Air Permit Application

Vinyl Ethers Expansion and Hydrolysis Line

October 2022

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The business of sustainability

October 2022

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Vinyl Ethers Expansion and Hydrolysis Line

Jeffrey Twaddle, PE
Partner

Christy Richardson, PE
Principal Consultant, Engineer

Kevin Eldridge
Project Manager

ERM NC, Inc.

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Acronyms and Abbreviations

Name	Description
ABR	Agitated Bed Reactor
BAE	Baseline Actual Emissions
CFR	Code of Federal Regulations
Chemours	The Chemours Company FC, LLC
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
DMSO	dimethyl sulfoxide
HAP	fluorinated organic compounds
FOC	hazardous air pollutant
HFPO-DAF	HFPO Dimer Acid Fluoride
H_2SO_4	sulfuric acid
KOH	potassium hydroxide
LDAR	Leak Detection and Repair
MACT	Maximum Achievable Control Technology
MON	Miscellaneous Organic NESHAP
NAAQS	National Ambient Air Quality Standards
NCAC	North Carolina Administrative Code
NC DAQ	North Carolina Division of Air Quality
NC DEQ	North Carolina Department of Environmental Quality
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	nitrogen oxides
NNSR	Non-Attainment New Source Review
NSPS	New Source Performance Standards
NSR	New Source Review
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than 2.5 microns
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
SER	Significant Emission Rate
SO_2	sulfur dioxide
TRE	Total Resource Effectiveness
tpy	tons per year
VOC	Volatile Organic Compounds
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

The Chemours Corporation (Chemours) owns and operates a chemical manufacturing facility located at 22828 NC Highway 87 West, Fayetteville, Bladen County, North Carolina (Chemours Company – Fayetteville Works, or the facility). The facility operates under Air Quality Permit 03735T48, effective on 12 July 2020, with an expiration date of 31 March 2021. Chemours submitted a permit renewal application as required in 3 September 2020. The facility is a major source of criteria pollutants under the Part 70 (Title V) Operating Permit Program and a major source of Hazardous Air Pollutants (HAPs).

Chemours is requesting authorization to modify the Vinyl Ethers North (VEN) and Vinyl Ethers South (VES) plants as well as and IXM Membrane Process area (ID Nos. NS-B, NS-C, and NS-H, respectively). The proposed modification will not change the status of the facility with respect to the applicability of Title V or National Emission Standards for Hazardous Air Pollutants (NESHAP) programs. The proposed emission increases will not exceed the Prevention of Significant Deterioration (PSD) Significant Emission Rates (SER) and therefore will not trigger PSD review.

Chemours requests that the NC Division of Air Quality (DAQ) process this 15A NCAC 02Q .0300 permit application using the two-step permitting process outlined in 15A NCAC 02Q .0501(b) and 15A NCAC 02Q .0504. To satisfy the requirements of 15A NCAC 02Q .0501(b)(2), Chemours will submit the Part 2 permit application within twelve (12) months after commencing operation of the modified areas, to request incorporation of the modified sources into the Title V Permit and associated permit shield. Chemours requests the opportunity to review the draft permit before it is issued for public comment.

This application is organized as follows:

- Section 2.0 includes a description of facility processes and permit actions requested in this application.
- Section 3.0 includes a description of emission estimation methodologies and PSD applicability evaluation.
- Section 4.0 includes an air regulatory applicability analysis.
- Appendix A includes NC DAQ Permit Application Forms and Zoning Consistency.
- Appendix B contains process flow diagrams of the proposed and/or modified process areas.
- Appendix C presents the detailed emission calculations for the affected sources.

2. FACILITY AND PROJECT DESCRIPTION

2.1 Current Facility Description

The Chemours Company – Fayetteville Works facility is located near Duart Township in Bladen County, North Carolina. The facility is located approximately 15 miles southeast of the City of Fayetteville on NC Highway 87, south of the Bladen-Cumberland county line. Currently, the facility manufactures plastic sheeting, fluorochemicals, and intermediates for plastics manufacturing.

Specific materials produced at the Fayetteville facility are:

- Chemours™ Nafion® Membrane (plastic film) used in the chloroalkali industry and in electrochemical fuel cells.
- Chemours™ Nafion® Polymer Dispersions used in the fabrication of thin films and coating formulations for fuel cells membranes, catalyst coatings, sensors, and a variety of electrochemical applications.
- HFPO monomer and Vinyl Ether monomers used to manufacture various fluorochemical products such as Chemours™ Teflon®.
- Fluorocarbon intermediates for Nafion® membranes and other fluorocarbon products, and
- Fluoropolymer Processing Aids (PPA) used in the manufacturing of fluoropolymers and fluorinated telomers.

In addition to the manufacturing operations, Chemours operates two natural gas-fired boilers and a wastewater treatment plant (WWTP) for the treatment of process and sanitary wastewaters from Chemours, Kuraray, and DuPont (both Kuraray and DuPont are also located on the site). However, no process wastewater is discharged currently from the Chemours facility to the WWTP, except reject water from making filtered, deionized/degassed water at the power plant.

2.2 Requested Permitting Actions

Chemours is submitting this permit application for modifications to Vinyl Ethers North process area (ID No. NS-B), Vinyl Ethers South process area (ID No. NS-C), and IXM Membrane process area (ID No. NS-H), referred to as the “Proposed Project”. The following sections provide a general discussion of changes associated with these three process areas. In addition to these changes, Chemours will route the existing Semiworks Polymerization Operation (ID No. SW-1) to the existing Thermal Oxidizer/Scrubber System (CD Nos. NCD-Q1 and NCD-Q2). There will be no other modifications to the SW-1.

