provides the guidance below in order to assist you as you make a final determination once you receive the relevant information. We will offer you further guidance then, if it would be helpful in ensuring that the final decision comports with applicable law, regulations and guidance.

As you are aware, EPA's regulations define a "major modification" as one in which a physical change or a change in the method of operation of a major stationary source results in a significant net emissions increase. 40 C.F.R. 52.21(b)(2).[3] The total increase in emissions that will result from the proposed changes at the source includes: (1) increases occurring at all new or modified units, and (2) any other increases at existing emissions units not being modified which could experience emissions increases as a result of the change.

With respect to the general concepts, the modification scenario as presented by Murphy's May 13, 2003 letter does not appear to fall within the concept of "debottlenecking." EPA's NSR/PSD

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the proposed project.

[2] Omitted information about a proposed project vitiates regulatory determinations. In a case involving this same company, a Court held that Murphy withheld relevant information from WDNR regarding NSR/PSD aspects of a proposed modification of a distillate unifier. See U.S. v. Murphy Oil USA, Inc. , 155 F. Supp. 2d 1117 (W.D.Wisc., August 1, 2001).

[3] The Wisconsin SIP defines **"**major modification" in 405.02(21) as "any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any air contaminant subject to regulation under the act."

policies define "debottlenecking" to apply to a unit that has not been modified, but which experiences an increase in its effective capacity due to the removal of a capacity limitation on an associated unit.[4] According to the information provided, the proposed project involves an increase in the boiler units' normal production of steam, not removal of capacity limitations. Emissions resulting from "increased utilization" of the boiler as part of the proposed project must be accounted for as set forth in the following paragraphs.

In determining whether a proposed change will be a major modification and will trigger PSD requirements, we calculate the total increase in emissions that will result from the proposed changes at the source. If all of the units affected by the project, not just those physically modified, collectively emit increased emissions in excess of the significance thresholds, the project is subject to PSD review. The total emissions increases attributable to the project (from the boilers and modified downstream units) are counted towards PSD applicability.

Because of the effective dates of your applicable SIP rules, the relevant analysis for the emissions from the new emissions unit(s) is actual-to-potential (PTE). See In re Rochester Public Utilities, PSD Appeal No. 03-03 (EAB August 3, 2004) at pg. 17. For any new unit(s) being added as part of the proposed project, actual emissions increases are calculated by determining the emissions levels at the maximum allowed production capacity for the unit(s) and subtracting the actual emissions at those units (presumably zero) averaged over the preceding two years (or other more representative period).

For a situation where the existing boilers are not being modified, the emissions increase from the existing boilers that occurs as a direct result of the proposed project should be based on the maximum utilization for which the new unit will be permitted.[5] The emissions increases should be calculated as the worst case increases that could occur at those existing units if

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[4] See the *New Source Review Workshop Manual* for understanding the concept of "debottlenecking." Pages A.37 and A.46 both contain examples of "debottlenecking."

[5] See September 17, 1993 letter from Jolie C. Luehrs, Chief, New Source Review Section, EPA Region 6 to Larry Devillier, Louisiana Dept. of Environmental Quality, regarding Union Carbide Chemicals and Plastics Company.

the new units were to operate at maximum capacity.[6]

If, as a result of the project, PSD significance thresholds for any of the PSD pollutants would be exceeded, then the project is subject to PSD requirements. Best Available Control Technology (BACT) will be required on all emission units that contribute to the emissions increase and are physically modified or experience a change in the method of operation. BACT would not apply to the boilers if no physical changes or change in the method of operation is planned for the boilers.

In sum, EPA defers to and generally agrees with the State's analysis, but lacks the details to provide final confirmation of the determination at this time. In order to assist you in going forward, we have clarified how applicable concepts would be applied under the federal regulations in effect at the time that the Wisconsin SIP was approved. If you obtain additional information on the project, we will be glad to offer you further guidance.

Please do not hesitate to contact Danny Marcus of my staff at (312) 353-8781, if you have any questions or comments; or to direct Murphy's attorneys to Andre Daugavietis, Associate Regional Counsel, at (312) 886-6663.

Sincerely yours,

/s/

Sam Portanova, Acting Section Chief
Air Permits Section

[6] See July 25, 2001 letter from Rebecca Weber, Associate Director for Air Multimedia Planning and Permits Division, EPA Region 6 to Bliss Higgins, Louisiana Dept. of Environmental Quality, regarding Motiva Enterprises, LLC.

Sunoco Partners Marketing & Terminals L.P.
Ethane Chilling Expansion
February 2022
Fugitive Component Emissions

Area	Equipment Type	Service	Emission Factor (kg/hr/source)[a]	Fluid 1 Ethane	Fluid 3 Natural Gas / Fuel Gas	Fluid 6 Flare Gas	Component Counts	Control Efficiency for LDAR Monitored Components	VOC Emissions (tons/year)	CO_2e Emissions (tons/year)[e]
Ethane Chilling System	Valves	Gas[b]	0.00597	377	176	18	571	0%	0.43	267.93
		Light Liquid[c]	0.00403	221	0		221	0%	0.17	6.45
		Heavy Liquid[d]	0.00023				0	0%	0.00	0.00
	Pump Seal Valves	Light Liquid[c]	0.00403				0	0%	0.00	0.00
		Heavy Liquid[d]	0.00023				0	0%	0.00	0.00
	Pump Seal Connectors	All	0.00183				0	0%	0.00	0.00
		Gas[b]	0.00597				0	0%	0.00	0.00
	Analyzer Valves	Light Liquid[c]	0.00403				0	0%	0.00	0.00
		Heavy Liquid[d]	0.00023				0	0%	0.00	0.00
	Analyzer Connectors	All	0.00183				0	0%	0.00	0.00
		Gas[b]	0.00597				0	0%	0.00	0.00
	Sample Station Valves	Light Liquid[c]	0.00403				0	0%	0.00	0.00
		Heavy Liquid[d]	0.00023				0	0%	0.00	0.00
	Sample Station Connectors	All	0.00183				0	0%	0.00	0.00
	Pump Seals	Light Liquid[c]	0.0199				0	0%	0.00	0.00
		Heavy Liquid[d]	0.00862				0	0%	0.00	0.00
	Compressor Seals	Gas[b]	0.228	8	0		8	0%	0.35	13.21
	Pressure Relief Valves	Gas[b]	0.104	20	0		20	0%	0.40	15.06
	Connectors	All	0.00183	1913	423	60	2,396	0%	0.68	217.39
	Open-ended Lines	All	0.0017				0	0%	0.00	0.00
	Sampling Connections	All	0.015				0	0%	0.00	0.00
TOTALS									**2.04**	**520.05**

Fluid Speciation for Fugitive Source Systems			
Speciation[f]	**Fluid 1 Ethane**	**Fluid 3 Natural Gas / Fuel Gas**	**Fluid 6 Flare Gas**
Methane	3.0%	90.0%	90.0%
Ethane	95.0%	10.0%	10.0%
Propane	2.0%	0.0%	0.0%
i-Butane	0.0%	0.0%	0.0%
i-Pentane	0.0%	0.0%	0.0%
Total VOC	**2.0%**	**0.0%**	**0.0%**
Total GHG	**3.0%**	**90.0%**	**90.0%**

[a] Emission Factors from EPA's *Procotol for Equipment Leak Emission Estimates,* EPA-453/R-95-017, Table 2-1.

[b] Gas/vapor - material in a gaseous state at operating conditions.

[c] Light liquid - material in a liquid state in which the sum of the concentration of individual constituents with a vapor pressure over 0.3 kilopascals (kPa) at 20 °C is greater than or equal to 20 weight percent.

[d] Heavy liquid - not in gas/vapor service or light liquid service.

[e] The global warming potential of methane is 25 from 40 CFR Part 98, Table A-1.

[f] The composition (weight %) is an engineering estimate only and should not be considered a permit representation.

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**

MHT Natural Gas Composition: July 1, 2022 –June 30, 2023 Daily Averages

Data courtesy of Williams Pipeline Co.

Meter ID	Chrmtg	Beg Date Time	G A Eff Date	Spec Grav	Heat Fctr	Nitrogen	Carbon Dioxide	Methane	Ethane	Propane	I-Butane	N-Butane	I-Pentane	N-Pentane	Hexane	Total VOCs	Hydrogen Sulfide	Smpl Dev	Smpl Type
6075	GQC06041	7/1/2022 9:00	7/1/2022	0.567	1.0288	0.228	0.042	97.553	2.107	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	7/2/2022 9:00	7/2/2022	0.567	1.0293	0.228	0.047	97.498	2.153	0.07	0.002	0.003	0	0	0	0.075	0	Chromatograph	Accumulated
6075	GQC06041	7/3/2022 9:00	7/3/2022	0.567	1.0285	0.232	0.039	97.598	2.065	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	7/4/2022 9:00	7/4/2022	0.567	1.0282	0.234	0.038	97.629	2.036	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	7/5/2022 9:00	7/5/2022	0.567	1.0281	0.235	0.037	97.64	2.026	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	7/6/2022 9:00	7/6/2022	0.567	1.0285	0.236	0.041	97.579	2.077	0.063	0.001	0.003	0	0	0	0.067	0	Chromatograph	Accumulated
6075	GQC06041	7/7/2022 9:00	7/7/2022	0.568	1.0294	0.235	0.048	97.456	2.184	0.071	0.002	0.004	0	0	0	0.077	0	Chromatograph	Accumulated
6075	GQC06041	7/8/2022 9:00	7/8/2022	0.567	1.0289	0.236	0.043	97.528	2.12	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	7/9/2022 9:00	7/9/2022	0.567	1.0289	0.236	0.045	97.526	2.121	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	7/10/2022 9:00	7/10/2022	0.567	1.0284	0.238	0.04	97.592	2.065	0.062	0.002	0.003	0	0	0	0.067	0	Chromatograph	Accumulated
6075	GQC06041	7/11/2022 9:00	7/11/2022	0.567	1.0282	0.239	0.039	97.615	2.043	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	7/12/2022 9:00	7/12/2022	0.567	1.0291	0.238	0.046	97.496	2.146	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	7/13/2022 9:00	7/13/2022	0.567	1.0293	0.235	0.045	97.481	2.164	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	7/14/2022 9:00	7/14/2022	0.567	1.0283	0.236	0.039	97.604	2.056	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	7/15/2022 9:00	7/15/2022	0.567	1.0287	0.237	0.044	97.543	2.106	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	7/16/2022 9:00	7/16/2022	0.567	1.0282	0.236	0.038	97.625	2.038	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	7/17/2022 9:00	7/17/2022	0.567	1.0284	0.238	0.041	97.585	2.069	0.063	0.001	0.003	0	0	0	0.067	0	Chromatograph	Accumulated
6075	GQC06041	7/18/2022 9:00	7/18/2022	0.567	1.0284	0.237	0.04	97.595	2.061	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	7/19/2022 9:00	7/19/2022	0.567	1.0293	0.228	0.048	97.489	2.161	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	7/20/2022 9:00	7/20/2022	0.568	1.0297	0.232	0.052	97.42	2.214	0.075	0.003	0.004	0	0	0	0.082	0	Chromatograph	Accumulated
6075	GQC06041	7/21/2022 9:00	7/21/2022	0.568	1.0294	0.232	0.049	97.461	2.18	0.072	0.002	0.004	0	0	0	0.078	0	Chromatograph	Accumulated
6075	GQC06041	7/22/2022 9:00	7/22/2022	0.568	1.0295	0.23	0.049	97.452	2.19	0.073	0.002	0.004	0	0	0	0.079	0	Chromatograph	Accumulated
6075	GQC06041	7/23/2022 9:00	7/23/2022	0.568	1.0297	0.233	0.051	97.416	2.219	0.074	0.002	0.004	0	0	0	0.080	0	Chromatograph	Accumulated
6075	GQC06041	7/24/2022 9:00	7/24/2022	0.568	1.0294	0.235	0.048	97.464	2.177	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	7/25/2022 9:00	7/25/2022	0.568	1.0294	0.234	0.048	97.458	2.185	0.07	0.002	0.003	0	0	0	0.075	0	Chromatograph	Accumulated
6075	GQC06041	7/26/2022 9:00	7/26/2022	0.567	1.0291	0.231	0.045	97.507	2.143	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	7/27/2022 9:00	7/27/2022	0.567	1.0288	0.234	0.044	97.54	2.111	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	7/28/2022 9:00	7/28/2022	0.567	1.0285	0.234	0.041	97.586	2.073	0.063	0.001	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	7/29/2022 9:00	7/29/2022	0.567	1.0292	0.229	0.046	97.494	2.159	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	7/30/2022 9:00	7/30/2022	0.567	1.0288	0.235	0.043	97.547	2.107	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	7/31/2022 9:00	7/31/2022	0.567	1.028	0.236	0.038	97.641	2.024	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	8/1/2022 9:00	8/1/2022	0.567	1.0281	0.236	0.038	97.637	2.028	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	8/2/2022 9:00	8/2/2022	0.568	1.0292	0.236	0.048	97.476	2.164	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	8/3/2022 9:00	8/3/2022	0.568	1.0296	0.23	0.049	97.448	2.197	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	8/4/2022 9:00	8/4/2022	0.568	1.0298	0.232	0.051	97.41	2.226	0.074	0.002	0.004	0	0	0	0.080	0	Chromatograph	Accumulated
6075	GQC06041	8/5/2022 9:00	8/5/2022	0.568	1.03	0.231	0.053	97.394	2.239	0.076	0.003	0.004	0	0	0	0.083	0	Chromatograph	Accumulated
6075	GQC06041	8/6/2022 9:00	8/6/2022	0.567	1.0292	0.233	0.046	97.498	2.151	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	8/7/2022 9:00	8/7/2022	0.568	1.0298	0.228	0.048	97.432	2.212	0.074	0.002	0.004	0	0	0	0.080	0	Chromatograph	Accumulated
6075	GQC06041	8/8/2022 9:00	8/8/2022	0.568	1.0303	0.232	0.051	97.351	2.28	0.079	0.003	0.004	0	0	0	0.086	0	Chromatograph	Accumulated
6075	GQC06041	8/9/2022 9:00	8/9/2022	0.568	1.0302	0.231	0.051	97.361	2.271	0.078	0.003	0.004	0	0	0	0.085	0	Chromatograph	Accumulated
6075	GQC06041	8/10/2022 9:00	8/10/2022	0.569	1.0314	0.232	0.057	97.217	2.393	0.09	0.004	0.006	0.001	0	0	0.101	0	Chromatograph	Accumulated
6075	GQC06041	8/11/2022 9:00	8/11/2022	0.568	1.0294	0.235	0.047	97.465	2.177	0.071	0.002	0.004	0	0	0	0.077	0	Chromatograph	Accumulated
6075	GQC06041	8/12/2022 9:00	8/12/2022	0.567	1.0289	0.23	0.043	97.538	2.118	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	8/13/2022 9:00	8/13/2022	0.567	1.0283	0.232	0.039	97.61	2.055	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	8/14/2022 9:00	8/14/2022	0.567	1.0281	0.235	0.038	97.639	2.027	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	8/15/2022 9:00	8/15/2022	0.567	1.028	0.235	0.038	97.65	2.017	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	8/16/2022 9:00	8/16/2022	0.567	1.0284	0.233	0.041	97.596	2.065	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	8/17/2022 9:00	8/17/2022	0.567	1.0289	0.23	0.043	97.536	2.122	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	8/18/2022 9:00	8/18/2022	0.567	1.0288	0.234	0.043	97.541	2.113	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	8/19/2022 9:00	8/19/2022	0.567	1.0287	0.231	0.042	97.56	2.098	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	8/20/2022 9:00	8/20/2022	0.567	1.0289	0.233	0.043	97.538	2.116	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	8/21/2022 9:00	8/21/2022	0.567	1.0285	0.233	0.041	97.582	2.077	0.063	0.001	0.003	0	0	0	0.067	0	Chromatograph	Accumulated
6075	GQC06041	8/22/2022 9:00	8/22/2022	0.567	1.0294	0.188	0.043	97.579	2.119	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	8/23/2022 9:00	8/23/2022	0.567	1.0285	0.213	0.039	97.628	2.056	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	8/24/2022 9:00	8/24/2022	0.567	1.0288	0.213	0.04	97.593	2.087	0.063	0.001	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	8/25/2022 9:00	8/25/2022	0.568	1.0296	0.232	0.046	97.45	2.194	0.072	0.002	0.003	0	0	0	0.077	0	Chromatograph	Accumulated
6075	GQC06041	8/26/2022 9:00	8/26/2022	0.567	1.029	0.231	0.043	97.532	2.123	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	8/27/2022 9:00	8/27/2022	0.567	1.0288	0.227	0.041	97.559	2.105	0.064	0.001	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	8/28/2022 9:00	8/28/2022	0.567	1.0288	0.232	0.043	97.543	2.113	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	8/29/2022 9:00	8/29/2022	0.567	1.0289	0.233	0.043	97.535	2.119	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	8/30/2022 9:00	8/30/2022	0.568	1.0296	0.229	0.048	97.448	2.197	0.073	0.002	0.003	0	0	0	0.078	0	Chromatograph	Accumulated
6075	GQC06041	8/31/2022 9:00	8/31/2022	0.568	1.0295	0.229	0.047	97.468	2.18	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	9/1/2022 9:00	9/1/2022	0.568	1.0295	0.232	0.045	97.462	2.184	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	9/2/2022 9:00	9/2/2022	0.567	1.0292	0.232	0.044	97.499	2.15	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	9/3/2022 9:00	9/3/2022	0.567	1.0286	0.234	0.041	97.573	2.085	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	9/4/2022 9:00	9/4/2022	0.567	1.0282	0.236	0.038	97.625	2.039	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	9/5/2022 9:00	9/5/2022	0.567	1.0284	0.231	0.039	97.6	2.065	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	9/6/2022 9:00	9/6/2022	0.567	1.0287	0.234	0.042	97.555	2.099	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	9/7/2022 9:00	9/7/2022	0.567	1.0292	0.236	0.044	97.494	2.149	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	9/8/2022 9:00	9/8/2022	0.567	1.0283	0.239	0.039	97.6	2.057	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	9/9/2022 9:00	9/9/2022	0.567	1.0282	0.239	0.038	97.616	2.044	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated

Attachment #5

6075	GQC06041	9/10/2022 9:00	9/10/2022	0.567	1.0283	0.238	0.04	97.597	2.06	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	9/11/2022 9:00	9/11/2022	0.567	1.0282	0.238	0.039	97.613	2.046	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	9/12/2022 9:00	9/12/2022	0.567	1.0281	0.236	0.038	97.626	2.037	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	9/13/2022 9:00	9/13/2022	0.567	1.0288	0.232	0.042	97.553	2.103	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	9/14/2022 9:00	9/14/2022	0.567	1.0282	0.235	0.039	97.625	2.039	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	9/15/2022 9:00	9/15/2022	0.567	1.0282	0.233	0.039	97.622	2.043	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	9/16/2022 9:00	9/16/2022	0.567	1.0283	0.234	0.039	97.608	2.056	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	9/17/2022 9:00	9/17/2022	0.567	1.0283	0.236	0.04	97.604	2.057	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	9/18/2022 9:00	9/18/2022	0.567	1.0279	0.239	0.038	97.65	2.013	0.057	0.001	0.002	0	0	0	0.060	0	Chromatograph	Accumulated
6075	GQC06041	9/19/2022 9:00	9/19/2022	0.567	1.028	0.24	0.039	97.639	2.022	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	9/20/2022 9:00	9/20/2022	0.567	1.0284	0.233	0.04	97.603	2.059	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	9/21/2022 9:00	9/21/2022	0.567	1.0288	0.234	0.042	97.547	2.11	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	9/22/2022 9:00	9/22/2022	0.567	1.0283	0.232	0.04	97.613	2.052	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	9/23/2022 9:00	9/23/2022	0.567	1.0281	0.234	0.039	97.631	2.035	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	9/24/2022 9:00	9/24/2022	0.567	1.028	0.238	0.038	97.635	2.027	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	9/25/2022 9:00	9/25/2022	0.567	1.028	0.239	0.038	97.635	2.026	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	9/26/2022 9:00	9/26/2022	0.567	1.0283	0.243	0.041	97.595	2.055	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	9/27/2022 9:00	9/27/2022	0.567	1.0289	0.242	0.048	97.508	2.125	0.07	0.002	0.003	0	0	0	0.075	0	Chromatograph	Accumulated
6075	GQC06041	9/28/2022 9:00	9/28/2022	0.569	1.0305	0.241	0.067	97.294	2.297	0.09	0.004	0.006	0.001	0	0	0.101	0	Chromatograph	Accumulated
6075	GQC06041	9/29/2022 9:00	9/29/2022	0.567	1.0279	0.241	0.038	97.65	2.011	0.057	0.001	0.002	0	0	0	0.060	0	Chromatograph	Accumulated
6075	GQC06041	9/30/2022 9:00	9/30/2022	0.567	1.0279	0.241	0.039	97.643	2.018	0.057	0	0.002	0	0	0	0.059	0	Chromatograph	Accumulated
6075	GQC06041	10/1/2022 9:00	10/1/2022	0.567	1.0279	0.238	0.039	97.65	2.014	0.057	0	0.002	0	0	0	0.059	0	Chromatograph	Accumulated
6075	GQC06041	10/2/2022 9:00	10/2/2022	0.567	1.0282	0.242	0.044	97.594	2.054	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	10/3/2022 9:00	10/3/2022	0.567	1.0281	0.237	0.04	97.628	2.031	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	10/4/2022 9:00	10/4/2022	0.567	1.0287	0.228	0.043	97.57	2.092	0.063	0.001	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	10/5/2022 9:00	10/5/2022	0.567	1.029	0.232	0.047	97.517	2.132	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	10/6/2022 9:00	10/6/2022	0.567	1.0285	0.235	0.042	97.586	2.072	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	10/7/2022 9:00	10/7/2022	0.567	1.0281	0.239	0.04	97.623	2.036	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	10/8/2022 9:00	10/8/2022	0.567	1.0279	0.236	0.038	97.653	2.013	0.057	0.001	0.002	0	0	0	0.060	0	Chromatograph	Accumulated
6075	GQC06041	10/9/2022 9:00	10/9/2022	0.567	1.0279	0.235	0.038	97.652	2.016	0.057	0.001	0.002	0	0	0	0.060	0	Chromatograph	Accumulated
6075	GQC06041	10/10/2022 9:00	10/10/2022	0.567	1.0281	0.237	0.04	97.629	2.033	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	10/11/2022 9:00	10/11/2022	0.567	1.0284	0.236	0.042	97.591	2.065	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	10/12/2022 9:00	10/12/2022	0.567	1.0284	0.238	0.042	97.589	2.064	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	10/13/2022 9:00	10/13/2022	0.567	1.0284	0.235	0.041	97.593	2.066	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	10/14/2022 9:00	10/14/2022	0.567	1.0282	0.235	0.04	97.614	2.048	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	10/15/2022 9:00	10/15/2022	0.567	1.0285	0.236	0.043	97.573	2.08	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	10/16/2022 9:00	10/16/2022	0.567	1.0283	0.236	0.041	97.601	2.058	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	10/17/2022 9:00	10/17/2022	0.567	1.0282	0.237	0.04	97.614	2.046	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	10/18/2022 9:00	10/18/2022	0.567	1.0284	0.239	0.042	97.588	2.065	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	10/19/2022 9:00	10/19/2022	0.567	1.0288	0.238	0.045	97.529	2.118	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	10/20/2022 9:00	10/20/2022	0.567	1.029	0.231	0.044	97.518	2.135	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	10/21/2022 9:00	10/21/2022	0.567	1.0287	0.235	0.043	97.552	2.102	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	10/22/2022 9:00	10/22/2022	0.567	1.0285	0.235	0.04	97.585	2.074	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	10/23/2022 9:00	10/23/2022	0.567	1.0281	0.238	0.039	97.623	2.039	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	10/24/2022 9:00	10/24/2022	0.567	1.0282	0.236	0.039	97.622	2.041	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	10/25/2022 9:00	10/25/2022	0.567	1.028	0.239	0.038	97.633	2.029	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	10/26/2022 9:00	10/26/2022	0.567	1.028	0.238	0.038	97.644	2.02	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	10/27/2022 9:00	10/27/2022	0.567	1.028	0.236	0.038	97.638	2.027	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	10/28/2022 9:00	10/28/2022	0.567	1.0284	0.235	0.039	97.6	2.062	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	10/29/2022 9:00	10/29/2022	0.567	1.0285	0.233	0.041	97.581	2.079	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	10/30/2022 9:00	10/30/2022	0.567	1.0285	0.234	0.04	97.591	2.07	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	10/31/2022 9:00	10/31/2022	0.567	1.0285	0.232	0.04	97.585	2.077	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	11/1/2022 9:00	11/1/2022	0.567	1.0284	0.237	0.04	97.597	2.062	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	11/2/2022 9:00	11/2/2022	0.567	1.0288	0.239	0.045	97.536	2.11	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	11/3/2022 9:00	11/3/2022	0.567	1.0289	0.24	0.045	97.518	2.125	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	11/4/2022 9:00	11/4/2022	0.567	1.0285	0.24	0.043	97.572	2.078	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	11/5/2022 9:00	11/5/2022	0.567	1.0281	0.24	0.039	97.628	2.032	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	11/6/2022 9:00	11/6/2022	0.567	1.028	0.242	0.038	97.631	2.027	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	11/7/2022 9:00	11/7/2022	0.566	1.0277	0.245	0.037	97.662	1.997	0.056	0	0.002	0	0	0	0.058	0	Chromatograph	Accumulated
6075	GQC06041	11/8/2022 9:00	11/8/2022	0.57	1.0329	0.245	0.071	96.995	2.562	0.11	0.006	0.008	0.001	0.001	0.001	0.127	0	Chromatograph	Accumulated
6075	GQC06041	11/9/2022 9:00	11/9/2022	0.569	1.0307	0.242	0.064	97.26	2.345	0.08	0.004	0.005	0.001	0	0	0.090	0	Chromatograph	Accumulated
6075	GQC06041	11/10/2022 9:00	11/10/2022	0.569	1.0311	0.242	0.062	97.223	2.375	0.087	0.004	0.006	0.001	0	0	0.098	0	Chromatograph	Accumulated
6075	GQC06041	11/11/2022 9:00	11/11/2022	0.57	1.0326	0.239	0.076	97.031	2.53	0.108	0.006	0.008	0.001	0.001	0.001	0.125	0	Chromatograph	Accumulated
6075	GQC06041	11/12/2022 9:00	11/12/2022	0.571	1.0338	0.246	0.085	96.866	2.659	0.123	0.007	0.009	0.002	0.001	0.001	0.143	0	Chromatograph	Accumulated
6075	GQC06041	11/13/2022 9:00	11/13/2022	0.569	1.0311	0.241	0.065	97.221	2.367	0.094	0.004	0.006	0.001	0	0	0.105	0	Chromatograph	Accumulated
6075	GQC06041	11/14/2022 9:00	11/14/2022	0.569	1.0304	0.236	0.063	97.313	2.293	0.085	0.003	0.005	0.001	0	0	0.094	0	Chromatograph	Accumulated
6075	GQC06041	11/15/2022 9:00	11/15/2022	0.569	1.0304	0.236	0.069	97.305	2.295	0.085	0.004	0.005	0.001	0	0	0.095	0	Chromatograph	Accumulated
6075	GQC06041	11/16/2022 9:00	11/16/2022	0.569	1.0306	0.238	0.069	97.274	2.322	0.086	0.004	0.005	0.001	0	0	0.096	0	Chromatograph	Accumulated
6075	GQC06041	11/17/2022 9:00	11/17/2022	0.569	1.0304	0.237	0.065	97.305	2.297	0.085	0.004	0.005	0.001	0	0	0.095	0	Chromatograph	Accumulated
6075	GQC06041	11/18/2022 9:00	11/18/2022	0.571	1.0337	0.242	0.091	96.872	2.65	0.123	0.008	0.01	0.002	0.001	0.002	0.146	0	Chromatograph	Accumulated
6075	GQC06041	11/19/2022 9:00	11/19/2022	0.572	1.0352	0.247	0.098	96.672	2.817	0.139	0.009	0.012	0.002	0.001	0.002	0.165	0	Chromatograph	Accumulated
6075	GQC06041	11/20/2022 9:00	11/20/2022	0.571	1.034	0.248	0.088	96.835	2.681	0.125	0.008	0.01	0.002	0.001	0.002	0.148	0	Chromatograph	Accumulated
6075	GQC06041	11/21/2022 9:00	11/21/2022	0.574	1.0373	0.25	0.123	96.371	3.059	0.164	0.011	0.014	0.003	0.002	0.003	0.197	0	Chromatograph	Accumulated
6075	GQC06041	11/22/2022 9:00	11/22/2022	0.572	1.0354	0.247	0.102	96.652	2.832	0.14	0.009	0.011	0.002	0.001	0.003	0.166	0	Chromatograph	Accumulated
6075	GQC06041	11/23/2022 9:00	11/23/2022	0.57	1.0321	0.242	0.075	97.091	2.469	0.104	0.006	0.008	0.001	0.001	0.001	0.121	0	Chromatograph	Accumulated