2.2.1 Vinyl Ethers North Process (ID No. NS-B)

Chemours plans to install the necessary equipment to support a capacity increase of approximately 100% within the Vinyl Ethers North process area. This will be accomplished by installing two new agitated bed reactors (ABRs), co-feeding the ABRs, and expanding the distillation area to purify higher production rates. The existing ABR will be replaced by the two new proposed ABRs. Additional equipment components (i.e., valves and connectors) will be added indoors (VE-North Indoor Fugitives, ID No. NS-B-2) and outdoors as a result of the process area modification; however, Chemours continues to evaluate ways to reduce emissions from fugitive equipment by reducing connections and installing low-emission (Low-E) valves, where possible.

A process flow diagram of Vinyl Ethers North process, including new and/or replaced equipment is provided in Appendix B.

2.2.2 Vinyl Ethers South Process (ID No. NS-C)

Chemours plans to install the necessary equipment to increase capacity by approximately 35 to 40% within the VE Ethers South process area. This will be accomplished by co-feeding of the ABRs and expanding the distillation area to purify the higher rates.

Additional equipment components (i.e., valves and connectors) will be added outdoors as a result of the process area modification; however, Chemours continues to evaluate ways to reduce emissions from fugitive equipment by reducing connections and installing low-emission (Low-E) valves, where possible.

A process flow diagram of Vinyl Ethers South process, including new and/or replaced equipment is provided in Appendix B.

2.2.3 IXM Membrane Process (ID No. NS-H)

Chemours plans to install a third Hydrolysis Line in the IXM Membrane process area that will increase the capacity by approximately 30%. The new line is essential to support the strong growth of the hydrogen market includes the need to generate hydrogen using water electrolysis.

A process flow diagram of the third Hydrolysis Line is provided in Appendix B.

2.2.4 Semiworks Polymerization Operation (ID No. SW-1)

In addition to the process area modifications previously discussed, Chemours will be venting process emissions from the Semiworks Polymerization Operations (ID No. SW-1) to the Thermal Oxidizer/Scrubber System (CD Nos. NCD-Q1 and NCD-Q2). The Semiworks Laboratory Hood (ID No. SW-2) as well as the VE Research Laboratory Hood and VE Research Laboratory Chemical Storage Cabinet (ID No. I-05-2) will continue to vent to the existing Carbon Adsorber (CD No. SCD-SW1). In addition, the indoor fugitives in Semiworks will continue to vent to the existing Carbon Adsorber (CD No. SCD-SW1). For permit clarity, Chemours is requesting that a new emissions source ID be applied to the existing Semiworks Indoor Fugitives (proposed ID No. SW-3). These emissions previously would have been included as part of the SW-1 emission source.

A process flow diagram of the current and proposed Semiworks Polymerization Operation is provided in Appendix B.

2.2.5 Continued Operations

Chemours will continue to manufacture existing products in compliance with the existing permit limitations. While there may be increased production in other process units as a result of the modifications in Vinyl Ethers and the IXM Membrane Process, there are no physical modifications planned in these other areas. In addition, these process units will continue to operate within the current permit limitations. The proposed modification will not result in changes to the current permitting status of the facility as a major Title V source of criteria pollutants and a major source of HAPs.

3. PSD APPLICABILITY AND PROJECT EMISSIONS

The manufacturing process at the Chemours – Fayetteville Works facility emits various pollutants to the atmosphere. This section describes the methodology used to quantify project emissions and assess PSD permitting applicability for the proposed modifications. Detailed emission calculations are presented in Appendix C.

Chemours is located in Bladen County which has been classified as “attainment/unclassifiable” for all criteria pollutants. As such, any new construction or modifications that result in emission increases are potentially subject to the PSD permitting regulations. PSD applicability depends on the existing status of the facility (i.e. PSD major or minor source) and the net emissions increase associated with the proposed project. Chemours is considered an existing major source under the PSD permitting program for purposes of New Source Review (NSR) as it belongs to one of the 28 PSD listed source categories (as listed in 40 CFR 51.166(b)(1)(iii)(t)) and has the potential to emit (PTE) greater than 100 tons per year (tpy) of NSR pollutants. Therefore, the emission increases from the modifications proposed in this application must be evaluated against PSD major modification SERs for each NSR pollutant to determine PSD permitting applicability.

A description of the methodologies used to determine the pollutant emission rates for the proposed modification are detailed throughout this section and/or in Appendix C. Baseline actual emissions (BAE) for this comparison are based on the period of January 2018 to December 2019, with limited exception. BAE for the Thermal Oxidizer, Lime Silo and Lime Slaker were calculated using data from January 2020 through December 2021 since the units were not in operation during 2018/2019. Based on the emissions detailed in this section, the proposed modification will not be subject to PSD review for any applicable pollutant as the emissions increases associated with the proposed modification are less than the PSD SERs. The methodology used for evaluating PSD SER and conducting a netting analysis followed EPA guidance.[1]

3.1 New Source Review Significant Emission Rates

There are three criteria for determining whether the Proposed Project will be subject to PSD. The first is to determine if the Proposed Project is significantly large enough to be classified as a major modification. The second criterion is that the source be located in an attainment or unclassified area. As previously detailed, Chemours is located in an attainment/unclassified area. The third criterion is whether the net emission changes result in an increase in excess of the PSD SER thresholds. For example, if the Proposed Project emission increases are significant, then an evaluation of net emissions (sum of contemporaneous and creditable emission increases and decreases) is conducted.