6075	GQC06041	11/24/2022 9:00	11/24/2022	0.569	1.0311	0.24	0.063	97.23	2.359	0.094	0.005	0.006	0.001	0	0.001	0.107	0	Chromatograph	Accumulated
6075	GQC06041	11/25/2022 9:00	11/25/2022	0.569	1.0307	0.241	0.062	97.274	2.32	0.09	0.005	0.006	0.001	0	0.001	0.103	0	Chromatograph	Accumulated
6075	GQC06041	11/26/2022 9:00	11/26/2022	0.569	1.0307	0.243	0.065	97.274	2.315	0.09	0.005	0.006	0.001	0	0.001	0.103	0	Chromatograph	Accumulated
6075	GQC06041	11/27/2022 9:00	11/27/2022	0.569	1.0309	0.24	0.069	97.245	2.336	0.095	0.006	0.007	0.001	0.001	0.001	0.111	0	Chromatograph	Accumulated
6075	GQC06041	11/28/2022 9:00	11/28/2022	0.569	1.0312	0.239	0.067	97.216	2.37	0.095	0.005	0.006	0.001	0	0.001	0.108	0	Chromatograph	Accumulated
6075	GQC06041	11/29/2022 9:00	11/29/2022	0.57	1.0318	0.239	0.073	97.135	2.436	0.102	0.006	0.007	0.001	0.001	0.001	0.118	0	Chromatograph	Accumulated
6075	GQC06041	11/30/2022 9:00	11/30/2022	0.569	1.0308	0.236	0.063	97.272	2.328	0.09	0.004	0.006	0.001	0	0.001	0.102	0	Chromatograph	Accumulated
6075	GQC06041	12/1/2022 9:00	12/1/2022	0.572	1.0355	0.248	0.092	96.661	2.826	0.144	0.01	0.012	0.003	0.002	0.002	0.173	0	Chromatograph	Accumulated
6075	GQC06041	12/2/2022 9:00	12/2/2022	0.574	1.0371	0.25	0.103	96.451	3.003	0.16	0.012	0.014	0.003	0.002	0.003	0.194	0	Chromatograph	Accumulated
6075	GQC06041	12/3/2022 9:00	12/3/2022	0.572	1.0349	0.245	0.087	96.746	2.76	0.135	0.009	0.011	0.002	0.001	0.002	0.160	0	Chromatograph	Accumulated
6075	GQC06041	12/4/2022 9:00	12/4/2022	0.571	1.0335	0.244	0.078	96.925	2.612	0.119	0.008	0.01	0.002	0.001	0.002	0.142	0	Chromatograph	Accumulated
6075	GQC06041	12/5/2022 9:00	12/5/2022	0.572	1.0348	0.242	0.091	96.737	2.777	0.131	0.008	0.01	0.002	0.001	0.002	0.154	0	Chromatograph	Accumulated
6075	GQC06041	12/6/2022 9:00	12/6/2022	0.573	1.0366	0.246	0.089	96.535	2.948	0.151	0.011	0.013	0.003	0.002	0.003	0.183	0	Chromatograph	Accumulated
6075	GQC06041	12/7/2022 9:00	12/7/2022	0.574	1.0376	0.246	0.1	96.402	3.057	0.162	0.012	0.014	0.003	0.002	0.003	0.196	0	Chromatograph	Accumulated
6075	GQC06041	12/8/2022 9:00	12/8/2022	0.576	1.0399	0.251	0.114	96.082	3.337	0.179	0.013	0.016	0.003	0.002	0.003	0.216	0	Chromatograph	Accumulated
6075	GQC06041	12/9/2022 9:00	12/9/2022	0.575	1.0393	0.25	0.11	96.152	3.281	0.172	0.012	0.015	0.003	0.002	0.003	0.207	0	Chromatograph	Accumulated
6075	GQC06041	12/10/2022 9:00	12/10/2022	0.58	1.0461	0.267	0.15	95.257	4.03	0.24	0.019	0.023	0.005	0.003	0.005	0.295	0	Chromatograph	Accumulated
6075	GQC06041	12/11/2022 9:00	12/11/2022	0.578	1.0426	0.26	0.131	95.714	3.642	0.206	0.016	0.019	0.004	0.002	0.004	0.251	0	Chromatograph	Accumulated
6075	GQC06041	12/12/2022 9:00	12/12/2022	0.578	1.0432	0.263	0.139	95.625	3.711	0.214	0.017	0.02	0.004	0.003	0.005	0.263	0	Chromatograph	Accumulated
6075	GQC06041	12/13/2022 9:00	12/13/2022	0.577	1.0422	0.263	0.133	95.775	3.568	0.213	0.017	0.02	0.004	0.003	0.005	0.262	0	Chromatograph	Accumulated
6075	GQC06041	12/14/2022 9:00	12/14/2022	0.577	1.0413	0.261	0.134	95.884	3.468	0.208	0.016	0.019	0.004	0.002	0.004	0.253	0	Chromatograph	Accumulated
6075	GQC06041	12/15/2022 9:00	12/15/2022	0.58	1.0459	0.265	0.169	95.276	3.969	0.261	0.021	0.025	0.006	0.003	0.005	0.321	0	Chromatograph	Accumulated
6075	GQC06041	12/16/2022 9:00	12/16/2022	0.578	1.0424	0.257	0.149	95.727	3.603	0.216	0.016	0.02	0.004	0.003	0.005	0.264	0	Chromatograph	Accumulated
6075	GQC06041	12/17/2022 9:00	12/17/2022	0.579	1.0443	0.264	0.155	95.457	3.852	0.223	0.017	0.021	0.004	0.003	0.005	0.273	0	Chromatograph	Accumulated
6075	GQC06041	12/18/2022 9:00	12/18/2022	0.576	1.0396	0.253	0.137	96.073	3.31	0.187	0.014	0.016	0.003	0.002	0.004	0.226	0	Chromatograph	Accumulated
6075	GQC06041	12/19/2022 9:00	12/19/2022	0.577	1.0413	0.257	0.146	95.846	3.505	0.202	0.015	0.018	0.004	0.002	0.004	0.245	0	Chromatograph	Accumulated
6075	GQC06041	12/20/2022 9:00	12/20/2022	0.579	1.0434	0.258	0.162	95.568	3.741	0.222	0.017	0.021	0.004	0.003	0.005	0.272	0	Chromatograph	Accumulated
6075	GQC06041	12/21/2022 9:00	12/21/2022	0.576	1.0402	0.253	0.134	96.017	3.368	0.189	0.014	0.017	0.003	0.002	0.004	0.229	0	Chromatograph	Accumulated
6075	GQC06041	12/22/2022 9:00	12/22/2022	0.578	1.0425	0.259	0.155	95.682	3.644	0.213	0.016	0.02	0.004	0.002	0.005	0.260	0	Chromatograph	Accumulated
6075	GQC06041	12/23/2022 9:00	12/23/2022	0.576	1.0398	0.251	0.129	96.076	3.317	0.188	0.014	0.016	0.003	0.002	0.003	0.226	0	Chromatograph	Accumulated
6075	GQC06041	12/24/2022 9:00	12/24/2022	0.575	1.0392	0.245	0.122	96.176	3.238	0.182	0.013	0.015	0.003	0.002	0.003	0.218	0	Chromatograph	Accumulated
6075	GQC06041	12/25/2022 9:00	12/25/2022	0.58	1.0452	0.258	0.159	95.424	3.833	0.263	0.022	0.025	0.006	0.004	0.007	0.327	0	Chromatograph	Accumulated
6075	GQC06041	12/26/2022 9:00	12/26/2022	0.58	1.0455	0.254	0.146	95.432	3.83	0.271	0.023	0.027	0.006	0.004	0.007	0.338	0	Chromatograph	Accumulated
6075	GQC06041	12/27/2022 9:00	12/27/2022	0.58	1.0454	0.256	0.149	95.442	3.805	0.28	0.024	0.028	0.006	0.004	0.006	0.348	0	Chromatograph	Accumulated
6075	GQC06041	12/28/2022 9:00	12/28/2022	0.579	1.0448	0.255	0.149	95.523	3.727	0.279	0.024	0.028	0.006	0.004	0.006	0.347	0	Chromatograph	Accumulated
6075	GQC06041	12/29/2022 9:00	12/29/2022	0.576	1.0403	0.25	0.127	96.066	3.292	0.215	0.017	0.02	0.004	0.003	0.004	0.263	0	Chromatograph	Accumulated
6075	GQC06041	12/30/2022 9:00	12/30/2022	0.57	1.032	0.239	0.07	97.121	2.448	0.106	0.006	0.007	0.001	0.001	0.001	0.122	0	Chromatograph	Accumulated
6075	GQC06041	12/31/2022 9:00	12/31/2022	0.571	1.0334	0.241	0.079	96.934	2.608	0.119	0.007	0.008	0.002	0.001	0.001	0.138	0	Chromatograph	Accumulated
6075	GQC06041	1/1/2023 9:00	1/1/2023	0.57	1.0328	0.241	0.077	96.998	2.556	0.112	0.006	0.007	0.001	0.001	0.001	0.128	0	Chromatograph	Accumulated
6075	GQC06041	1/2/2023 9:00	1/2/2023	0.57	1.0322	0.241	0.071	97.08	2.49	0.104	0.006	0.006	0.001	0	0.001	0.118	0	Chromatograph	Accumulated
6075	GQC06041	1/3/2023 9:00	1/3/2023	0.571	1.0336	0.242	0.075	96.905	2.647	0.114	0.007	0.007	0.001	0.001	0.001	0.131	0	Chromatograph	Accumulated
6075	GQC06041	1/4/2023 9:00	1/4/2023	0.571	1.0342	0.24	0.08	96.834	2.708	0.12	0.007	0.008	0.001	0.001	0.001	0.138	0	Chromatograph	Accumulated
6075	GQC06041	1/5/2023 9:00	1/5/2023	0.575	1.0397	0.251	0.117	96.095	3.328	0.176	0.012	0.014	0.003	0.002	0.002	0.209	0	Chromatograph	Accumulated
6075	GQC06041	1/6/2023 9:00	1/6/2023	0.575	1.0389	0.249	0.119	96.187	3.24	0.174	0.012	0.014	0.003	0.002	0.003	0.208	0	Chromatograph	Accumulated
6075	GQC06041	1/7/2023 9:00	1/7/2023	0.578	1.0431	0.26	0.142	95.637	3.693	0.221	0.016	0.019	0.004	0.002	0.004	0.266	0	Chromatograph	Accumulated
6075	GQC06041	1/8/2023 9:00	1/8/2023	0.579	1.0438	0.262	0.151	95.547	3.76	0.231	0.018	0.02	0.004	0.003	0.005	0.281	0	Chromatograph	Accumulated
6075	GQC06041	1/9/2023 9:00	1/9/2023	0.577	1.0417	0.257	0.141	95.818	3.53	0.21	0.016	0.018	0.004	0.002	0.004	0.254	0	Chromatograph	Accumulated
6075	GQC06041	1/10/2023 9:00	1/10/2023	0.577	1.0419	0.258	0.138	95.796	3.552	0.211	0.016	0.018	0.004	0.002	0.004	0.255	0	Chromatograph	Accumulated
6075	GQC06041	1/11/2023 9:00	1/11/2023	0.577	1.0417	0.257	0.138	95.824	3.525	0.211	0.016	0.018	0.004	0.002	0.004	0.255	0	Chromatograph	Accumulated
6075	GQC06041	1/12/2023 9:00	1/12/2023	0.575	1.039	0.254	0.116	96.193	3.219	0.181	0.013	0.015	0.003	0.002	0.003	0.217	0	Chromatograph	Accumulated
6075	GQC06041	1/13/2023 9:00	1/13/2023	0.578	1.0434	0.258	0.15	95.609	3.706	0.229	0.017	0.02	0.005	0.003	0.004	0.278	0	Chromatograph	Accumulated
6075	GQC06041	1/14/2023 9:00	1/14/2023	0.577	1.041	0.258	0.136	95.911	3.449	0.203	0.015	0.018	0.004	0.002	0.004	0.246	0	Chromatograph	Accumulated
6075	GQC06041	1/15/2023 9:00	1/15/2023	0.577	1.0413	0.255	0.145	95.866	3.484	0.206	0.015	0.018	0.004	0.002	0.004	0.249	0	Chromatograph	Accumulated
6075	GQC06041	1/16/2023 9:00	1/16/2023	0.577	1.041	0.256	0.141	95.906	3.451	0.204	0.015	0.018	0.004	0.002	0.004	0.247	0	Chromatograph	Accumulated
6075	GQC06041	1/17/2023 9:00	1/17/2023	0.577	1.0413	0.255	0.143	95.862	3.489	0.207	0.015	0.018	0.004	0.002	0.004	0.250	0	Chromatograph	Accumulated
6075	GQC06041	1/18/2023 9:00	1/18/2023	0.578	1.0432	0.258	0.158	95.605	3.705	0.227	0.017	0.02	0.004	0.002	0.004	0.274	0	Chromatograph	Accumulated
6075	GQC06041	1/19/2023 9:00	1/19/2023	0.577	1.0419	0.254	0.144	95.805	3.536	0.218	0.016	0.019	0.004	0.002	0.003	0.262	0	Chromatograph	Accumulated
6075	GQC06041	1/20/2023 9:00	1/20/2023	0.577	1.0417	0.255	0.146	95.812	3.527	0.215	0.016	0.018	0.004	0.002	0.004	0.259	0	Chromatograph	Accumulated
6075	GQC06041	1/21/2023 9:00	1/21/2023	0.576	1.0395	0.251	0.133	96.094	3.297	0.187	0.013	0.015	0.003	0.002	0.003	0.223	0	Chromatograph	Accumulated
6075	GQC06041	1/22/2023 9:00	1/22/2023	0.575	1.0386	0.25	0.125	96.218	3.198	0.175	0.012	0.014	0.003	0.002	0.003	0.209	0	Chromatograph	Accumulated
6075	GQC06041	1/23/2023 9:00	1/23/2023	0.575	1.0392	0.249	0.138	96.121	3.272	0.183	0.013	0.015	0.003	0.002	0.003	0.219	0	Chromatograph	Accumulated
6075	GQC06041	1/24/2023 9:00	1/24/2023	0.577	1.0409	0.254	0.148	95.901	3.457	0.199	0.014	0.017	0.004	0.002	0.004	0.240	0	Chromatograph	Accumulated
6075	GQC06041	1/25/2023 9:00	1/25/2023	0.576	1.04	0.251	0.154	95.988	3.376	0.191	0.013	0.016	0.003	0.002	0.004	0.229	0	Chromatograph	Accumulated
6075	GQC06041	1/26/2023 9:00	1/26/2023	0.576	1.0402	0.251	0.143	95.996	3.384	0.189	0.014	0.016	0.003	0.002	0.004	0.228	0	Chromatograph	Accumulated
6075	GQC06041	1/27/2023 9:00	1/27/2023	0.576	1.0398	0.25	0.145	96.043	3.335	0.189	0.013	0.016	0.003	0.002	0.004	0.227	0	Chromatograph	Accumulated
6075	GQC06041	1/28/2023 9:00	1/28/2023	0.571	1.0333	0.241	0.086	96.931	2.607	0.116	0.007	0.008	0.002	0.001	0.002	0.136	0	Chromatograph	Accumulated
6075	GQC06041	1/29/2023 9:00	1/29/2023	0.57	1.0325	0.24	0.078	97.035	2.523	0.107	0.006	0.007	0.001	0.001	0.001	0.123	0	Chromatograph	Accumulated
6075	GQC06041	1/30/2023 9:00	1/30/2023	0.571	1.0332	0.238	0.084	96.946	2.599	0.115	0.007	0.008	0.001	0.001	0.001	0.133	0	Chromatograph	Accumulated
6075	GQC06041	1/31/2023 9:00	1/31/2023	0.574	1.0369	0.246	0.115	96.445	3.008	0.156	0.011	0.012	0.003	0.002	0.003	0.187	0	Chromatograph	Accumulated
6075	GQC06041	2/1/2023 9:00	2/1/2023	0.574	1.0379	0.249	0.125	96.315	3.106	0.17	0.012	0.014	0.003	0.002	0.004	0.205	0	Chromatograph	Accumulated
6075	GQC06041	2/2/2023 9:00	2/2/2023	0.576	1.0401	0.256	0.138	96.011	3.363	0.192	0.014	0.016	0.004	0.002	0.004	0.232	0	Chromatograph	Accumulated
6075	GQC06041	2/3/2023 9:00	2/3/2023	0.576	1.0399	0.252	0.139	96.041	3.335	0.195	0.014	0.017	0.004	0.002	0.003	0.235	0	Chromatograph	Accumulated
6075	GQC06041	2/4/2023 9:00	2/4/2023	0.577	1.0418	0.255	0.151	95.803	3.527	0.217	0.016	0.019	0.004	0.003	0.005	0.264	0	Chromatograph	Accumulated
6075	GQC06041	2/5/2023 9:00	2/5/2023	0.575	1.0387	0.25	0.133	96.208	3.18	0.189	0.014	0.016	0.004	0.002	0.004	0.229	0	Chromatograph	Accumulated
6075	GQC06041	2/6/2023 9:00	2/6/2023	0.574	1.0372	0.252	0.127	96.391	3.027	0.17	0.012	0.014	0.003	0.002	0.003	0.204	0	Chromatograph	Accumulated