To address the first criterion, a project is considered a major modification if it emits a regulated NSR pollutant in amounts equal to or greater than specified significant increases. Regulated NSR pollutants include:

- Any pollutant for which a NAAQS has been developed and any constituents or precursors identified by the USEPA;
- Any pollutant regulated under a New Source Performance Standard (NSPS);
- Any material identified as contributing to the depletion of stratospheric ozone;
- Any other material regulated under the CAA except for Hazardous Air Pollutants (HAPs); and

[1] Memorandum from E. Scott Pruitt EPA Administrator to Regional Administrators, “Project Emissions Accounting Under the New Source Review Preconstruction Permitting Program”, 13 March 2018.

- Greenhouse gases (GHG).

The significant thresholds, as defined in 40 CFR 51.166(b)(23)(i) for each regulated NSR pollutant, are presented in Table 3-1. The significance thresholds are established by the PSD regulations, as the level of increase that would trigger PSD review at an existing major stationary source. However, it is not the emissions increase from the new or modified equipment or emission sources alone that determines PSD applicability. Other emission sources at the facility must also be evaluated to determine whether emission increases could occur because of the addition of the new or modified emission sources. If the Proposed Project is determined to result in a significant emissions increase, the increase may be combined with other emissions increases and decreases made at the facility contemporaneously with the specific project. Then if the net result is greater than the significant amount, the specific project is determined to result in a significant net emissions increase and is subject to PSD. If the first step does not result in a significant emissions increase, then it is not necessary to determine the net emissions increase.

The proposed modifications to Vinyl Ethers North, Vinyl Ethers South, and IXM Membrane processes and associated equipment is expected to result in an increase in production in these areas. It has been determined that production in other process areas at the Chemours – Fayetteville Works facility may also be affected by increased production in Vinyl Ethers North, Vinyl Ethers South, and IXM Membrane process units. As shown in Table 3-1, for the Proposed Project, the emissions review included criteria pollutants and other PSD regulated pollutants including:

- particulate matter (PM),
- particulate matter with an aerodynamic diameter less than 10 microns PM_{10},
- particulate matter with an aerodynamic diameter less than 2.5 microns $PM_{2.5}$,
- sulfur dioxide (SO_2),
- nitrogen oxides (NO_X),
- ozone,
- carbon monoxide (CO)
- volatile organic compounds (VOC),
- lead (Pb),
- inorganic fluorides,
- sulfuric acid mist (H_2SO_4).
- total reduced sulfur (TRS) including hydrogen sulfide (H_2S),
- ozone depleting substance (ODS) and
- carbon dioxide equivalent (CO_{2e}).

Table 3-1. PSD Significant Emission Rate Thresholds

Pollutant	SER (tpy)	Increased Emissions due to the Proposed Project[a]	Associated Emission Increase in Excess of SER
PM	25	Yes	No
PM_{10}	15	Yes	No
$PM_{2.5}$	10, direct (40 SO_2/NO_X precursors)	Yes	No
SO_2	40	Yes	No
NO_X	40	Yes	No
CO	100	Yes	No
VOC	40	Yes	Yes
Pb	0.6	No	No
Fluorides (inorganic)	3	No	No
H_2SO_4[b]	7	Yes	No
ODS	Any Increase	No	No
CO_2e[c]	75,000 CO_2e	Yes	No

[a] Increases in PM, PM_{10}, $PM_{2.5}$, NO_x, SO_2, and CO emissions are associated mostly with slight increases in natural gas combustion and are less than the SERs.

[b] Increases in H_2SO_4 emissions are associated with the RSU process and are significantly less than the SER.

[c] Increases in CO_2e emissions are associated with various affected process units and was calculated to be 1,793 tons per year and are less than the SER.

3.2 Project Emissions

Production rates and actual emissions will increase as a result of the modification in Vinyl Ethers North, Vinyl Ethers South, and the IXM Membrane Processes. The process emissions from the Vinyl Ethers facilities currently vent to the Thermal Oxidizer/Scrubber System (CD Nos. NCD-Q1 and NCD-Q2) and will continue to vent there following the proposed modifications. The IXM Membrane Process (ID No. NS-H) currently is uncontrolled and will remain uncontrolled following modifications. In addition, Semiworks Polymerization Operation process emissions (ID No. SW-1) is currently vented to the existing Carbon Adsorber (CD No. SCD-SW1); however, as part of this proposed project, these emissions will be vented to the Thermal Oxidizer/Scrubber system (CD Nos. NCD-Q1 and NCD-Q2). This chance will result in a significant decrease in VOC emissions. The Semiworks Laboratory Hood (ID No. SW-2) and Semiworks Indoor Fugitives (Proposed ID No. SW-3) will continue to vent to the existing Carbon Adsorber (CD No. SCD-SW1).

The increase in production due to the Proposed Project will also impact the emissions from many other areas of the facility, which supply raw materials and/or supply additional steam demand (i.e., boilers). The following areas are expected to have resulting emission increases associated with the Proposed Project:

- Hexafluoropropylene oxide (HFPO) process (ID No. NS-A)
- RSU Process (ID No. NS-D-1 and NS-D-2)
- IXM Membrane Coating (ID No. NS-I)

- TFE/CO2 Separation Process (ID No. NS-M)
- HFPO Product Container Decontamination Process (ID No. NS-N)
- Vinyl Ethers North Product Container Decontamination Process (ID No. NS-O)
- Vinyl Ethers South Product Container Decontamination Process (ID No. NS-P)
- Lime Silo (ID No. NS-R1)
- Lime Slaker (ID No. NS-R2)
- Thermal Oxidizer (CD No. NCD-Q1)
- Boilers (ID Nos. PS-A and PS-B)
- Waste DMSO Storage Tank (ID No. I-02)
- Fugitive Emissions of Methylene Chloride (ID No. I-03)

Chemours evaluated each area individually and determined the associated increase in production volume for the affected process units. Details are provided in Appendix C.