6075	GQC06041	2/7/2023 9:00	2/7/2023	0.577	1.0417	0.257	0.149	95.814	3.512	0.22	0.017	0.02	0.004	0.003	0.004	0.268	0	Chromatograph	Accumulated
6075	GQC06041	2/8/2023 9:00	2/8/2023	0.579	1.0439	0.264	0.16	95.516	3.77	0.237	0.019	0.022	0.005	0.003	0.005	0.291	0	Chromatograph	Accumulated
6075	GQC06041	2/9/2023 9:00	2/9/2023	0.571	1.0331	0.243	0.086	96.946	2.588	0.117	0.007	0.008	0.002	0.001	0.002	0.137	0	Chromatograph	Accumulated
6075	GQC06041	2/10/2023 9:00	2/10/2023	0.569	1.0308	0.239	0.071	97.25	2.333	0.093	0.005	0.006	0.001	0.001	0.001	0.107	0	Chromatograph	Accumulated
6075	GQC06041	2/11/2023 9:00	2/11/2023	0.57	1.0319	0.24	0.074	97.112	2.456	0.102	0.006	0.007	0.001	0.001	0.001	0.118	0	Chromatograph	Accumulated
6075	GQC06041	2/12/2023 9:00	2/12/2023	0.569	1.0316	0.236	0.07	97.168	2.414	0.098	0.005	0.006	0.001	0	0.001	0.111	0	Chromatograph	Accumulated
6075	GQC06041	2/13/2023 9:00	2/13/2023	0.571	1.0339	0.243	0.087	96.869	2.65	0.127	0.008	0.01	0.002	0.001	0.002	0.150	0	Chromatograph	Accumulated
6075	GQC06041	2/14/2023 9:00	2/14/2023	0.571	1.0334	0.24	0.081	96.933	2.604	0.12	0.008	0.009	0.002	0.001	0.002	0.142	0	Chromatograph	Accumulated
6075	GQC06041	2/15/2023 9:00	2/15/2023	0.572	1.0344	0.244	0.093	96.8	2.703	0.136	0.009	0.01	0.002	0.001	0.002	0.160	0	Chromatograph	Accumulated
6075	GQC06041	2/16/2023 9:00	2/16/2023	0.571	1.0337	0.243	0.087	96.883	2.635	0.128	0.008	0.009	0.002	0.001	0.002	0.150	0	Chromatograph	Accumulated
6075	GQC06041	2/17/2023 9:00	2/17/2023	0.571	1.0338	0.246	0.083	96.884	2.636	0.128	0.008	0.01	0.002	0.001	0.002	0.151	0	Chromatograph	Accumulated
6075	GQC06041	2/18/2023 9:00	2/18/2023	0.569	1.0313	0.237	0.074	97.191	2.383	0.099	0.005	0.006	0.001	0.001	0.001	0.113	0	Chromatograph	Accumulated
6075	GQC06041	2/19/2023 9:00	2/19/2023	0.57	1.0324	0.239	0.085	97.055	2.488	0.114	0.007	0.008	0.002	0.001	0.002	0.134	0	Chromatograph	Accumulated
6075	GQC06041	2/20/2023 9:00	2/20/2023	0.571	1.0331	0.24	0.093	96.95	2.573	0.122	0.008	0.009	0.002	0.001	0.002	0.144	0	Chromatograph	Accumulated
6075	GQC06041	2/21/2023 9:00	2/21/2023	0.57	1.0321	0.24	0.079	97.095	2.46	0.108	0.006	0.007	0.001	0.001	0.001	0.124	0	Chromatograph	Accumulated
6075	GQC06041	2/22/2023 9:00	2/22/2023	0.569	1.0314	0.238	0.074	97.178	2.397	0.099	0.005	0.006	0.001	0.001	0.001	0.113	0	Chromatograph	Accumulated
6075	GQC06041	2/23/2023 9:00	2/23/2023	0.57	1.032	0.24	0.079	97.103	2.456	0.105	0.006	0.007	0.001	0.001	0.001	0.121	0	Chromatograph	Accumulated
6075	GQC06041	2/24/2023 9:00	2/24/2023	0.575	1.0388	0.252	0.137	96.167	3.228	0.18	0.013	0.015	0.003	0.002	0.003	0.216	0	Chromatograph	Accumulated
6075	GQC06041	2/25/2023 9:00	2/25/2023	0.574	1.0376	0.254	0.125	96.325	3.097	0.165	0.012	0.013	0.003	0.002	0.004	0.199	0	Chromatograph	Accumulated
6075	GQC06041	2/26/2023 9:00	2/26/2023	0.575	1.0387	0.255	0.135	96.181	3.214	0.178	0.013	0.015	0.003	0.002	0.004	0.215	0	Chromatograph	Accumulated
6075	GQC06041	2/27/2023 9:00	2/27/2023	0.575	1.0382	0.252	0.134	96.252	3.152	0.174	0.012	0.014	0.003	0.002	0.003	0.208	0	Chromatograph	Accumulated
6075	GQC06041	2/28/2023 9:00	2/28/2023	0.576	1.0401	0.256	0.147	95.993	3.368	0.195	0.014	0.017	0.004	0.002	0.004	0.236	0	Chromatograph	Accumulated
6075	GQC06041	3/1/2023 9:00	3/1/2023	0.569	1.0316	0.242	0.074	97.158	2.409	0.1	0.006	0.007	0.001	0.001	0.002	0.117	0	Chromatograph	Accumulated
6075	GQC06041	3/2/2023 9:00	3/2/2023	0.571	1.0338	0.244	0.092	96.852	2.664	0.125	0.008	0.009	0.002	0.001	0.002	0.147	0	Chromatograph	Accumulated
6075	GQC06041	3/3/2023 9:00	3/3/2023	0.573	1.0361	0.245	0.106	96.561	2.913	0.148	0.01	0.012	0.003	0.002	0.003	0.178	0	Chromatograph	Accumulated
6075	GQC06041	3/4/2023 9:00	3/4/2023	0.574	1.037	0.249	0.109	96.443	3.008	0.158	0.011	0.013	0.003	0.002	0.003	0.190	0	Chromatograph	Accumulated
6075	GQC06041	3/5/2023 9:00	3/5/2023	0.575	1.0384	0.255	0.116	96.275	3.137	0.178	0.014	0.015	0.004	0.002	0.004	0.217	0	Chromatograph	Accumulated
6075	GQC06041	3/6/2023 9:00	3/6/2023	0.573	1.0359	0.246	0.104	96.586	2.888	0.147	0.01	0.011	0.003	0.001	0.003	0.175	0	Chromatograph	Accumulated
6075	GQC06041	3/7/2023 9:00	3/7/2023	0.576	1.0405	0.259	0.144	95.945	3.415	0.196	0.014	0.017	0.004	0.002	0.003	0.236	0	Chromatograph	Accumulated
6075	GQC06041	3/8/2023 9:00	3/8/2023	0.577	1.0416	0.263	0.147	95.802	3.538	0.206	0.016	0.018	0.004	0.002	0.004	0.250	0	Chromatograph	Accumulated
6075	GQC06041	3/9/2023 9:00	3/9/2023	0.574	1.0376	0.25	0.116	96.352	3.09	0.161	0.011	0.013	0.003	0.002	0.003	0.193	0	Chromatograph	Accumulated
6075	GQC06041	3/10/2023 9:00	3/10/2023	0.571	1.0337	0.241	0.081	96.88	2.662	0.116	0.007	0.008	0.002	0.001	0.002	0.136	0	Chromatograph	Accumulated
6075	GQC06041	3/11/2023 9:00	3/11/2023	0.572	1.0347	0.245	0.085	96.761	2.761	0.126	0.008	0.01	0.002	0.001	0.002	0.149	0	Chromatograph	Accumulated
6075	GQC06041	3/12/2023 9:00	3/12/2023	0.572	1.0346	0.246	0.088	96.767	2.744	0.131	0.008	0.01	0.002	0.001	0.002	0.154	0	Chromatograph	Accumulated
6075	GQC06041	3/13/2023 9:00	3/13/2023	0.571	1.0343	0.246	0.085	96.806	2.714	0.126	0.008	0.009	0.002	0.001	0.002	0.148	0	Chromatograph	Accumulated
6075	GQC06041	3/14/2023 9:00	3/14/2023	0.575	1.0384	0.259	0.117	96.234	3.188	0.167	0.012	0.014	0.003	0.002	0.003	0.201	0	Chromatograph	Accumulated
6075	GQC06041	3/15/2023 9:00	3/15/2023	0.574	1.0378	0.257	0.12	96.302	3.124	0.163	0.012	0.014	0.003	0.002	0.003	0.197	0	Chromatograph	Accumulated
6075	GQC06041	3/16/2023 9:00	3/16/2023	0.574	1.0371	0.254	0.113	96.41	3.036	0.156	0.011	0.013	0.003	0.002	0.003	0.188	0	Chromatograph	Accumulated
6075	GQC06041	3/17/2023 9:00	3/17/2023	0.571	1.0335	0.245	0.086	96.894	2.635	0.119	0.007	0.009	0.002	0.001	0.002	0.140	0	Chromatograph	Accumulated
6075	GQC06041	3/18/2023 9:00	3/18/2023	0.573	1.036	0.246	0.112	96.547	2.923	0.145	0.009	0.011	0.002	0.001	0.002	0.170	0	Chromatograph	Accumulated
6075	GQC06041	3/19/2023 9:00	3/19/2023	0.573	1.0354	0.247	0.112	96.613	2.86	0.142	0.009	0.011	0.002	0.001	0.002	0.167	0	Chromatograph	Accumulated
6075	GQC06041	3/20/2023 9:00	3/20/2023	0.574	1.0376	0.255	0.117	96.341	3.094	0.161	0.011	0.013	0.003	0.002	0.003	0.193	0	Chromatograph	Accumulated
6075	GQC06041	3/21/2023 9:00	3/21/2023	0.569	1.0305	0.241	0.063	97.297	2.299	0.087	0.005	0.005	0.001	0.001	0.001	0.100	0	Chromatograph	Accumulated
6075	GQC06041	3/22/2023 9:00	3/22/2023	0.567	1.0283	0.238	0.043	97.6	2.054	0.061	0.002	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	3/23/2023 9:00	3/23/2023	0.567	1.0289	0.235	0.047	97.518	2.128	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	3/24/2023 9:00	3/24/2023	0.567	1.0286	0.237	0.045	97.552	2.097	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	3/25/2023 9:00	3/25/2023	0.567	1.0286	0.234	0.044	97.561	2.093	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	3/26/2023 9:00	3/26/2023	0.567	1.0288	0.238	0.048	97.527	2.11	0.069	0.003	0.003	0	0	0	0.075	0	Chromatograph	Accumulated
6075	GQC06041	3/27/2023 9:00	3/27/2023	0.568	1.0294	0.235	0.052	97.462	2.17	0.074	0.003	0.004	0	0	0	0.081	0	Chromatograph	Accumulated
6075	GQC06041	3/28/2023 9:00	3/28/2023	0.569	1.0309	0.235	0.062	97.254	2.352	0.087	0.004	0.005	0.001	0	0	0.097	0	Chromatograph	Accumulated
6075	GQC06041	3/29/2023 9:00	3/29/2023	0.57	1.0318	0.239	0.071	97.119	2.461	0.097	0.005	0.006	0.001	0	0.001	0.110	0	Chromatograph	Accumulated
6075	GQC06041	3/30/2023 9:00	3/30/2023	0.569	1.0304	0.247	0.059	97.296	2.309	0.081	0.004	0.005	0.001	0	0	0.091	0	Chromatograph	Accumulated
6075	GQC06041	3/31/2023 9:00	3/31/2023	0.57	1.0329	0.244	0.076	96.973	2.592	0.101	0.005	0.006	0.001	0.001	0.001	0.115	0	Chromatograph	Accumulated
6075	GQC06041	4/1/2023 9:00	4/1/2023	0.57	1.0318	0.238	0.071	97.138	2.442	0.097	0.005	0.006	0.001	0.001	0.001	0.111	0	Chromatograph	Accumulated
6075	GQC06041	4/2/2023 9:00	4/2/2023	0.568	1.0294	0.24	0.052	97.443	2.183	0.074	0.003	0.004	0	0	0	0.081	0	Chromatograph	Accumulated
6075	GQC06041	4/3/2023 9:00	4/3/2023	0.568	1.0294	0.237	0.046	97.465	2.175	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	4/4/2023 9:00	4/4/2023	0.569	1.0316	0.232	0.063	97.177	2.421	0.095	0.005	0.006	0.001	0	0	0.107	0	Chromatograph	Accumulated
6075	GQC06041	4/5/2023 9:00	4/5/2023	0.568	1.0293	0.235	0.046	97.472	2.171	0.07	0.002	0.003	0	0	0	0.075	0	Chromatograph	Accumulated
6075	GQC06041	4/6/2023 9:00	4/6/2023	0.567	1.0292	0.231	0.043	97.498	2.154	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	4/7/2023 9:00	4/7/2023	0.568	1.0296	0.235	0.049	97.436	2.201	0.072	0.002	0.003	0	0	0	0.077	0	Chromatograph	Accumulated
6075	GQC06041	4/8/2023 9:00	4/8/2023	0.567	1.0292	0.231	0.044	97.501	2.151	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	4/9/2023 9:00	4/9/2023	0.568	1.0295	0.229	0.048	97.458	2.188	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	4/10/2023 9:00	4/10/2023	0.568	1.03	0.233	0.053	97.381	2.251	0.076	0.003	0.004	0	0	0	0.083	0	Chromatograph	Accumulated
6075	GQC06041	4/11/2023 9:00	4/11/2023	0.567	1.0292	0.231	0.045	97.499	2.151	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	4/12/2023 9:00	4/12/2023	0.567	1.0285	0.236	0.039	97.585	2.073	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	4/13/2023 9:00	4/13/2023	0.567	1.0283	0.238	0.039	97.606	2.052	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	4/14/2023 9:00	4/14/2023	0.567	1.0284	0.237	0.04	97.586	2.07	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	4/15/2023 9:00	4/15/2023	0.567	1.029	0.235	0.044	97.513	2.136	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	4/16/2023 9:00	4/16/2023	0.567	1.0287	0.237	0.041	97.557	2.096	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	4/17/2023 9:00	4/17/2023	0.567	1.029	0.238	0.045	97.505	2.138	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	4/18/2023 9:00	4/18/2023	0.57	1.033	0.241	0.076	96.972	2.585	0.111	0.006	0.007	0.001	0	0	0.125	0	Chromatograph	Accumulated
6075	GQC06041	4/19/2023 9:00	4/19/2023	0.568	1.0297	0.236	0.051	97.42	2.21	0.076	0.003	0.004	0	0	0	0.083	0	Chromatograph	Accumulated
6075	GQC06041	4/20/2023 9:00	4/20/2023	0.567	1.0289	0.234	0.043	97.535	2.117	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	4/21/2023 9:00	4/21/2023	0.567	1.0289	0.235	0.044	97.531	2.119	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	4/22/2023 9:00	4/22/2023	0.567	1.0284	0.238	0.04	97.593	2.063	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated

6075	GQC06041	4/23/2023 9:00	4/23/2023	0.567	1.0286	0.238	0.042	97.564	2.088	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	4/24/2023 9:00	4/24/2023	0.568	1.0293	0.243	0.051	97.454	2.175	0.071	0.003	0.003	0	0	0	0.077	0	Chromatograph	Accumulated
6075	GQC06041	4/25/2023 9:00	4/25/2023	0.567	1.0289	0.242	0.045	97.51	2.131	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	4/26/2023 9:00	4/26/2023	0.567	1.0288	0.235	0.047	97.535	2.112	0.066	0.002	0.003	0	0	0	0.071	0	Chromatograph	Accumulated
6075	GQC06041	4/27/2023 9:00	4/27/2023	0.569	1.0312	0.237	0.062	97.211	2.388	0.091	0.004	0.005	0.001	0	0	0.101	0	Chromatograph	Accumulated
6075	GQC06041	4/28/2023 9:00	4/28/2023	0.567	1.0292	0.233	0.05	97.489	2.154	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	4/29/2023 9:00	4/29/2023	0.567	1.029	0.23	0.047	97.518	2.132	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	4/30/2023 9:00	4/30/2023	0.568	1.0293	0.232	0.05	97.477	2.165	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	5/1/2023 9:00	5/1/2023	0.567	1.0282	0.237	0.039	97.622	2.04	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	5/2/2023 9:00	5/2/2023	0.567	1.0286	0.235	0.043	97.564	2.091	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	5/3/2023 9:00	5/3/2023	0.567	1.0292	0.232	0.047	97.496	2.152	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	5/4/2023 9:00	5/4/2023	0.567	1.0291	0.232	0.047	97.502	2.146	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	5/5/2023 9:00	5/5/2023	0.567	1.0291	0.225	0.044	97.522	2.136	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	5/6/2023 9:00	5/6/2023	0.567	1.0285	0.233	0.042	97.581	2.078	0.063	0.002	0.002	0	0	0	0.067	0	Chromatograph	Accumulated
6075	GQC06041	5/7/2023 9:00	5/7/2023	0.567	1.0284	0.236	0.041	97.594	2.062	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/8/2023 9:00	5/8/2023	0.567	1.0282	0.235	0.04	97.62	2.041	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	5/9/2023 9:00	5/9/2023	0.567	1.0282	0.235	0.04	97.617	2.044	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	5/10/2023 9:00	5/10/2023	0.567	1.0281	0.236	0.039	97.628	2.034	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	5/11/2023 9:00	5/11/2023	0.567	1.0283	0.235	0.041	97.602	2.056	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/12/2023 9:00	5/12/2023	0.567	1.0281	0.237	0.039	97.629	2.032	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	5/13/2023 9:00	5/13/2023	0.567	1.0281	0.236	0.039	97.629	2.032	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	5/14/2023 9:00	5/14/2023	0.567	1.0281	0.24	0.04	97.622	2.035	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	5/15/2023 9:00	5/15/2023	0.567	1.028	0.242	0.04	97.629	2.027	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	5/16/2023 9:00	5/16/2023	0.566	1.0278	0.242	0.037	97.657	2.004	0.057	0.001	0.002	0	0	0	0.060	0	Chromatograph	Accumulated
6075	GQC06041	5/17/2023 9:00	5/17/2023	0.567	1.0284	0.235	0.041	97.59	2.067	0.063	0.001	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/18/2023 9:00	5/18/2023	0.567	1.0285	0.234	0.042	97.578	2.078	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	5/19/2023 9:00	5/19/2023	0.567	1.0286	0.235	0.043	97.564	2.09	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	5/20/2023 9:00	5/20/2023	0.567	1.0285	0.235	0.042	97.575	2.08	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	5/21/2023 9:00	5/21/2023	0.567	1.0284	0.236	0.042	97.591	2.065	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/22/2023 9:00	5/22/2023	0.567	1.0283	0.238	0.043	97.59	2.064	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/23/2023 9:00	5/23/2023	0.567	1.0286	0.233	0.046	97.56	2.093	0.064	0.002	0.003	0	0	0	0.069	0	Chromatograph	Accumulated
6075	GQC06041	5/24/2023 9:00	5/24/2023	0.567	1.0291	0.234	0.051	97.495	2.147	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
6075	GQC06041	5/25/2023 9:00	5/25/2023	0.567	1.0287	0.234	0.046	97.55	2.102	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	5/26/2023 9:00	5/26/2023	0.567	1.0284	0.237	0.044	97.583	2.07	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/27/2023 9:00	5/27/2023	0.567	1.028	0.236	0.039	97.636	2.027	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	5/28/2023 9:00	5/28/2023	0.567	1.0283	0.239	0.044	97.585	2.066	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	5/29/2023 9:00	5/29/2023	0.567	1.0284	0.239	0.045	97.577	2.073	0.062	0.002	0.003	0	0	0	0.067	0	Chromatograph	Accumulated
6075	GQC06041	5/30/2023 9:00	5/30/2023	0.567	1.0284	0.235	0.043	97.59	2.066	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	5/31/2023 9:00	5/31/2023	0.567	1.028	0.234	0.04	97.64	2.025	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	6/1/2023 9:00	6/1/2023	0.567	1.0284	0.233	0.041	97.601	2.06	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	6/2/2023 9:00	6/2/2023	0.567	1.0284	0.234	0.042	97.588	2.07	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	6/3/2023 9:00	6/3/2023	0.567	1.0285	0.234	0.043	97.578	2.079	0.062	0.001	0.002	0	0	0	0.065	0	Chromatograph	Accumulated
6075	GQC06041	6/4/2023 9:00	6/4/2023	0.567	1.0281	0.237	0.04	97.628	2.033	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	6/5/2023 9:00	6/5/2023	0.567	1.0279	0.236	0.039	97.652	2.013	0.057	0.001	0.002	0	0	0	0.060	0	Chromatograph	Accumulated
6075	GQC06041	6/6/2023 9:00	6/6/2023	0.567	1.0283	0.236	0.042	97.604	2.053	0.06	0.001	0.002	0	0	0	0.063	0	Chromatograph	Accumulated
6075	GQC06041	6/7/2023 9:00	6/7/2023	0.567	1.0282	0.24	0.041	97.612	2.045	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	6/8/2023 9:00	6/8/2023	0.567	1.0285	0.236	0.045	97.572	2.08	0.062	0.001	0.003	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	6/9/2023 9:00	6/9/2023	0.567	1.0281	0.236	0.04	97.626	2.036	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	6/10/2023 9:00	6/10/2023	0.567	1.028	0.236	0.039	97.641	2.024	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	6/11/2023 9:00	6/11/2023	0.567	1.0284	0.238	0.044	97.582	2.07	0.062	0.002	0.002	0	0	0	0.066	0	Chromatograph	Accumulated
6075	GQC06041	6/12/2023 9:00	6/12/2023	0.567	1.0281	0.237	0.042	97.618	2.04	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	6/13/2023 9:00	6/13/2023	0.567	1.0286	0.234	0.046	97.566	2.086	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	6/14/2023 9:00	6/14/2023	0.567	1.0282	0.235	0.042	97.62	2.04	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	6/15/2023 9:00	6/15/2023	0.567	1.0285	0.233	0.044	97.575	2.081	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	6/16/2023 9:00	6/16/2023	0.567	1.0281	0.236	0.042	97.62	2.04	0.059	0.001	0.002	0	0	0	0.062	0	Chromatograph	Accumulated
6075	GQC06041	6/17/2023 9:00	6/17/2023	0.567	1.0284	0.236	0.043	97.584	2.071	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	6/18/2023 9:00	6/18/2023	0.567	1.028	0.239	0.041	97.63	2.029	0.058	0.001	0.002	0	0	0	0.061	0	Chromatograph	Accumulated
6075	GQC06041	6/19/2023 9:00	6/19/2023	0.567	1.0284	0.24	0.046	97.569	2.079	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	6/20/2023 9:00	6/20/2023	0.568	1.0292	0.234	0.051	97.479	2.161	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	6/21/2023 9:00	6/21/2023	0.567	1.0288	0.237	0.05	97.516	2.125	0.067	0.002	0.003	0	0	0	0.072	0	Chromatograph	Accumulated
6075	GQC06041	6/22/2023 9:00	6/22/2023	0.567	1.0283	0.235	0.043	97.598	2.06	0.061	0.001	0.002	0	0	0	0.064	0	Chromatograph	Accumulated
6075	GQC06041	6/23/2023 9:00	6/23/2023	0.568	1.0292	0.238	0.055	97.463	2.168	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	6/24/2023 9:00	6/24/2023	0.567	1.0284	0.241	0.046	97.567	2.079	0.063	0.002	0.003	0	0	0	0.068	0	Chromatograph	Accumulated
6075	GQC06041	6/25/2023 9:00	6/25/2023	0.567	1.0287	0.237	0.048	97.539	2.107	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	6/26/2023 9:00	6/26/2023	0.567	1.0288	0.238	0.046	97.526	2.12	0.065	0.002	0.003	0	0	0	0.070	0	Chromatograph	Accumulated
6075	GQC06041	6/27/2023 9:00	6/27/2023	0.568	1.0292	0.235	0.053	97.471	2.166	0.069	0.002	0.003	0	0	0	0.074	0	Chromatograph	Accumulated
6075	GQC06041	6/28/2023 9:00	6/28/2023	0.568	1.0293	0.236	0.056	97.451	2.18	0.071	0.002	0.003	0	0	0	0.076	0	Chromatograph	Accumulated
6075	GQC06041	6/29/2023 9:00	6/29/2023	0.568	1.0294	0.236	0.054	97.448	2.185	0.072	0.002	0.003	0	0	0	0.077	0	Chromatograph	Accumulated
6075	GQC06041	6/30/2023 9:00	6/30/2023	0.567	1.029	0.234	0.052	97.499	2.143	0.068	0.002	0.003	0	0	0	0.073	0	Chromatograph	Accumulated
			Averages:	**0.570**	**1.032**	**0.240**	**0.068**	**97.138**	**2.440**	**0.100**	**0.005**	**0.007**	**0.001**	**0.001**	**0.001**	**0.114**	**0.000**		