In a direct comparison of post-project emissions to CY2021 actual emissions, it is indicated that the Proposed Project may exceed the PSD threshold levels for VOC. This same comparison resulted in potential increases significantly less than PSD SERs for all other pollutants. As such, a netting analysis was conducted for VOC emissions only.

3.3 PSD Netting Analysis

BAE are defined as the average rate of emissions, in tons per year, from a source that actually occurred over any consecutive 24-month period. The 24-month period must fall within a specific timeframe before the proposed project commences construction. BAE are used as the starting point for determining the magnitude of changes associated with the proposed project in order to determine if the change will be subject to PSD. For the Vinyl Ethers North, Vinyl Ethers South, and IXM Membrane Process projects, BAE was calculated by taking the average of the CY2018 and CY2019 actual emissions. The periods used for BAE were prior to the installation of the Thermal Oxidizer/Scrubber System since the Thermal Oxidizer was not installed to control VOC but rather under the Consent Order[2] to control perfluoroalkyl and polyfluoroalkyl substances (PFAS). As such, the VOC emission reductions due to the installation of the Thermal Oxidizer/Scrubber System are considered “surplus” and are creditable emissions[3].

A netting analysis was conducted to evaluate increased emissions from the project for comparison to the PSD SERs. In addition to the Proposed Project and associated emission increases, over the past five years the following projects have resulted in an increase or decrease of VOC emissions from the Chemours facility:

- Decreased emissions due to the installation of the Thermal Oxidizer/Scrubber System (CD Nos. NCD-01 and NCD-02) and associated equipment;
- Increased emissions due to Thermal Oxidizer/Scrubber System Emergency Generator (ID No. I-RICE 04);

[2] "Consent Order" means the Consent Order entered on February 25, 2019, in State of North Carolina, ex rel., Michael S. Regan, Secretary, North Carolina Department of Environmental Quality v. The Chemours Company FC, LLC, 17 CVS 580 (Bladen County).

3 Memorandum from John S. Seits, Director, Office of Ai Quality Planning and Standards to Bob Hannesschlager, Acting Director, Multimedia Planning and Permitting Division, Region VI, 12 November 1997.

- Increased emissions due to Remediation Treatment System Emergency Generator (ID No. I-RICE 05);
- Increased emissions due to Barrier Wall and Wastewater Treatment Emergency Generators (ID No. I-RICE 06-24);
- Increased emissions due to Remediation Treatment System Emergency Generator (ID No. I-RICE 05); and
- Increased emissions due to the proposed project.

Table 3-4 shows a comparison of the difference between the Net Emissions Increase (Post-Project Emissions + Contemporaneous Emission Increases – BAE) and the PSD SERs for VOC. As depicted in the table, the proposed project will not result in a net emissions increase greater than the VOC SER. Therefore, the proposed project does not cause a significant net emissions increase and does not trigger PSD review.

Table 3-2. PSD Net Emissions Increase

Pollutant	Baseline Actual Emissions (tpy)	Post-Project Emissions[b, c] (tpy)	Contemporaeous Emission Increases[d] (tpy)	Net Emissions Increase (tpy)	SERs (tpy)
VOC[a]	168.18	187.85	0.56	20.22	40

[a] Only VOC will be emitted in excess of the PSD SER due to the Proposed Project.
[b] Includes reductions associated with the installation of the Thermal Oxidizer/Scrubber System (2020).
[c] Chemours is continuing to reevaluate the DMSO emissions from the IXM Membrane Process and will be submitting an update to this number to reflect the decrease in estimated VOC emissions based on the results of this reevaluation
[d] Includes the emissions from the emergency generators listed above.

4. AIR REGULATORY APPLICABILITY ANALYSIS

The applicability determinations made for potentially applicable federal and state air quality regulations are described in this section for the Proposed Project modifications. Federal regulations are reviewed first, followed by North Carolina regulations. A summary detailing applicability of each regulation is provided throughout this section.

4.1 Federal Requirements

4.1.1 Permitting Programs

4.1.1.1 Title V Operating Permit Program, 40 CFR 70

A Title V (Part 70) operating permit is required for facilities that meet the definition of a major source according to 40 Code of Federal Regulations (CFR) Part 70.2. A facility with criteria pollutant emissions greater than 100 tpy or 10 tpy of a single HAP or 25 tpy of a combination of HAPs is considered a major source under the Title V permitting program. The Chemours facility is considered a major source with respect to the Title V permitting program and operates under Air Permit 03735T48.

Chemours will submit the Part 2 permit application within twelve (12) months after commencing operation of the Proposed Project, to request incorporation of the new sources into the Title V Permit.

4.1.1.2 Prevention of Significant Deterioration (PSD), 40 CFR 52.21

The federal PSD program, codified in 40 CFR Part 52.21, requires any new major stationary source of air pollutants to obtain a major source air construction permit before commencing construction. North Carolina has incorporated the federal PSD program in 15A NCAC 2Q .0300. The PSD program applies to a facility if potential emissions exceed applicable major source thresholds. The facility is considered a chemical process plant, which is one of the 28 listed PSD source categories specified in §52.21(b)(1)(i)(a) with a 100-tpy PSD major source threshold for regulated New Source Review (NSR) pollutants. Since the existing facility is a major source with respect to the PSD program, modifications at the facility must undergo major source review if the proposed project will increase emissions of one of the PSD regulated pollutants in excess of the applicable pollutant SER threshold.