New cells added to GC data by DEP

Highest daily VOC content

VOC and GHG PTEs for Piping and Fugitive Emissions Components Not in VOC Service

Area	Equipment Type	Service	Emission Factor (kg/hr/source)[a]	Fluid 1 Ethane	Fluid 3 Natural Gas / Fuel Gas	Fluid 6 Flare Gas	Component Counts	VOC Emissions (tons/year)	CO_2e Emissions (tons/year)[b]
Ethane Chilling System	Valves	Gas	0.00597	377	176	18	571	0.45	287.89
		Light Liquid	0.00403	221	0	0	221	0.17	6.45
	Compressor Seals	Gas	0.228	8	0	0	8	0.35	13.21
	Pressure Relief Valves	Gas	0.104	20	0	0	20	0.40	15.06
	Connectors	All	0.00183	1913	423	60	2,396	0.69	232.62
			TOTALS	2539	599	78	3216	**2.06**	**555.24**

Speciated Composition Information

Constituents	Fluid 1 Ethane	Fluid 3 Natural Gas / Fuel Gas	Fluid 6 Flare Gas
Methane	3.0%	97.138%	97.138%
Ethane	95.0%	2.440%	2.440%
Propane	2.0%	0.100%	0.100%
i-Butane	0.0%	0.005%	0.005%
n-Butane	0.0%	0.007%	0.007%
i-Pentane	0.0%	0.001%	0.001%
n-Pentane	0.0%	0.001%	0.001%
Hexane	0.0%	0.001%	0.001%
Total VOCs	**2.0%**	**0.114%**	**0.114%**
Total GHGs	**3.0%**	**97.138%**	**97.138%**

[a] Emission Factors from EPA's *Procotol for Equipment Leak Emission Estimates,* EPA-453/R-95-017, Table 2-1.

[b] The global warming potential of methane from 40 CFR Part 98, Table A-1, is 25.

Sunoco Partners Marketing & Terminals L.P.
Ethane Chilling Expansion
February 2022
Flare Emissions Summary

Cold Flares	MMBtu/hr	Emissions (TPY)				
		NO_x	CO	VOC	SO_2	CO_2e
C01 HP Cold Flare						
Sweep Continuous Flows	0.49	0.1458	0.6645	0.0095	0.0013	298.74
Operational & Maintenance Flows	1.96E-05	2.67E-05	2.67E-05	2.64E-05	0	1.20E-02
C01 LP Cold Flare						
Operational & Maintenance Flows	0.64	0.1897	0.8647	0.4281	0	389.97
C04 HP Cold Flare						
Operational & Maintenance Flows	0.05	0.0161	0.0733	0.0502	0	33.04
Total	**1.18**	**0.35**	**1.60**	**0.49**	**0.001**	**721.75**

Sunoco Partners Marketing & Terminals L.P.
Ethane Chilling Expansion
February 2022
Flare Emissions - Sweep Flow

			C01 HP Cold Flare		
Sweep Gas Flow			**Value**	**Units**	**Notes**
[A]	Natural Gas Mass Flow	=	190,530	lb/yr	Engineering Analysis
[B]	Natural Gas HHV	=	22,500	Btu/lb	Literature Value
[C]	Heating Duty (Natural Gas)	=	4,287	MMBtu/yr	= [A] * [B] /1000000
[D]	Operating Hours	=	8,760	hrs/yr	Assumption
[E]	SPMT Heating Duty	=	0.49	MMBtu/hr	= [C] / [D]
Flare Emissions			**Value**	**Units**	**Notes**
[F]	NO_x Emission Factor	=	0.068	lb/MMBtu	AP-42 Ch 13.5, Table 13.5-1
[G1]	VOC Destruction Efficiency	=	99%	% DRE	Compliance with 40 CFR 60.18
[G2]	VOC Content of natural gas	=	1%	% VOC	Composition Data
[H]	CO Emission Factor	=	0.31	lb/MMBtu	AP-42 Ch 13.5, Table 13.5-2 (Updated April 2015)
[I]	SO_2 Emission Factor	=	0.0006	lb/MMBtu	AP-42 Table 1.4-2 (converted to lb/MMBtu)
[J]	NO_x Emission Rate	=	0.0333	lb/hr	= [E] * [F]
[K]	VOC Emission Rate	=	0.0022	lb/hr	= [A] / [D] * (1 - [G1]) * [G2]
[L]	CO Emission Rate	=	0.1517	lb/hr	= [E] * [H]
[M]	SO_2 Emission Rate	=	2.86E-04	lb/hr	= [E] * [I]
[N]	NO_x Emissions	=	0.1458	TPY	= [J] * 8760/2000
[O]	VOC Emissions	=	0.0095	TPY	= [K] * 8760/2000
[P]	CO Emissions	=	0.6645	TPY	= [L] * 8760/2000
[Q]	SO_2 Emissions	=	0.0013	TPY	= [M] * 8760/2000
[R]	CH_4 Emission factor for natural gas	=	0.001	kg/MMBtu	40 CFR Part 98, Table C-2
[S]	N_2O Emission factor for natural gas	=	0.0001	kg/MMBtu	40 CFR Part 98, Table C-2
[T]	CO_2 Emissions	=	252	metric tons/year	40 CFR Part 98, Equation Y-3
[U]	CO_2 Emissions	=	278	TPY	Conversion
[V]	CH_4 Emissions	=	0.7525	metric tons/year	40 CFR Part 98, Equation Y-4
[W]	CH_4 Emissions	=	0.8294	TPY	Conversion
[X]	CH_4 Global Warming Potential	=	25		40 CFR Part 98, Table A-1
[Y]	N_2O Emissions	=	0.0004	metric tons/year	40 CFR Part 98, Equation Y-5
[Z]	N_2O Emissions	=	0.0005	TPY	Conversion
[AA]	N_2O Global Warming Potential	=	298		40 CFR Part 98, Table A-1
[AB]	CO_2e Emissions	=	299	TPY	= [U] + [W] * [X] + [Z] * [AA]

Sunoco Partners Marketing & Terminals L.P.
Ethane Chilling Expansion
February 2022
Flare Emissions - Operation & Maintenance Flows

			C01 HP Cold Flare	C01 LP Cold Flare		
Operational & Maintenance Flow			**Value**	**Value**	**Units**	**Notes**
[A]	Butane Mass Flow	=	0.00	0.00	lb/yr	Engineering Analysis
[B]	Ethane Mass Flow	=	3.81	123,406.50	lb/yr	Engineering Analysis
[C]	Methane Mass Flow	=	1.32	42,814.50	lb/yr	Engineering Analysis
[D]	Pentane Mass Flow	=	1.24	40,296.00	lb/yr	Engineering Analysis
[E]	Propane Mass Flow	=	1.40	45,333.00	lb/yr	Engineering Analysis
[F]	Butane HHV	=	21,640	21,640	Btu/lb	Engineering Analysis
[G]	Ethane HHV	=	22,198	22,198	Btu/lb	Engineering Analysis
[H]	Methane HHV	=	23,811	23,811	Btu/lb	Engineering Analysis
[I]	Pentane HHV	=	20,908	20,908	Btu/lb	Engineering Analysis
[L]	Propane HHV	=	21,564	21,564	Btu/lb	Engineering Analysis
[M]	Butane Heating Duty	=	0.00	0.00	MMBtu/yr	= [A] * [F] / 1,000,000
[N]	Ethane Heating Duty	=	0.08	2,739	MMBtu/yr	= [B] * [G] / 1,000,000
[O]	Methane Heating Duty	=	0.03	1,019.46	MMBtu/yr	= [C] * [H] / 1,000,000
[P]	Pentane Heating Duty	=	0.03	843	MMBtu/yr	= [D] * [I] / 1,000,000
[Q]	Propane Heating Duty	=	0.03	978	MMBtu/yr	= [E] * [L] / 1,000,000
[R]	Total Heating Duty	=	0.17	5,579	MMBtu/yr	= [M] + [N] + [O] + [P] + [Q]
[S]	Operating Hours	=	8,760	8,760	hrs/yr	Assumption
[T]	SPMT Heating Duty	=	0.00	0.64	MMBtu/hr	= [R] / [S]
Flare Emissions			**Value**	**Value**	**Units**	**Notes**
[U]	NO_x Emission Factor	=	0.068	0.068	lb/MMBtu	AP-42 Ch 13.5, Table 13.5-1
[W]	VOC Destruction Efficiency	=	98%	99%	% DRE	Compliance with 40 CFR 60.18
[X]	VOC Content of Natural Gas	=	1%	1%	% VOC	Composition Data
[Y]	CO Emission Factor	=	0.31	0.31	lb/MMBtu	AP-42 Ch 13.5, Table 13.5-2 (Updated April 2015)
[Z]	SO_2 Emission Factor (Natural Gas Only)	=	0.0006	0.0006	lb/MMBtu	Only present if Natural Gas is combusted
[AA]	NO_x Emission Rate	=	1.34E-06	0.0433	lb/hr	= [T] * [U]
[AB]	VOC Emission Rate	=	6.03E-06	0.0978	lb/hr	= (([A] + [D] + [E]) * (1 - [W])) / [S]
[AC]	CO Emission Rate	=	6.09E-06	0.1974	lb/hr	= [T] * [Y]
[AD]	SO_2 Emission Rate	=	0	0.0000	lb/hr	Only present if Natural Gas is combusted
[AE]	NO_x Emissions	=	5.85E-06	0.1897	TPY	= [AA] * 8,760 / 2,000
[AF]	VOC Emissions	=	2.64E-05	0.4281	TPY	= [AB] * 8,760 / 2,000
[AG]	CO Emissions	=	2.67E-05	0.8647	TPY	= [AC] * 8,760 / 2,000
[AH]	SO_2 Emissions	=	0	0	TPY	Only present if Natural Gas is combusted
[AI]	CH_4 Emission factor for petroleum products	=	0.0030	0.0030	kg/MMBtu	40 CFR Part 98, Table C-2
[AJ]	N_2O Emission factor for petroleum products	=	0.0006	0.0006	kg/MMBtu	40 CFR Part 98, Table C-2
[AK]	CO_2 Emissions	=	0	328	metric tons/year	40 CFR Part 98, Equation Y-3
[AL]	CO_2 Emissions	=	0	362	TPY	Conversion
[AM]	CH_4 Emissions	=	3.05E-05	0.9902	metric tons/year	40 CFR Part 98, Equation Y-4
[AN]	CH_4 Emissions	=	3.37E-05	1.0915	TPY	Conversion
[AO]	CH_4 Global Warming Potential	=	25	25		40 CFR Part 98, Table A-1
[AP]	N_2O Emissions	=	1.01E-07	0.0033	metric tons/year	40 CFR Part 98, Equation Y-5
[AQ]	N_2O Emissions	=	1.12E-07	0.0036	TPY	Conversion
[AR]	N_2O Global Warming Potential	=	298	298		40 CFR Part 98, Table A-1
[AS]	CO_2e Emissions	=	0	390	TPY	= [AL] + [AN] * [AO] + [AQ] * [AR]

Sunoco Partners Marketing & Terminals L.P.
Ethane Chilling Expansion
February 2022
Flare Emissions - Operation & Maintenance Flows

			C04 HP Cold Flare		
Operational & Maintenance Flow			**Value**	**Units**	**Notes**
[A]	Butane Mass Flow	=	100.61	lb/yr	Engineering Analysis
[B]	Ethane Mass Flow	=	8,677.49	lb/yr	Engineering Analysis
[C]	Methane Mass Flow	=	2,667.67	lb/yr	Engineering Analysis
[D]	Pentane Mass Flow	=	0.00	lb/yr	Engineering Analysis
[E]	Propane Mass Flow	=	9,937.18	lb/yr	Engineering Analysis
[F]	Butane HHV	=	21,640	Btu/lb	Engineering Analysis
[G]	Ethane HHV	=	22,198	Btu/lb	Engineering Analysis
[H]	Methane HHV	=	23,811	Btu/lb	Engineering Analysis
[I]	Pentane HHV	=	20,908	Btu/lb	Engineering Analysis
[L]	Propane HHV	=	21,564	Btu/lb	Engineering Analysis
[M]	Butane Heating Duty	=	2.18	MMBtu/yr	= [A] * [F] / 1,000,000
[N]	Ethane Heating Duty	=	192.62	MMBtu/yr	= [B] * [G] / 1,000,000
[O]	Methane Heating Duty	=	63.52	MMBtu/yr	= [C] * [H] / 1,000,000
[P]	Pentane Heating Duty	=	0.00	MMBtu/yr	= [D] * [I] / 1,000,000
[Q]	Propane Heating Duty	=	214.29	MMBtu/yr	= [E] * [L] / 1,000,000
[R]	Total Heating Duty	=	472.61	MMBtu/yr	= [M] + [N] + [O] + [P] + [Q]
[S]	Operating Hours	=	8,760	hrs/yr	Assumption
[T]	SPMT Heating Duty	=	0.05	MMBtu/hr	= [R] / [S]

Flare Emissions			**Value**	**Units**	**Notes**
[U]	NO_x Emission Factor	=	0.068	lb/MMBtu	AP-42 Ch 13.5, Table 13.5-1
[W]	VOC Destruction Efficiency	=	99%	% DRE	Compliance with 40 CFR 60.18
[X]	VOC Content of Natural Gas	=	1%	% VOC	Composition Data
[Y]	CO Emission Factor	=	0.31	lb/MMBtu	AP-42 Ch 13.5, Table 13.5-2 (Updated April 2015)
[Z]	SO_2 Emission Factor (Natural Gas Only)	=	0.0006	lb/MMBtu	Only present if Natural Gas is combusted
[AA]	NO_x Emission Rate	=	0.0037	lb/hr	= [T] * [U]
[AB]	VOC Emission Rate	=	0.0115	lb/hr	= (([A] + [D] + [E]) * (1 - [W])) / [S]
[AC]	CO Emission Rate	=	0.0167	lb/hr	= [T] * [Y]
[AD]	SO_2 Emission Rate	=	0	lb/hr	Only present if Natural Gas is combusted
[AE]	NO_x Emissions	=	0.0161	TPY	= [AA] * 8,760 / 2,000
[AF]	VOC Emissions	=	0.0502	TPY	= [AB] * 8,760 / 2,000
[AG]	CO Emissions	=	0.0733	TPY	= [AC] * 8,760 / 2,000
[AH]	SO_2 Emissions	=	0	TPY	Only present if Natural Gas is combusted
[AI]	CH_4 Emission factor for petroleum products	=	0.0030	kg/MMBtu	40 CFR Part 98, Table C-2
[AJ]	N_2O Emission factor for petroleum products	=	0.0006	kg/MMBtu	40 CFR Part 98, Table C-2
[AK]	CO_2 Emissions	=	28	metric tons/year	40 CFR Part 98, Equation Y-3
[AL]	CO_2 Emissions	=	31	TPY	Conversion
[AM]	CH_4 Emissions	=	0.0839	metric tons/year	40 CFR Part 98, Equation Y-4
[AN]	CH_4 Emissions	=	0.0925	TPY	Conversion
[AO]	CH_4 Global Warming Potential	=	25		40 CFR Part 98, Table A-1
[AP]	N_2O Emissions	=	0.0003	metric tons/year	40 CFR Part 98, Equation Y-5
[AQ]	N_2O Emissions	=	0.0003	TPY	Conversion
[AR]	N_2O Global Warming Potential	=	298		40 CFR Part 98, Table A-1
[AS]	CO_2e Emissions	=	33	TPY	= [AL] + [AN] * [AO] + [AQ] * [AR]

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.