As detailed in Section 3, the emission increase of each NSR regulated pollutant associated with the proposed project is less than the applicable SER. Therefore, the proposed project will not trigger PSD review. Since the administration of the Federal NSR program has been delegated to the NC DEQ, the application will be processed in compliance with the state rules described in Section 4.2 below.

4.1.1.3 Nonattainment Area New Source Review (NNSR), 40 CFR 52/21

NNSR is applicable to construction of a new major stationary source or a project that is a major modification at an existing major stationary source in an area designated as nonattainment for the National Ambient Air Quality Standards (NAAQS). The Chemours facility is located in Bladen County which is classified as an attainment or unclassifiable county for all NSR pollutants. Thus, the facility is not subject to NNSR.

4.1.2 New Source Performance Standards, 40 CFR Part 60

New Source Performance Standards (NSPS), codified in Title 40 CFR Part 60, establish pollutant emission limits and monitoring, reporting, and recordkeeping requirements for various emission sources based on source type and size. The NSPS apply to new, modified, or reconstructed sources as defined by particular NSPS. North Carolina has incorporated the federal NSPS in 15A NCAC 02D .0524. The

proposed modifications in Vinyl Ethers North, Vinyl Ethers South, and IXM Membrane Process areas and associated equipment will not affect applicability of any NSPS regulations.

4.1.3 National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61 and 40 CFR Part 63

National Emission Standards for Hazardous Air Pollutants (NESHAP) are generally applicable to sources of HAP. The NESHAP regulations in 40 CFR 61 are pollutant-specific while the NESHAP regulations in 40 CFR 63 are established based on Maximum Achievable Control Technology (MACT) determinations for particular source types.

None of the NESHAP regulations in 40 CFR 61 apply to the facility; however, the facility is a major source, of HAP as defined in 40 CFR 63.2 and is submit to regulations in 40 CFR 63.

4.1.3.1 Miscellaneous Organic Chemical (MON), 40 CFR 63 Subpart FFFF

Several operations at the Chemours – Fayetteville Works facility, including Vinyl Ethers North (ID No. NS-B) and Viny Ethers South (ID No. NS-C), are subject to the requirements of 40 CFR 63, Subpart FFFF, "National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing" (also referred to as the Miscellaneous Organic NESHAP, or MON). The project is not considered reconstruction under 40 CFR 63.2 as the fixed capital cost of the new equipment does not exceed 50 percent of the fixed capital cost that would be required to construct a comparable new source.

While MON-affected equipment may be modified as a result of the Proposed Project, it is not expected that applicability and/or compliance requirements will be changed. As required by 40 CFR §63.2520(a), a notification of compliance status (NOCS) report is required to be submitted no later than 150 days after startup of the new equipment.

4.1.4 Compliance Assurance Monitoring (CAM), 40 CFR Part 64

Under 40 CFR Part 64, Compliance Assurance Monitoring (CAM), facilities are required to prepare and submit monitoring plans for certain emission units with certain Title V permit applications. Specifically, CAM applies to any unit that meets all three of the following criteria:

- be subject to an emission limitation or standard,
- use a control device to achieve compliance, and
- have pre-control emissions that exceed or are equivalent to the major source threshold.

Following modification, Vinyl Ethers North and Vinyl Ethers South will continue to vent to the Thermal Oxidizer/Scrubber System. As part of this project, Semiworks Polymerization Operation will also be vented to the Thermal Oxidizer/Scrubber System. A CAM plan for the Thermal Oxidizer/Scrubber System was submitted as part of the Title V permit renewal application submitted in 2020. IXM Membrane Process does not utilize a control device to achieve compliance and is not subject to CAM.

4.2 State of North Carolina Regulations

Potentially applicable standards under 15A North Carolina Administrative Code (NCAC) Chapter 02, Environmental Management are discussed in the following section.

4.2.1 15A NCAC 02D .1111 – Maximum Achievable Control Technology

This rule implements the federal MACT standards. Compliance with the federal MACT standards is discussed in Section 4.1.3

4.2.2 15A NCAC 02D .0521 – Control of Visible Emissions

This rule applies to "industrial processes where an emission can reasonably be expected to occur". For sources installed after July 1, 1971, visible emissions are limited to no more than 20 percent opacity when averaged over a six-minute period. Visible emissions are not expected as a result of the Proposed Project and Chemours will continue to comply with the rule as applicable throughout the facility.

4.2.3 15A NCAC 02D .0530 – Prevention of Significant Deterioration

As discussed in section 4.1.1.2, the current facility is a major source with respect to the PSD regulations. As such, the increase in emissions associated with any modification at the facility must be assessed against the appropriate SER. As detailed in Section 3, the emission increase of each PSD regulated pollutant associated with the proposed project is less than the applicable SER. Therefore, the proposed project will not trigger PSD review. Chemours requests to maintain the current PSD avoidance limits for applicable affected sources.

4.2.4 15A NCAC 02Q .0300 – Construction and Operation Permits

The owner or operator of a new, modified, or existing facility or source is required by 15A NCAC 02Q .0300 to apply for and obtain a construction permit. This application is a request for modification of the existing permit. As stated previously, Chemours is requesting that NC DAQ process this application using the two step permitting process outlined in 15A NCAC 02Q .0501(b) and 15A NCAC 02Q .0504. This application initiates the request for the permit modification.

4.2.5 15A NCAC 02Q .0500 – Title V Procedures

As noted in the Federal Regulations section, the Title V permitting program does apply to the Chemours Fayetteville Works that currently operates under Title V permit number 03735T48.