Prevention of Significant Deterioration (PSD) & New Source Review (NSR) Analyses for All Natural Gas Liquids-Related Projects at Energy Transfer Marketing & Terminals, L.P.—Marcus Hook Terminal

		CO	GHGs	H_2SO_4	NO_x	Pb	PM	PM_{10}	$PM_{2.5}$	SO_2	VOCs	Source Type & Other Notes
Authorizations Comprising Expanded Single Aggregated Project (in reverse chronological order)												
Plan Approval No. 23-0119K (complete application received 3/9/2022)												
Ethane Chilling Expansion Project Piping and Fugitive Emissions Components Not in VOC Service		0	555.24	0	0	0	0	0	0	0	2.06	Construction/modification of existing emissions unit: PTE because fugitive emissions not readily quantifiable
Ethane Chilling Expansion Project Piping and Fugitive Emissions Components in VOC Service		0	2.11	0	0	0	0	0	0	0	2.19	Construction/modification of existing emissions unit: PTE because fugitive emissions not readily quantifiable
West Cold Flare Incremental Emissions Increases		1.529	688.72	0	0.3355	0	0	0	0	0.0013	0.4376	No construction/modification of existing emissions unit: incremental emissions increase
Project Phoenix Cold Flare Incremental Emissions Increases		0.0733	33.04	0	0.0161	0	0	0	0	0	0.0502	No construction/modification of existing emissions unit: incremental emissions increase
Auxiliary Boilers Incremental Emissions Increases		0.430	16,175	0.00678	3.774	0.00117	0.165	0.165	0.165	0.454	0.0715	No construction/modification of existing emissions unit: incremental emissions increase
	Totals	2.033	17,454	0.00678	4.126	0.00117	0.165	0.165	0.165	0.455	4.809	
De Minimis Emissions Increase (written notice received 1/4/2022)												
YZ Light Liquid Sampler Systems and Fugitive Emissions Components		0	0	0	0	0	0	0	0	0	0.0716	New emissions unit: PTE
West Warm Flare Incremental Emissions Increases		0.0059	2.5063	0	0.0013	0	0	0	0	0	0.0178	No construction/modification of existing emissions unit: incremental emissions increase
	Totals	0.0059	2.5063	0	0.0013	0	0	0	0	0	0.0894	
Request for Determination No. 9332 (approved 9/3/2021)												
New Butane Truck Loading Station and Fugitive Emissions Components		0	0	0	0	0	0	0	0	0	0.024	New emissions unit: PTE
West Warm Flare Incremental Emissions Increases		0.015	6.28	0	0.0033	0	0	0	0	0	0.045	No construction/modification of existing emissions unit: incremental emissions increase
	Totals	0.015	6.28	0	0.0033	0	0	0	0	0	0.069	
De Minimis Emissions Increase (written notice received 5/19/2021)												
West Warm Flare Incremental Emissions Increases (for Ethane Recycle Pump Casings)		0.00016	0	0	0.000035	0	0	0	0	0	0.00	No construction/modification of existing emissions unit: incremental emissions increase
	Totals	0.00016	0	0	0.000035	0	0	0	0	0	0.00	
Request for Determination No. 9156 (approved 5/13/2021)												
Propane and Butane Truck Loading and Unloading Stations and Fugitive Emissions Components		0	0	0	0	0	0	0	0	0	0	No construction/modification of existing emissions unit: net emissions decrease
West Warm Flare Incremental Emissions Increases		0.0782	32.5175	0	0.0172	0	0	0	0	0	0.2266	No construction/modification of existing emissions unit: incremental emissions increase
	Totals	0.0782	32.5175	0	0.0172	0	0	0	0	0	0.2266	
Plan Approval Nos. 23-0119E (revised) & 23-0119J (concurrently issued 2/12/2021)		101.13	243,261	0.0574	58.89	0.00684	3.87	3.66	1.82	17.49	177.22	Emissions increases determined under Plan Approval No. 23-0119E (revised), which included those under Plan Approval No. 23-0119J
Emissions Increases for Expanded Single Aggregated Project [40 CFR § 52.21(a)(2)(iv)(*c*)–(*d*)]		103.26	260,756	0.0642	63.04	0.00801	4.039	3.829	1.983	17.94	182.41	
PSD Significant Emissions Rates (tons/yr) [40 CFR § 52.21(b)(40)]		100	75,000	7	40	0.6	25	15	10	40	N/A	10 tons/yr for direct $PM_{2.5}$, but 40 tons/yr for NO_x or SO_2 based on those pollutants being precursors to PM2.5
Are Emissions Increases Significant for PSD?		Yes	Yes	No	Yes	No	No	No	Yes	No	N/A	
Authorizations Not Part of the Expanded Single Aggregated Project												PSD contemporaneous period: 10/31/2018–4/30/2026 NSR contemporaneous period: Calendar years 2022–2026
De Minimis Emissions Increase (written notice received 3/22/2019)												
West Warm Flare Incremental Emissions Increases (for C-3/4 Truck Rack Depressurization Line)		0.0010	0	0	0.00022	0	0	0	0	0	0.00301	No construction/modification of existing emissions unit: incremental emissions increase
Request for Determination No. 7548 (approved 4/11/2019)												
West Warm Flare Incremental Emissions Increases (for H-5 Truck Pressure Unloading Project)		0.0679	30.39	0	0.0149	0	0	0	0	0	0.2090	No construction/modification of existing emissions unit: incremental emissions increase
Request for Determination No. 9446 (approved 7/14/2022)												
West Warm Flare Incremental Emissions Increases (for Braskem Propylene Splitter Dryer Project)		0.2336	27.79	0	0.0429	0	0	0	0	0	0.6000	No construction/modification of existing emissions unit: incremental emissions increase
Request for Determination No. 9668 (approved 5/23/2022)												
West Warm Flare Incremental Emissions Increases (for Braskem Pulsation Dampener Dryer)		0.3388	40.07	0	0.0623	0	0	0	0	0	0.8650	No construction/modification of existing emissions unit: incremental emissions increase
	Totals	0.6413	98.25	0	0.1203	0	0	0	0	0	1.6770	
Net Emissions Increases for Expanded Single Aggregated Project [40 CFR § 52.21(a)(2)(iv)(*c*)–(*d*) and (b)(3)]		103.90	260,855		63.16				1.983			
PSD Significant Net Emissions Rates (tons/yr) [40 CFR § 52.21(b)(23)]		100	75,000		40				10			10 tons/yr for direct $PM_{2.5}$, but 40 tons/yr for NO_x or SO_2 based on those pollutants being precursors to PM2.5
Are Net Emissions Increases Significant for PSD?		Yes	Yes		Yes				Yes			
Aggregated Emissions Increases for Expanded Single Aggregated Project [25 Pa. Code § 127.203(b)(1)(i)]					63.15						183.88	
NSR Significant Net Emissions Rates (tons/yr) [25 Pa. Code § 121.1: Significant, subparagraphs (ii)–(iii)]					25						25	
Are Aggregated Emissions Increases Significant for NSR?					Yes						Yes	
ERCs Required for Expanded Single Aggregated Project (1.3:1 Offset Ratio)					82.09						239.04	
ERCs Previously Surrendered and Retired for Expanded Single Aggregated Project												
Plan Approval No. 23-0119B											34.65	
Plan Approval No. 23-0119C											7.18	
Plan Approval No. 23-0119E					32.80						56.10	
Plan Approval No. 23-0119F											17.77	
Plan Approval No. 23-0119H (portion attributable to expanded single aggregated project)											19.02	
Plan Approval No. 23-0119E (revised)					46.35						59.07	
	Totals				79.15						193.79	
ERCs Still Required to Be Surrendered for Expanded Single Aggregated Project												
Plan Approval No. 23-0119J											49.93	The negative value for the remaining VOC ERCs to obtain for the expanded single aggregated project does not serve to reduce the amount of VOC ERCs that ETMT is required to surrender under Plan Approval No. 23-0119J
Remaining ERCs to Surrender for Expanded Single Aggregated Project					2.94						-4.68	

Attachment #9

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

TO David S. Smith, E.I.T.
Air Quality Engineering Specialist
Facilities Permitting Section
Air Quality Program
Southeast Regional Office

FROM Daniel J. Roble
Air Quality Program Specialist
Air Quality Modeling Section
Division of Air Resource Management
Bureau of Air Quality

THROUGH Andrew W. Fleck
Environmental Group Manager
Air Quality Modeling Section
Division of Air Resource Management
Bureau of Air Quality

DATE [INSERT DATE]

RE Air Quality Analyses for Prevention of Significant Deterioration
Energy Transfer Marketing & Terminals, L.P.
Plan Approval Application 23-0119K
Proposed Ethane Chilling Expansion Project
Marcus Hook Terminal, Marcus Hook Borough, Delaware County

The Pennsylvania Department of Environmental Protection's (DEP) Air Quality Modeling Section has completed its technical review of the air quality analyses included in Energy Transfer Marketing & Terminals, L.P.'s (ETMT) plan approval application for its proposed Ethane Chilling Expansion Project at Marcus Hook Terminal (MHT) in Marcus Hook Borough, Delaware County.

ETMT's proposed Ethane Chilling Expansion Project and previous natural gas liquids (NGL) projects were aggregated as a single project for Prevention of Significant Deterioration (PSD) applicability purposes. ETMT's single aggregated project at MHT is a major modification to an existing major stationary source and therefore subject to the PSD regulations.

The DEP's technical review concludes that ETMT's air quality analyses satisfy the requirements of the PSD regulations. The DEP's summary of ETMT's air quality analyses for PSD is attached.

If you have any questions regarding ETMT's air quality analyses for PSD, you may contact me (droble@pa.gov, 717.705.7689) or Andrew Fleck (afleck@pa.gov, 717.783.9243).

Attachment

cc: James Rebarchak, SERO Air Quality
Janine Tulloch-Reid, SERO Facilities Permitting
Viren Trivedi, BAQ Permits
Sean Wenrich, BAQ New Source Review
Kirit Dalal, BAQ Air Resource Management
AQ Modeling Correspondence File

DEP Summary of Air Quality Analyses for Prevention of Significant Deterioration
Energy Transfer Marketing & Terminals, L.P.
Plan Approval Application 23-0119K
Proposed Ethane Chilling Expansion Project
Marcus Hook Terminal, Marcus Hook Borough, Delaware County
[INSERT DATE]

I. Background

The Pennsylvania Department of Environmental Protection (DEP) received a plan approval application on February 16, 2022, from Sunoco Partners Marketing & Terminals, L.P. (SPMT) for its proposal to add process equipment to increase the ethane chilling capacity, referred to as the Ethane Chilling Expansion Project, at Marcus Hook Industrial Complex in Marcus Hook Borough, Delaware County.[1] The plan approval application was prepared by Environmental Resources Management (ERM), on behalf of SPMT. Effective March 1, 2022, SPMT changed its company name to Energy Transfer Marketing & Terminals, L.P. (ETMT) and the facility name to Marcus Hook Terminal (MHT). On March 15, 2022, the DEP's Southeast Regional Office (SERO) notified ETMT that its plan approval application was administratively complete.[2]

Subsequently, the DEP received additional information associated with ETMT's plan approval application during its technical review.[3,4,5]

II. PSD Requirements

In accordance with the adjudication decision by the Commonwealth of Pennsylvania Environmental Hearing Board (EHB),[6] ETMT's proposed Ethane Chilling Expansion Project and previous natural gas liquids (NGL) projects should be aggregated as a single project for Prevention of Significant Deterioration (PSD) applicability purposes.

ETMT's single aggregated project at MHT is a major modification[7] to an existing major stationary source[8] and therefore subject to the PSD regulations codified in 40 CFR § 52.21. These federal PSD regulations are adopted and incorporated by reference in their entirety in 25 *Pa. Code* § 127.83 and the Commonwealth's State Implementation Plan (SIP) codified in 40 CFR § 52.2020.

[1] Letter with enclosures from Lisa M. Garcia, SPMT to David Smith, DEP/SERO/Air Quality/Facilities Permitting. February 14, 2022.
[2] Letter from David S. Smith, DEP/SERO/Air Quality/Facilities Permitting to Edward G. Human, ETMT. March 15, 2022.
[3] E-mail with attachment from Tom Wickstrom, ERM to Andrew Fleck, DEP/BAQ/Air Quality Modeling. February 27, 2023.
[4] E-mail with attachment from Adam DiAntonio, ERM to James Rebarchak, DEP/SERO/Air Quality and Janine Tulloch-Reid, DEP/SERO/Air Quality/Facilities Permitting. March 31, 2023.
[5] E-mail with attachment from Adam DiAntonio, ERM to David S. Smith, DEP/SERO/Air Quality/Facilities Permitting. April 3, 2023.
[6] Clean Air Council v. Commonwealth of Pennsylvania Department of Environmental Protection and Sunoco Partners Marketing & Terminals, L.P., Permittee. EHB Docket No. 2016-073-L.
[7] *Code of Federal Regulations*. 40 CFR § 52.21(b)(2). Definition of "major modification."
[8] *Code of Federal Regulations*. 40 CFR § 52.21(b)(1). Definition of "major stationary source."

ETMT calculated the net emissions increase[9] of carbon monoxide (CO), nitrogen oxides (NO_X), sulfur dioxide (SO_2), particulate matter (PM), particulate matter less than or equal to 10 micrometers in diameter (PM-10), particulate matter less than or equal to 2.5 micrometers in diameter (PM-2.5), lead (Pb), and sulfuric acid mist (H_2SO_4) for the single aggregated project. ETMT's net emissions increase equals or exceeds the PSD significant emission rates (SER)[10] for CO, NO_X, and PM-2.5, therefore requiring ETMT to conduct air quality analyses for these pollutants. ETMT's net emissions increase for the single aggregated project for pollutants potentially requiring an air quality analysis is summarized in Table 1.

Table 1: ETMT's Net Emissions Increase for Single Aggregated Project

Pollutant	Single Aggregated Project Net Emissions Increase[A]	PSD Significant Emission Rate
	tpy	tpy
CO	103.90	100
NO_X	63.16	40
SO_2	17.94	40
PM	4.039	25
PM-10	3.829	15
PM-2.5	1.983	10 of direct PM-2.5, 40 of SO_2, or 40 of NO_X
Pb	0.00801	0.6
H_2SO_4	0.0642	7

[A] Values were corrected according to DEP/SERO technical review.

In accordance with the PSD regulations, ETMT's plan approval application included the following air quality analyses:

- Relevant to 40 CFR § 52.21(k) through (n), air quality analyses of the net emissions increase of CO, NO_X, and PM-2.5 due to ETMT's major modification of MHT;
- Relevant to 40 CFR § 52.21(o), additional impact analyses of the impairment to visibility, soils, and vegetation due to ETMT's major modification of MHT and associated growth; and
- Relevant to 40 CFR § 52.21(p), initial screening calculations to determine whether the net emissions increase due to ETMT's major modification of MHT would have negligible impacts on air quality related values (AQRV) and visibility in nearby federal Class I areas.

[9] *Code of Federal Regulations*. 40 CFR § 52.21(b)(3). Definition of "net emissions increase."
[10] *Code of Federal Regulations*. 40 CFR § 52.21(b)(23). Definition of "significant."

III. Air Dispersion Modeling

A. Model Selection

ETMT's air dispersion modeling utilized the American Meteorological Society (AMS) / U.S. Environmental Protection Agency's (EPA) Regulatory Model (AERMOD) v22112. AERMOD is the EPA's required near-field air dispersion model for a wide range of regulatory applications in all types of terrain and for aerodynamic building downwash.[11]

B. Model Input

1. Control Pathway

AERMOD was executed with regulatory default options to calculate concentrations for each applicable pollutant and averaging time.

AERMOD was executed with rural dispersion, by default, based on the EPA's recommended Land Use Procedure.[12,13] The EPA's Land Use Procedure was conducted by evaluating National Land Cover Database (NLCD) v2019 land cover data for 2019 from the U.S. Geological Survey (USGS) Multi-Resolution Land Characteristics Consortium (MRLC). NLCD land cover code 23 (Developed, Medium Intensity) and land cover code 24 (Developed, High Intensity) were considered to be equivalent to Auer[14] land use types that are classified as urban by the EPA's Land Use Procedure, whereas the remaining NLCD land cover codes were considered to be equivalent to Auer land use types that are classified as rural. There is not sufficient urban land cover, which contributes to an urban heat island effect, to support the use of AERMOD's urban dispersion option. ETMT provided justification for rural dispersion in subsection 3.3.1 (Land Use Characteristics) of the Air Quality Modeling Report (Appendix F of the plan approval application) and in subsection 4.3 (Supplement to Section 3.3.1 – Land Use Characteristics) of the plan approval application addendum.[15]

In the 1-hour and annual nitrogen dioxide (NO_2) analyses, the EPA's 2nd-tier screening technique was used to account for NO_2 chemistry by selecting the Ambient Ratio Method 2 (ARM2) regulatory option in AERMOD with default upper and lower limits on the ambient NO_2/NO_X ratio applied to the modeled NO_X concentration of 0.9 and 0.5, respectively.[16]

[11] *Code of Federal Regulations*. 40 CFR Part 51, Appendix W (Guideline on Air Quality Models). Subsection 4.2.2.1(a).
[12] *Code of Federal Regulations*. 40 CFR Part 51, Appendix W (Guideline on Air Quality Models). Subsection 7.2.1.1(b)(i).
[13] AERMOD Implementation Guide (EPA-454/B-22-008, June 2022). Subsection 5.1.
[14] Auer, Jr., A.H., 1978. Correlation of Land Use and Cover with Meteorological Anomalies. *Journal of Applied Meteorology*, 17(5): 636–643.
[15] E-mail with attachment from Adam DiAntonio, ERM to James Rebarchak, DEP/SERO/Air Quality and Janine Tulloch-Reid, DEP/SERO/Air Quality/Facilities Permitting. March 31, 2023.
[16] *Code of Federal Regulations*. 40 CFR Part 51, Appendix W (Guideline on Air Quality Models). Subsection 4.2.3.4(d).

2. Source Pathway

a. Source Characterization

ETMT's aggregated project emissions of CO, NO_X, and PM-2.5 are and would be released to the atmosphere via typical unobstructed vertical stacks that were characterized in AERMOD as point sources. ETMT's emission sources, associated model source IDs, and pollutants are listed in Table 2.

Table 2: ETMT's Emission Sources, Model Source IDs, and Pollutants

Emission Source(s)	Model Source ID(s)	Pollutant(s)
3 Auxiliary Boilers	B031	CO, NO_X, PM-2.5
1 West Warm Flare	WWF	CO, NO_X
1 ME-1 Cold Flare (Low & high pressure)	ME1CF_LP, ME1CF_HP	CO, NO_X
1 ME-2 Cold Flare (Low pressure)	ME2CF_LP	CO, NO_X
1 ME-2x Cold Flare (Low & high pressure)	ME2XCFLP, ME2XCFHP	CO, NO_X
1 Mechanical Draft 15-2B Cooling Tower (6 cells)	152BCTC1 – 152BCTC6	PM-2.5
2 Mechanical Draft Cooling Towers (3 cells each)	230119C1 – 230119C3 & 230119D1 – 230119D3	PM-2.5
2 Wet Surface Air Coolers (5 cells each)	1WSAC1 – 1WSAC5 & 2WSAC1 – 2WSAC5	PM-2.5

b. Emission Data

The emission rates and associated parameters entered in AERMOD for each source are consistent with those that ETMT provided in Attachment C (Model Source Information) of the Air Quality Modeling Report (Appendix F of the plan approval application). Emission data were entered in AERMOD for the auxiliary boilers that account for 9 combinations of the number of auxiliary boilers operating at the same time (one, two, and three) and the operating level (100, 75, and 50 percent). Emission rates entered in AERMOD that represent ETMT's net emissions increase of CO and NO_X and net emissions increase of PM-2.5 are summarized in Table 3a and Table 3b, respectively.

Table 3a: ETMT's Modeled Emission Rates of CO and NO_X

Model Source ID	CO Modeled Emission Rate		NO_X Modeled Emission Rate	
	1-hour	8-hour	1-hour	Annual
	lb/hr	lb/hr	lb/hr	lb/hr
B031[A]	22.69	22.69	18.91	18.91
WWF	4.33	4.33	0.95	0.95
ME1CF_LP	1.48	1.48	0.33	0.33
ME1CF_HP	6.10	6.10	1.34	1.34
ME2CF_LP	3.58	3.58	0.78	0.78
ME2XCFLP	3.69	3.69	0.81	0.81
ME2XCFHP	2.52	2.52	0.55	0.55

[A] Total emission rate for 3 auxiliary boilers at 100% operating level.

Table 3b: ETMT's Modeled Emission Rates of PM-2.5

Model Source ID(s)	PM-2.5 Modeled Emission Rate	
	24-hour	Annual
	lb/hr	lb/hr
B031[A]	3.93	1.67
152BCTC1 – 152BCTC6[B]	1.31E-02	1.31E-02
230119C1 – 230119C3[B]	8.37E-04	8.37E-04
230119D1 – 230119D3[B]	4.57E-03	4.57E-03
1WSAC1 – 1WSAC5 & 2WSAC1 – 2WSAC5[B]	3.07E-05	3.07E-05

[A] Total emission rate for 3 auxiliary boilers at 100% operating level.
[B] Emission rate for each cell.

c. Good Engineering Practice Stack Height and Downwash

ETMT's buildings and structures affecting downwash and stacks at MHT were entered in the EPA's Building Profile Input Program for Plume Rise Model Enhancements (BPIPPRM) v04274. The height of each stack was fully creditable for entry in AERMOD since none exceeded Good Engineering Practice (GEP) stack height,[17] i.e., the greater of 65 meters or the GEP formula stack height calculated by BPIPPRM. ETMT's GEP stack heights and stack heights entered in AERMOD are summarized in Table 4.

[17] *Code of Federal Regulations*. 40 CFR § 51.100(ii). Definition of "good engineering practice stack height."

Table 4: ETMT's GEP Stack Heights and Modeled Stack Heights

Model Source ID(s)	GEP Formula Stack Height(s)	GEP Stack Height(s)	Modeled Stack Height(s)
	m	m	m
B031	84.19	84.19	83.76
WWF[A]	-----	-----	61.32[B]
ME1CF_LP[A]	-----	-----	39.03[B]
ME1CF_HP[A]	-----	-----	39.71[B]
ME2CF_LP[A]	-----	-----	79.13[B]
ME2XCFLP[A]	-----	-----	61.54[B]
ME2XCFHP[A]	-----	-----	61.19[B]
152BCTC1	35.87	65.00	17.43
152BCTC2 – 152BCTC6	35.82 – 35.90 (varies by cell)	65.00 (each cell)	18.59 (each cell)
230119C1	133.04	133.04	13.69
230119C2	133.98	133.98	13.66
230119C3	134.14	134.14	13.72
230119D1	134.11	134.11	13.99
230119D2	133.54	133.54	13.96
230119D3	131.90	131.90	13.93
1WSAC1 – 1WSAC5	113.71 – 114.31 (varies by cell)	113.71 – 114.31 (varies by cell)	8.69 (each cell)
2WSAC1 – 2WSAC5	132.91 – 133.02 (varies by cell)	132.91 – 133.02 (varies by cell)	8.69 (each cell)

[A] Flares are excluded from the GEP stack height regulation.
[B] Modeled stack height for each flare is the effective stack height based on "AERSCREEN User's Guide" (EPA-454/B-21-005, April 2021), subsection 2.1.2.

Additionally, direction-specific downwash parameters, calculated by BPIPPRM, were entered in AERMOD for each stack.

d. PM-2.5 PSD Increment Affecting Sources

ETMT's plan approval application is the first administratively complete application for a proposed project in Delaware County that is subject to the PSD regulations with significant emissions of direct PM-2.5 or PM-2.5 precursors, i.e., NO_X and/or SO_2, after the PM-2.5 trigger date of October 20, 2011.[18] ETMT's plan approval application therefore establishes the PM-2.5 minor source baseline date[19] as March 9, 2022,[20] for the PM-2.5 baseline area[21] that includes all of Delaware County.

[18] *Code of Federal Regulations*. 40 CFR § 52.21(b)(14)(ii)(c). Definition of "trigger date."
[19] *Code of Federal Regulations*. 40 CFR § 52.21(b)(14)(ii). Definition of "minor source baseline date."
[20] Letter from David S. Smith, DEP/SERO/Air Quality/Facilities Permitting to Edward G. Human, ETMT. March 15, 2022.
[21] *Code of Federal Regulations*. 40 CFR § 52.21(b)(15)(i). Definition of "baseline area."

Actual emissions[22] of direct PM-2.5 and PM-2.5 precursors associated with ETMT's previous NGL projects at MHT were aggregated with the proposed Ethane Chilling Expansion Project and included in ETMT's 24-hour PM-2.5 and annual PM-2.5 Class II PSD increment analyses. No actual emissions were identified from any other major stationary source on which construction commenced after the major source baseline date[23] of October 20, 2010, that would affect PM-2.5 Class II PSD increment in the area impacted by ETMT's net emissions increase of PM-2.5 and PM-2.5 precursors.

3. Receptor Pathway

a. Receptors

Receptors were entered in AERMOD at locations defined to be ambient air.[24,25]

In the Class II significant impact level (SIL) analyses and Class II PSD increment analyses, a 50-by 50-kilometer Cartesian receptor grid, with receptor density decreasing with distance, was centered on MHT. ETMT provided a detailed description of AERMOD's receptor domain in subsection 3.4 (Receptor Grids) of the Air Quality Modeling Report (Appendix F of the plan approval application).

In the Class I SIL analyses, receptors within the nearby federal Class I areas, i.e., Brigantine National Wildlife Refuge in New Jersey, Shenandoah National Park in Virginia, and Dolly Sods Wilderness and Otter Creek Wilderness, both in West Virginia, as provided by the Federal Land Managers (FLM),[26] were entered in AERMOD.

The extent and density of ETMT's receptor domain in AERMOD were adequate to determine the location and magnitude of the maximum concentrations in the Class II and Class I SIL analyses and the design concentrations in the Class II PSD increment analyses.

b. Terrain Preprocessing

In the Class II SIL analyses, receptor elevations and hill height scales were calculated by the AERMOD terrain preprocessor (AERMAP) v18081 using elevation data from the USGS 3-Dimensional Elevation Program (3DEP) with a resolution of one-third arc-second. In the Class I SIL analyses, receptor elevations provided by the FLMs for Class I areas were used. Hill height scales were calculated by AERMAP using these receptor elevations along with elevation data from the USGS 3DEP with a resolution of one-third arc-second.

[22] *Code of Federal Regulations*. 40 CFR § 52.21(b)(21). Definition of "actual emissions."
[23] *Code of Federal Regulations*. 40 CFR § 52.21(b)(14)(i)(c). Definition of "major source baseline date."
[24] *Code of Federal Regulations*. 40 CFR § 50.1(e). Definition of "ambient air."
[25] Revised Policy on Exclusions from "Ambient Air." EPA memorandum from Andrew R. Wheeler, Administrator to Regional Administrators. December 2, 2019.
[26] National Park Service (NPS) DataStore. https://irma.nps.gov/DataStore/Reference/Profile/2249830.

4. Meteorological Pathway

ETMT's air dispersion modeling utilized a 5-year meteorological dataset consisting of hourly records from January 1, 2016, through December 31, 2020, derived from surface data measured at Philadelphia International Airport (KPHL) and upper air data measured at Washington Dulles International Airport (KIAD).

a. Meteorological Dataset Preprocessing

The meteorological dataset was processed by the DEP with the AERMOD meteorological preprocessor (AERMET) v22112 and its associated AERMINUTE v15272 preprocessor and AERSURFACE v20060 tool.

The KPHL and KIAD data provide the minimum meteorological measurements necessary for AERMET to produce the two output files, i.e., the surface and profile files, necessary for AERMOD input. The KPHL surface data included single-level measurements of wind direction and wind speed at 7.92 meters, as well as measurements of station pressure, cloud cover, dry bulb temperature, dew point temperature, and relative humidity. The KIAD upper air data included multi-level morning measurements of atmospheric pressure, dry bulb temperature, dew point temperature, wind direction, and wind speed from the surface to the first level above 5,000 meters.

AERMET Stage 1 extracted KPHL surface data, downloaded from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) in the Integrated Surface Data (ISD) format, and KIAD upper air data, downloaded from NOAA's Earth System Research Laboratory (ESRL) Radiosonde Database in the Forecast Systems Laboratory (FSL) format. Before processing with AERMET Stage 1, a Line 9 with missing data codes was added to the KIAD upper air 12Z measurements with a missing Line 9. This allowed AERMET to process the available upper air 12Z measurements. Additionally, AERMET Stage 1 utilized the MODIFY option to check for problems with the upper air data and correct them.

AERMET Stage 2 utilized output data from AERMINUTE, which processed KPHL 1-minute and 5-minute wind speed and wind direction measurements downloaded from NCEI.

AERMET Stage 2 utilized the surface friction velocity adjustment option, which is intended to address potential concerns regarding AERMOD's performance relevant to the overprediction of concentrations during stable low wind speed meteorological conditions by adjusting the surface friction velocity based on Qian, W., and A. Venkatram, 2011.[27]

AERMET Stage 2 utilized options for substitutions of missing temperature and cloud cover measurements, an anemometer height of 7.92 meters, a minimum wind speed threshold of 0.5 meter per second, and a 3-hour before to 1-hour after 12Z window for determining upper air measurements for use.

[27] Qian, W., and A. Venkatram, 2011. Performance of Steady-State Dispersion Models Under Low Wind-Speed Conditions. *Boundary Layer Meteorology*, 138, 475-491.

AERMET Stage 2 utilized output data from AERSURFACE, which processed NLCD v2019 land cover, impervious surface, and tree canopy data for 2016, downloaded from the USGS MRLC, to estimate noontime albedo, daytime Bowen ratio, and surface roughness length for the KPHL meteorological site. AERSURFACE utilized options for a default 1-kilometer surface roughness length study area with seven user-defined sectors with airport designations, non-arid condition, and monthly frequency with default month-to-season assignments. Surface moisture condition (wet, dry, or average) for the KPHL meteorological site was based on average precipitation data for Pennsylvania Climate Division 03, downloaded from NCEI, and derived in accordance with the EPA's guidance[28] to determine the surface moisture condition thresholds using a 30-year (1991-2020) climatological dataset. Snow cover condition (non-continuous or continuous) was based on Local Climatological Data, downloaded from NCEI, for the KPHL meteorological site.

b. Meteorological Dataset Representativeness

The fully processed meteorological dataset satisfies the EPA's recommendations for use in AERMOD,[29] and was appropriate for AERMOD to construct realistic boundary layer profiles to adequately represent plume transport and dispersion under both convective and stable conditions within the modeling domain. Additionally, the fully processed meteorological dataset satisfies the DEP's data completeness recommendation for use in air dispersion modeling.

The KPHL meteorological site, located approximately 17.4 kilometers northeast of MHT, is the nearest site with Automated Surface Observing System (ASOS) instrumentation, which provided 1-minute and 5-minute wind measurements that, when processed, increased the hourly meteorological data records available to AERMOD for calculating concentrations by keeping reported calm and variable winds to a minimum. The KPHL meteorological site is on a wide open, flat plain with no major obstacles to the meteorological instrumentation. The KPHL meteorological tower base elevation is approximately 2 meters. ETMT's emission sources at MHT have similar base elevations that range from 2.85 to 7.16 meters. There is no significant terrain between the KPHL meteorological site and MHT.

The KIAD meteorological site, located approximately 198 kilometers southwest of MHT, is the nearest upper air data site. There is no significant terrain between the KIAD meteorological site and MHT.

As recommended by the EPA's guidance,[30] the estimated values of the surface characteristics, i.e., noontime albedo, daytime Bowen ratio, and surface roughness length, for the KPHL meteorological site were compared to those of MHT. The sites have similar estimated values; nonetheless, ETMT conducted an additional set of modeling runs utilizing the meteorological dataset processed with the MHT surface characteristics.

[28] User's Guide for AERSURFACE Tool (EPA-454/B-20-008, February 2020). Subsection 2.3.3.
[29] *Code of Federal Regulations*. 40 CFR Part 51, Appendix W (Guideline on Air Quality Models). Subsections 8.4.3.2 and A.1(b)(2).
[30] AERMOD Implementation Guide (EPA-454/B-22-008, June 2022). Subsection 3.1.1.

ETMT provided justification for the use of the meteorological dataset in subsection 3.5 (Meteorological Data for Air Quality Modeling) of the Air Quality Modeling Report (Appendix F of the plan approval application).

C. Secondary PM-2.5 Formation

In the 24-hour PM-2.5 and annual PM-2.5 analyses, the AERMOD results were appropriately adjusted upward to account for secondary PM-2.5 formation due to ETMT's net emissions increase of both PM-2.5 precursors, i.e., NO_X and SO_2, based on the EPA's guidance.[31,32] ETMT's estimated secondary PM-2.5 impacts in Class II areas were conservatively based on the EPA's photochemical grid modeling results for the Chester, PA hypothetical source with a 10-meter stack and 500 tons per year of emissions of each precursor. ETMT's estimated secondary PM-2.5 impacts in Class I areas were conservatively assumed to be the same as the estimated secondary PM-2.5 impacts in Class II areas, i.e., the estimated secondary impacts did not account for the distances to the Class I areas. ETMT provided calculations for the estimated secondary PM-2.5 impacts in subsection 3.2.2 (Secondary $PM_{2.5}$ Impacts – Tier 1 Assessment) of the Air Quality Modeling Report (Appendix F of the plan approval application). ETMT's estimated secondary PM-2.5 impacts are summarized in Table 5.

Table 5: ETMT's Estimated Secondary PM-2.5 Impacts in Class II and Class I Areas

Averaging Time	Secondary PM-2.5 Impact Due to NO_X	Secondary PM-2.5 Impact Due to SO_2	Total Secondary PM-2.5 Impact
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
24-hour	0.01083	0.00950	0.02033
Annual	0.00087	0.00024	0.00111

D. Existing Ambient Air Quality

Existing ambient air quality was established for the area that ETMT's net emissions increase due to the major modification of MHT would affect by utilizing representative CO, NO_2, and PM-2.5 data measured from January 1, 2019, through December 31, 2021, at the ambient monitors listed in Table 6.

Table 6: Monitors for Establishing Existing Ambient Air Quality

Pollutant	Monitor Site Name	Monitor Operator	Monitor Site ID	Distance/Direction from MHT
CO	MLK	Delaware DNREC	10-003-2004	13 km / SW
NO_2	Chester	DEP	42-045-0002	5 km / ENE
PM-2.5	Marcus Hook	DEP	42-045-0109	0.6 km / E

Since the impact of ETMT's net emissions increase due to the major modification of MHT was calculated by AERMOD, as described later, to be less than each pollutant's SILs for the National Ambient Air Quality Standards (NAAQS), the ambient monitoring data were used to support the

[31] Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (EPA-454/R-19-003, April 2019).
[32] Guidance for Ozone and Fine Particulate Matter Permit Modeling (EPA-454/R-22-005, July 2022).

conclusion that the impact of the net emissions increase of each pollutant would not cause or contribute to a violation of the NAAQS without having to conduct a cumulative impact analysis. As shown in Table 7, the difference between the NAAQS and the 2019-2021 monitored design value is greater than the SIL for the NAAQS for each pollutant and averaging time subject to PSD review.