4.2.6 15A NCAC 02Q. 0700 – Toxic Air Pollutant Procedures and 15A NCAC 02D.1100 – Control of Toxic Air Pollutants

The Toxic Air Pollutant (TAP) Procedures require a permit for any facility with emissions of a Toxic Air Pollutant in excess of the applicable Toxic Pollutant Emission Rates (TPER) presented in 15A NCAC 02Q. 0711. The current permit contains facility-wide emission limits for each of the applicable TAP emitted from the facility [Permit Conditions 2.2(B)(1) and 2.2(B)(2) of Air Quality Permit No. 03735T48]. These limits were based on SCREEN2 modeling conducted in 1995 as part of the Nafion® Semiworks air permit modification. This modeling is the basis of the current TAP limits in the Chemours air permit. Appendix C contains detailed calculations for TAPs emitted from the affected sources. As detailed in those calculations, the Proposed Project will not increase TAP emissions above the current permit limits. Therefore, update Toxics modeling demonstration is not required as part of this application.

4.2.7 15A NCAC 02Q. 0519(a)(7) – Consent Order

Permit Condition 2.2.D.1 requires Chemours to reduce facility-wide annual emissions (including fugitive, maintenance, malfunction, or accidental emissions) of GenX Compounds[4] to less than 23.027 pounds per year. Chemours is requesting that this facility-wide emission limitation for GenX Compounds remain unchanged with the Proposed Project permit modification.

[4] "GenX Compounds" means HFPO Dimer Acid, also known as C3 Dimer Acid (CAS No. 13252-13-6); HFPO Dimer Acid Fluoride, also known as C3 Dimer Acid Fluoride (CAS No. 2062-98-8); and HFPO Dimer Acid Ammonium Salt, also known as C3 Dimer Acid Ammonium Salt (CAS No. 62037-80-3)

Chemours evaluated post-project GenX Compound emissions using the projected hours of operation for each unit that emits GenX Compounds and the projected campaign mix. February 2022 carbon adsorber stack testing data was utilized for Vinyl Ethers North indoor fugitives (ID No. NS-B-2) and September 2021 carbon adsorber stack testing data was used for Vinyl Ethers South indoor fugitives (ID No. NS-C-2) calculations. In addition, Chemours assumes a 13% decrease in GenX Compound emissions from the Vinyl Ethers North Carbon Adsorber (CD No. NCD-Q3) due to expected improvement using the recently installed coconut carbon system. Detailed emission calculations can be found in Appendix C.

Appendix A NC DEQ AIR PERMIT APPLICATION FORMS AND ZONING CONSISTENCY

FORM A

GENERAL FACILITY INFORMATION

REVISED 09/22/16 | NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate | A

NOTE- APPLICATION WILL NOT BE PROCESSED WITHOUT THE FOLLOWING:

- ☑ Local Zoning Consistency Determination (new or modification only)
- ☑ Appropriate Number of Copies of Application
- ☑ Responsible Official/Authorized Contact Signature
- ☑ P.E. Seal (if required)

Application Fee (please check one option below)

- ☐ Not Required
- ☑ ePayment
- ☐ Check Enclosed

GENERAL INFORMATION

Legal Corporate/Owner Name:	*The Chemours Company FC, LLC*
Site Name:	*The Chemours Company - Fayetteville Works*
Site Address (911 Address) Line 1:	*22828 NC Highway 87 West*
Site Address Line 2:	
City: *Fayetteville*	State: *North Carolina*
Zip Code: *28306-7332*	County: *Bladen*

CONTACT INFORMATION

Responsible Official/Authorized Contact:	***Invoice Contact:***
Name/Title: *Dawn M. Hughes/Plant Manager*	Name/Title: *Christel Compton/Program Manager*
Mailing Address Line 1: *22828 NC Highway 87 West*	Mailing Address Line 1: *22828 NC Highway 87 West*
Mailing Address Line 2:	Mailing Address Line 2:
City: *Fayetteville* State: *North Carolina* Zip Code: *28306-7332*	City: *Fayetteville* State: *North Carolina* Zip Code: *28306-7332*
Primary Phone No.: *910.678.1415* Fax No.:	Primary Phone No.: *910.678.1213* Fax No.: *910.678.1247*
Secondary Phone No.:	Secondary Phone No.:
Email Address: *Dawn.M.Hughes-1@chemours.com*	Email Address: *Christel.E.Compton@chemours.com*

Facility/Inspection Contact:	***Permit/Technical Contact:***
Name/Title: *Christel Compton/Program Manager*	Name/Title: *Christel Compton/Program Manager*
Mailing Address Line 1: *22828 NC Highway 87 West*	Mailing Address Line 1: *22828 NC Highway 87 West*
Mailing Address Line 2:	Mailing Address Line 2:
City: *Fayetteville* State: *North Carolina* Zip Code: *28306-7332*	City: *Fayetteville* State: *North Carolina* Zip Code: *28306-7332*
Primary Phone No.: *910.678.1213* Fax No.:	Primary Phone No.: *910.678.1213* Fax No.:
Secondary Phone No.:	Secondary Phone No.:
Email Address: *Christel.E.Compton@chemours.com*	Email Address: *Christel.E.Compton@chemours.com*

APPLICATION IS BEING MADE FOR

- ☐ New Non-permitted Facility/Greenfield
- ☑ Modification of Facility (permitted)
- ☐ Renewal Title V
- ☐ Renewal Non-Title V
- ☐ Name Change
- ☐ Ownership Change
- ☐ Administrative Amendment
- ☐ Renewal with Modification

FACILITY CLASSIFICATION AFTER APPLICATION (Check Only One)