Table 7: Comparison of NAAQS Minus Monitored Design Values to SILs for NAAQS

Pollutant	Averaging Time	NAAQS	Monitored Design Value 2019-2021[A]		NAAQS Minus Monitored Design Value	SIL for NAAQS
		$\mu g/m^3$	ppm or ppb	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
CO	1-hour	40,000	1.8 ppm	2,059.2	37,940.8	2,000
	8-hour	10,000	1.3 ppm	1,487.2	8,512.8	500
NO_2	1-hour	188	41 ppb	77.08216	110.91784	7.5
	Annual	100	9 ppb	16.92047	83.07953	25
PM-2.5	24-hour	35	-----	22	13	1.2
	Annual	12	-----	8.6	3.4	0.2

[A] Monitored design values for CO in parts per million (ppm) and NO_2 in parts per billion (ppb) were converted to micrograms per cubic meter ($\mu g/m^3$) using AERMOD.

Additionally, ETMT should be exempted from the PSD pre-application ambient monitoring requirements[33] for PM and H_2SO_4 since the EPA has not established a significant monitoring concentration (SMC) for these pollutants.[34]

E. Modeling Results

1. SIL Analyses

a. SIL Analyses for NAAQS and Class II PSD Increments

The impacts of ETMT's net emissions increase due to the major modification of MHT were calculated by AERMOD to be less than the following:

- The EPA's 1-hour CO and 8-hour CO SILs for the NAAQS;[35]
- The EPA's 1-hour NO_2 interim SIL for the NAAQS;[36,37]
- The EPA's annual NO_2 SIL for the NAAQS;[38]

[33] *Code of Federal Regulations*. 40 CFR § 52.21(m).
[34] *Code of Federal Regulations*. 40 CFR § 52.21(i)(5).
[35] *Code of Federal Regulations*. 40 CFR § 51.165(b)(2).
[36] Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program. EPA memorandum from Stephen D. Page, OAQPS to Regional Air Division Directors. June 29, 2010. Pages 11-13.
[37] Interim 1-Hour Significant Impact Levels for Nitrogen Dioxide and Sulfur Dioxide. DEP memorandum from Andrew W. Fleck, BAQ/Air Quality Modeling to Regional Air Program Managers. December 1, 2010.
[38] *Code of Federal Regulations*. 40 CFR § 51.165(b)(2).

- The EPA's 24-hour PM-2.5 and annual PM-2.5 SILs for the NAAQS;[39,40,41]
- The EPA's annual NO_2 SIL for the Class II PSD increment;[42] and
- The EPA's 24-hour PM-2.5 and annual PM-2.5 SILs for the Class II PSD increments.[43]

Cumulative impact analyses were therefore not necessary for the 1-hour CO, 8-hour CO, 1-hour NO_2, annual NO_2, 24-hour PM-2.5, and annual PM-2.5 NAAQS, as well as the annual NO_2 Class II PSD increment.

Cumulative impact analyses were also not necessary for the 24-hour PM-2.5 and annual PM-2.5 Class II PSD increments since ETMT's plan approval application establishes the PM-2.5 minor source baseline date for Delaware County and no actual emissions of direct PM-2.5 or PM-2.5 precursors were identified from any major stationary source on which construction commenced after the major source baseline date, except those associated with ETMT's previous NGL projects, which were aggregated with the proposed Ethane Chilling Expansion Project.

The results of ETMT's SIL analyses for the NAAQS and Class II PSD Increments are summarized for each meteorological dataset utilized with AERMOD in Table 8.

Table 8: Results of ETMT's SIL Analyses for NAAQS and Class II PSD Increments

Pollutant	Averaging Time	Modeled Maximum Concentration		SIL for NAAQS & Class II PSD Increment
		Meteorological Dataset Processed with KPHL Surface Characteristics	Meteorological Dataset Processed with MHT Surface Characteristics	
		µg/m^3	µg/m^3	µg/m^3
CO	1-hour	25.69072	30.35097	2,000
	8-hour	9.19624	9.76582	500
NO_2	1-hour	4.31995	4.96737	7.5
	Annual	0.18437	0.16788	1.0
PM-2.5[A]	24-hour	0.16568	0.15532	1.2
	Annual	0.01845	0.01759	0.2
PM-2.5[B]	24-hour	0.23497	0.19491	1.2
	Annual	0.02093	0.01995	0.2

[A] Based on the forms of the SILs for the NAAQS. AERMOD results were adjusted upward to account for secondary PM-2.5 formation.
[B] Based on the forms of the SILs for the PSD increments. AERMOD results were adjusted upward to account for secondary PM-2.5 formation.

[39] Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program. EPA memorandum from Peter Tsirigotis, OAQPS to Regional Air Division Directors. April 17, 2018. Pages 15-16.
[40] Technical Basis for the EPA's Development of the Significant Impact Thresholds for $PM_{2.5}$ and Ozone (EPA-454/R-18-001, April 2018).
[41] Legal Memorandum: Application of Significant Impact Levels in the Air Quality Demonstration for Prevention of Significant Deterioration Permitting under the Clean Air Act. April 2018.
[42] *Code of Federal Regulations*. 40 CFR § 51.165(b)(2). Based on long-standing EPA policy and guidance, these NAAQS SILs have also been applied to Class II PSD increments.
[43] Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program. EPA memorandum from Peter Tsirigotis, OAQPS to Regional Air Division Directors. April 17, 2018. Pages 16-17.

b. SIL Analyses for Class I PSD Increments

The impacts of ETMT's net emissions increase due to the major modification of MHT were conservatively calculated by AERMOD to be less than the following:

- The EPA's annual NO_2 proposed SIL for the Class I PSD increment;[44] and
- The EPA's 24-hour PM-2.5 and annual PM-2.5 SILs for the Class I PSD increments.[45,46,47]

Cumulative impact analyses were therefore not necessary for the annual NO_2, 24-hour PM-2.5, and annual PM-2.5 Class I PSD increments.

The results of ETMT's SIL analyses for the Class I PSD increments are summarized for each meteorological dataset utilized with AERMOD in Table 9.

Table 9: Results of ETMT's SIL Analyses for Class I PSD Increments

Pollutant	Averaging Time	Modeled Maximum Concentration[B]		SIL for Class I PSD Increment
		Meteorological Dataset Processed with KPHL Surface Characteristics	Meteorological Dataset Processed with MHT Surface Characteristics	
		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
NO_2	Annual	0.00151	0.00069	0.1
PM-2.5[A]	24-hour	0.02098	0.02063	0.27
	Annual	0.00123	0.00117	0.05

[A] Based on the forms of the SILs for the PSD increments. AERMOD results were adjusted upward to account for secondary PM-2.5 formation.
[B] All modeled maximum concentrations occur at receptors in Brigantine Wilderness Area, NJ.

2. Comparison of SIL Analyses Results to NAAQS

Cumulative impact analyses for the 1-hour CO, 8-hour CO, 1-hour NO_2, annual NO_2, 24-hour PM-2.5 and annual PM-2.5 NAAQS were not necessary, as stated previously. The DEP therefore provides Table 10 to show that the sum of (1) the impact of ETMT's net emissions increase due to the major modification of MHT, i.e., the result of the SIL analysis for the NAAQS, plus (2) the monitored background concentration, i.e., the 2019-2021 monitored design value, is well below the NAAQS for each pollutant and averaging time.

[44] *Federal Register*. 61 FR 38249. Prevention of Significant Deterioration and Nonattainment New Source Review; Proposed Rule. July 23, 1996.
[45] Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program. EPA memorandum from Peter Tsirigotis, OAQPS to Regional Air Division Directors. April 17, 2018. Pages 16-17.
[46] Technical Basis for the EPA's Development of the Significant Impact Thresholds for $PM_{2.5}$ and Ozone (EPA-454/R-18-001, April 2018).
[47] Legal Memorandum: Application of Significant Impact Levels in the Air Quality Demonstration for Prevention of Significant Deterioration Permitting under the Clean Air Act. April 2018.

Table 10: Comparison of Maximum Modeled Concentration Plus Monitored Design Value to NAAQS

Pollutant	Averaging Time	Modeled Maximum Concentration	Monitored Design Value 2019-2021	Total Concentration	NAAQS	Percent of NAAQS
		µg/m^3	µg/m^3	µg/m^3	µg/m^3	%
CO	1-hour	25.69072	2,059.2	2,084.89072	40,000	5.21
	8-hour	9.19624	1,487.2	1,496.39624	10,000	14.96
NO_2	1-hour	4.31995	77.08216	81.40211	188	43.30
	Annual	0.18437	16.92047	17.10484	100	17.10
PM-2.5[A]	24-hour	0.16568	22	22.16568	35	63.33
	Annual	0.01845	8.6	8.61845	12.0	71.82

[A] Based on the forms of the SILs for the NAAQS. AERMOD results were adjusted upward to account for secondary PM-2.5 formation.

3. Class II PSD Increment Analyses

Cumulative impact analyses for the 24-hour PM-2.5 and annual PM-2.5 Class II PSD increments were not necessary, as stated previously. The impacts of ETMT's net emissions increase due to the major modification of MHT were calculated by AERMOD to be less than the 24-hour PM-2.5 and annual PM-2.5 Class II PSD increments. The results of ETMT's Class II PSD increment analyses are summarized in Table 11.

Table 11: Results of ETMT's Class II PSD Increment Analyses

Pollutant	Averaging Time	Modeled Maximum Design Value	Class II PSD Increment	Percent of Class II PSD Increment
		µg/m^3	µg/m^3	%
PM-2.5	24-hour[A]	0.17276	9	1.92
	Annual[B]	0.02093	4	0.52

[A] Design value is the highest of the 2nd-highest 24-hour concentrations for each year. AERMOD results were adjusted upward to account for secondary PM-2.5 formation.
[B] Design value is the highest of the annual concentrations for each year. AERMOD results were adjusted upward to account for secondary PM-2.5 formation.

In accordance with 25 *Pa. Code* § 127.45(b)(4), the DEP's notice of proposed plan approval issuance in the *Pennsylvania Bulletin* must include, for sources subject to the PSD regulations, "the degree of increment consumption expected to result from the operation of the source or facility." To this end, the degree of Class II and Class I PSD increment consumption expected to result from ETMT's major modification of MHT is provided in Table 12a and Table 12b, respectively.

Table 12a: Degree of Class II PSD Increment Consumption from ETMT's Major Modification of MHT

Pollutant	Averaging Time	Degree of Class II PSD Increment Consumption		Class II PSD Increment
		$\mu g/m^3$	Percent of Class II PSD Increment	$\mu g/m^3$
NO_2	Annual	0.18437	0.74 %	25
PM-2.5	24-hour	0.17276	1.92 %	9
	Annual	0.02093	0.52 %	4

Table 12b: Degree of Class I PSD Increment Consumption from ETMT's Major Modification of MHT

Pollutant	Averaging Time	Degree of Class I PSD Increment Consumption		Class I PSD Increment
		$\mu g/m^3$	Percent of Class I PSD Increment	$\mu g/m^3$
NO_2	Annual	0.00151	0.06 %	2.5
PM-2.5	24-hour	0.02098	1.05 %	2
	Annual	0.00123	0.12 %	1

4. Confirmation of Air Dispersion Modeling Results

The DEP confirmed the overall results of ETMT's air dispersion modeling by executing AERMOD upon reviewing the appropriateness of all model input, i.e., model options, emission data, downwash data, terrain data, and meteorological data.

IV. Additional Impact Analyses

A. Associated Growth

General commercial, residential, industrial, and other growth associated with ETMT's major modification of MHT is expected to be negligible. Secondary emissions[48] would therefore be negligible and were not included in the additional impact analyses of the impairment to visibility, soils, and vegetation described below.

B. Visibility Impairment

Impairment to visibility due to ETMT's net emissions increase due to the major modification of MHT is expected to be negligible based on a Level-1 plume visual impact screening analysis for John Heinz National Wildlife Refuge at Tinicum using VISCREEN v13190 in accordance with the EPA's guidance.[49]

[48] *Code of Federal Regulations*. 40 CFR § 52.21(b)(18). Definition of "secondary emissions."
[49] Workbook for Plume Visual Impact Screening and Analysis (Revised) (EPA-454/R-92-023, October 1992).

C. Soils and Vegetation

No adverse impacts to soils and vegetation are expected from ETMT's net emissions increase due to the major modification of MHT. The impacts of ETMT's net emissions increase of criteria pollutants subject to PSD review are calculated by AERMOD to be less than the EPA's ambient screening concentrations.[50] ETMT's net emissions increase of non-criteria pollutants are less than the EPA's SERs.[51]

D. Secondary NAAQS

The DEP notes that the EPA established secondary NAAQS to protect visibility and vegetation, among other things. The impacts of ETMT's net emissions increase due to the major modification of MHT are calculated by AERMOD to be less than the secondary NAAQS for the criteria pollutants subject to PSD review.

V. Class I Area Analyses for AQRVs and Visibility

ETMT provided written notice of its proposed major modification of MHT to the FLMs of the following nearby federal Class I areas: Brigantine Wilderness Area in New Jersey, Shenandoah National Park in Virginia, and Dolly Sods Wilderness and Otter Creek Wilderness, both in West Virginia.[52] The notice included initial screening calculations, which account for ETMT's net emissions increase (Q) due to the major modification of MHT and distances (D) to these nearby federal Class I areas, to demonstrate that ETMT's net emissions increase would have negligible impacts on AQRVs and visibility in these nearby federal Class I areas.[53] The FLM of each nearby federal Class I area stated that no analyses for AQRVs and visibility would be necessary.[54,55,56] ETMT's initial screening Q/D calculations are summarized in Table 13.

[50] A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA 450/2-81-078, December 12, 1980). Table 5.3.
[51] Ibid. Table 5.6 and Table 5.7.
[52] E-mail with attachment from Tom Wickstrom, ERM to U.S. Fish and Wildlife Service, U.S. Forest Service, and National Park Service representatives. February 15, 2022.
[53] U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service, 2010. Federal Land Managers' Air Quality Related Values Work Group (FLAG): Phase I Report – Revised (2010). Natural Resource Report NPS/NRPC/NRR – 2010/232. National Park Service, Denver, CO. Subsection 3.2.
[54] E-mail from Andrea Stacy, National Park Service to Tom Wickstrom, ERM. March 9, 2022.
[55] E-mail from Alexia Prosperi, U.S. Forest Service to Tom Wickstrom, ERM. March 10, 2022.
[56] E-mail from Tim Allen, U.S. Fish and Wildlife Service to Tom Wickstrom, ERM. August 29, 2022.

Table 13: ETMT Initial Screening Q/D Calculations for Nearby Federal Class I Areas

Class I Area	Distance (D) from MHT km	ETMT Net Emissions Increase (Q)[A]/ Distance (D) Ratio	FLM Q/D Threshold
Brigantine Wilderness Area, NJ	90	0.95	10
Shenandoah National Park, VA	260	0.33	
Dolly Sods Wilderness, WV	335	0.25	
Otter Creek Wilderness, WV	360	0.24	

[A] Emission Rate (Q) equals the total SO_2, NO_X, PM-10, and H_2SO_4 annual emissions (in tpy) based on 24-hour maximum allowable emissions. Q for MHT = 85.16 tpy.

VI. Conclusions

The DEP's technical review concludes that ETMT's air quality analyses satisfy the requirements of the PSD regulations. Additionally, ETMT provided adequate responses[57] to the DEP's comments[58] on the air quality analyses.

In accordance with 40 CFR § 52.21(k), ETMT's source impact analyses demonstrate that the net emissions increase due to the major modification of MHT would not cause or contribute to air pollution in violation of the NAAQS for CO, NO_2, or PM-2.5. Additionally, ETMT's source impact analyses demonstrate that the net emissions increase due to the major modification of MHT would not cause or contribute to air pollution in violation of the Class II or Class I PSD increments for NO_2 or PM-2.5.

In accordance with 40 CFR § 52.21(l), ETMT's estimates of ambient concentrations are based on applicable air quality models, databases, and other requirements specified in the EPA's *Guideline on Air Quality Models*[59] as well as the EPA's relevant air quality modeling policy and guidance.

In accordance with 40 CFR § 52.21(m), ETMT provided an analysis of existing ambient air quality in the area that the net emissions increase due to the major modification of MHT would affect that included existing representative ambient monitoring data for CO, NO_2, and PM-2.5. ETMT should be exempted from the requirements of 40 CFR § 52.21(m) for PM and H_2SO_4.

In accordance with 40 CFR § 52.21(n), ETMT provided all information necessary to perform the air quality analyses required by the PSD regulations, including all dispersion modeling data necessary to estimate the air quality impacts of the net emissions increase due to the major modification of MHT.

In accordance with 40 CFR § 52.21(o), ETMT provided additional impact analyses of the impairment to visibility, soils, and vegetation that would occur as a result of the major

[57] E-mail with attachment from Tom Wickstrom, ERM to Andrew Fleck, DEP/BAQ/Air Quality Modeling. February 27, 2023.
[58] E-mail with attachment from Daniel J. Roble, DEP/BAQ/Air Quality Modeling to Adam DiAntonio, ERM. August 12, 2022.
[59] *Code of Federal Regulations*. 40 CFR Part 51, Appendix W (Guideline on Air Quality Models).

modification of MHT. General commercial, residential, industrial, and other growth associated with ETMT's major modification of MHT is expected to be negligible.

In accordance with 40 CFR § 52.21(p), written notice of ETMT's proposed major modification of MHT has been provided to the FLMs of nearby federal Class I areas. The notice included initial screening calculations which demonstrate that ETMT's net emissions increase due to the major modification of MHT would have negligible impacts on AQRVs and visibility in nearby federal Class I areas.

All input, output, and data files associated with ETMT's air dispersion modeling for the PSD air quality analyses are available in electronic format upon request.