- ☐ General
- ☐ Small
- ☐ Prohibitory Small
- ☐ Synthetic Minor
- ☑ Title V

FACILITY (Plant Site) INFORMATION

Describe nature of (plant site) operation(s): *Manufacturer of Chemcals, Plastics, Plastic Sheeting and Plastic Film.*

	Facility ID No. *900009*
Primary SIC/NAICS Code: *2821, 3081, 3083/326113*	Current/Previous Air Permit No. *03735T48* Expiration Date: *3/31/2021*
Facility Coordinates: Latitude: *38.843934*	Longitude: *-78.836834*

Does this application contain confidential data? ☑ YES ☐ NO ***If yes, please contact the DAQ Regional Office prior to submitting this application.*** **(See Instructions)**

PERSON OR FIRM THAT PREPARED APPLICATION

Person Name: *Kevin Eldridge*	Firm Name: *ERM NC, Inc.*
Mailing Address Line 1: *4140 Parklake Avenue*	Mailing Address Line 2:
City: *Raleigh* State: *North Carolina*	Zip Code: *27612* County: *Wake*
Phone No.: *919.428.9508* Fax No.:	Email Address: *Kevin.Eldridge@ERM.com*

SIGNATURE OF RESPONSIBLE OFFICIAL/AUTHORIZED CONTACT

Name (typed): *Dawn M. Hughes*	Title: *Plant Manager*
X Signature(Blue Ink):	Date:

Attach Additional Sheets As Necessary

FORM A (continued, page 2 of 2)

GENERAL FACILITY INFORMATION

SECTION AA1 - APPLICATION FOR NON-TITLE V PERMIT RENEWAL

_____ (Company Name) hereby formally requests renewal of Air Permit No. _____

There have been no modifications to the originally permitted facility or the operations therein that would require an air permit since the last permit was issued.

Is your facility subject to 40 CFR Part 68 "Prevnetion of Accidental Releases" - Section 112(r) of the Clean Air Act? ☐ YES ☐ NO

If yes, have you already submitted a Risk Manage Plan (RMP) to EPA? ☐ YES ☐ NO Date Submitted: _____

Did you attach a current emissions inventory? ☐ YES ☐ NO

If no, did you submit the inventory via AERO or by mail? ☐ Via AERO ☐ Mailed Date Mailed: _____

SECTION AA2- APPLICATION FOR TITLE V PERMIT RENEWAL

In accordance with the provisions of Title 15A 2Q .0513, the responsible official of _____ (Company Name)

hereby formally requests renewal of Air Permit No. _____ (Air Permit No.) and further certifies that:

(1) The current air quality permit identifies and describes all emissions units at the above subject facility, except where such units are exempted under the North Carolina Title V regulations at 15A NCAC 2Q .0500;

(2) The current air quality permit cits all applicable requirements and provides the method or methods for determing compliance with the applicable requirements;

(3) The facility is currently in compliance, and shall continue to comply, with all applicable requiremetns. (Note: As provided under 15A NCAC 2Q .0512 compliance with the conditions of the permit shall be deemed compliance with the applicable requirements specifically identified in the permit);

(4) For applicable requirements that become effective during the term of the renewed permit that the facility shall comply on a timely basis;

(5) The facility shall fulfill applicable enhanced monitoring requirements and submit a compliance certification as required by 40 CFR Part 64.

The responsible official (signature on page 1) certifies under the penalty of law that all information and statements provided above, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.

SECTION AA3- APPLICATION FOR NAME CHANGE

New Facility Name: _____

Former Facility Name: _____

An official facility name change is requested as described above for the air permit mentioned on page 1 of this form. Complete the other sections if there have been modifications to the originally premitted facility that would requie an air quality permit since the last permit was issued and if ther has been an ownership change associated with this name change.

SECTION AA4- APPLICATION FOR AN OWNERSHIP CHANGE

By this application we hereby request transfer of Air Quality Permit No. _____ from the former owner to the new owner as described below.

The transfer of permit responsibility, coverage and liability shall be effective _____ (immediately or insert date.) The legal ownership of the facility described on page 1 of this form has been or will be transferred on _____ (date). There have been no modifications to the originally permitted facility that would require an air quality permit since the last permit was issued.

Signature of New (Buyer) Responsible Official/Authorized Contact (as typed on page 1):

X Signature (Blue Ink): _____

Date:

New Facility Name:

Former Facility Name:

Signature of Former (Seller) Responsible Official/Authorized Contact:

Name (typed or print):

Title:

X Signature (Blue Ink): _____

Date:

Former Legal Corporate/Owner Name:

In lieu of the seller's signature on this form, a letter may be submitted with the seller's signature indicating the ownership change

SECTION AA5- APPLICATION FOR ADMINISTRATIVE AMENDMENT

Describe the requested administrative amendment here (attach additional documents as necessary):

FORMs A2, A3

EMISSION SOURCE LISTING FOR THIS APPLICATION - A2

112r APPLICABILITY INFORMATION - A3

REVISED 09/22/16 — **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** — **A2**

EMISSION SOURCE LISTING: New, Modified, Previously Unpermitted, Replaced, Deleted

EMISSION SOURCE ID NO.	EMISSION SOURCE DESCRIPTION	CONTROL DEVICE ID NO.	CONTROL DEVICE DESCRIPTION
Equipment To Be ADDED By This Application (New, Previously Unpermitted, or Replacement)			
SW-3	*Semiworks Indoor Fugitives [Previously included as part of SW-1]*	*SCD-SW1*	*Carbon Adsorber*
Existing Permitted Equipment To Be MODIFIED By This Application			
NS-B	*Vinyl Ethers North Process*	*NCD-Q1 and NCD-Q2*	*Thermal Oxidizer (10 million Btu per hour, natural gas-fired) 4-Stage Scrubber: Countercurrent Packed Bed Stages 1, 2, and 3; Caustic Stage 4 with minimum scrubber liquor flow of 40 gallons per minute and minimum pH of 7.1*
NS-C	*Vinyl Ethers South Process*	*NCD-Q1 and NCD-Q2*	*Thermal Oxidizer (10 million Btu per hour, natural gas-fired) 4-Stage Scrubber: Countercurrent Packed Bed Stages 1, 2, and 3; Caustic Stage 4 with minimum scrubber liquor flow of 40 gallons per minute and minimum pH of 7.1*
NS-H	*IXM Membrane Process*	*N/A*	*N/A*
SW-1	*Semiworks Polymerization Operation*	*NCD-Q1 and NCD-Q2*	*Thermal Oxidizer (10 million Btu per hour, natural gas-fired) 4-Stage Scrubber: Countercurrent Packed Bed Stages 1, 2, and 3; Caustic Stage 4 with minimum scrubber liquor flow of 40 gallons per minute and minimum pH of 7.1*
Equipment To Be DELETED By This Application			

112(r) APPLICABILITY INFORMATION — A 3

Is your facility subject to 40 CFR Part 68 "Prevention of Accidental Releases" - Section 112(r) of the Federal Clean Air Act? ☑ Yes ☐ No

If No, please specify in detail how your facility avoided applicability: _____

If your facility is Subject to 112(r), please complete the following:

A. Have you already submitted a Risk Management Plan (RMP) to EPA Pursuant to 40 CFR Part 68.10 or Part 68.150?

☑ Yes ☐ No Specify required RMP submittal date: *30 June 1999* If submitted, RMP submittal date: *Last update 24 July 2019*

B. Are you using administrative controls to subject your facility to a lesser 112(r) program standard?

☐ Yes ☑ No If yes, please specify: _____

C. List the processes subject to 112(r) at your facility:

PROCESS DESCRIPTION	PROCESS LEVEL (1, 2, or 3)	HAZARDOUS CHEMICAL	MAXIMUM INTENDED INVENTORY (LBS)
SO_3 Process	*3*	*sulfur trioxide*	*59,400*
TFE Process	*1*	*tetrafluoroethylene*	*61,000*

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B**

EMISSION SOURCE DESCRIPTION: *Vinyl Ethers North*	EMISSION SOURCE ID NO: *NS-B*
	CONTROL DEVICE ID NO(S): *NCD-Q1 and NCD-Q2*
OPERATING SCENARIO *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-Q2*

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Vinyl Ethers North process produces isolated intermediates . The intermediates are acid fluorides produced in separate campaigns and in the same equipment using similar processes. Acid fluorides are produced and purified in a continuous process. See accompanying report for flow diagram and description of the proposed modifications to this process.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

☐ Coal,wood,oil, gas, other burner (Form B1)	☐ Woodworking (Form B4)	☐ Manuf. of chemicals/coatings/inks (Form B7)
☐ Int.combustion engine/generator (Form B2)	☐ Coating/finishing/printing (Form B5)	☐ Incineration (Form B8)
☐ Liquid storage tanks (Form B3)	☐ Storage silos/bins (Form B6)	☑ Other (Form B9)

START CONSTRUCTION DATE: *Start-up 4th Quarter of 2024*	DATE MANUFACTURED: *NA*
MANUFACTURER / MODEL NO.: *NA*	EXPECTED OP. SCHEDULE: *24* HR/DAY *7* DAY/WK *50* WK/YR
IS THIS SOURCE SUBJECT TO? ☐ NSPS (SUBPARTS?):	☑ NESHAP (SUBPARTS?): *FFFF*

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB *26.1* MAR-MAY *26.1* JUN-AUG *26.1* SEP-NOV *21.7*

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	*NA*	*See Appendix C of Report*					
PARTICULATE MATTER<10 MICRONS (PM_{10})	*NA*						
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)	*NA*						
SULFUR DIOXIDE (SO2)	*NA*						
NITROGEN OXIDES (NOx)	*NA*						
CARBON MONOXIDE (CO)	*NA*						
VOLATILE ORGANIC COMPOUNDS (VOC)	*NA*						
LEAD	*NA*						
OTHER	*NA*						

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
See Appendix C of Report								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
Air toxics will not exceed the current permit limits for air toxics as the result of the project.					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURCE

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 — **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** — **B**

EMISSION SOURCE DESCRIPTION: *Vinyl Ethers South*	EMISSION SOURCE ID NO: *NS-C*
	CONTROL DEVICE ID NO(S): *NCD-Q1 and NCD-Q2*
OPERATING SCENARIO *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-Q2*

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

The Vinyl Ethers South process produces isolated intermediates . The intermediates are acid fluorides produced in separate campaigns and in the same equipment using similar processes. Acid fluorides are produced and purified in a continuous process. See accompanying report for flow diagram and a description of the proposed modifications to this process.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: *4th Quarter 2023 for Modification Startup* — DATE MANUFACTURED: *NA*

MANUFACTURER / MODEL NO.: *NA* — EXPECTED OP. SCHEDULE: *24* HR/DAY *7* DAY/WK *50* WK/YR

IS THIS SOURCE SUBJECT TO? ☐ NSPS (SUBPARTS?): ☑ NESHAP (SUBPARTS?): *FFFF*

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB *26.1* MAR-MAY *26.1* JUN-AUG *26.1* SEP-NOV *21.7*

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	*NA*	*See Appendix C of Report*					
PARTICULATE MATTER<10 MICRONS (PM_{10})	*NA*						
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)	*NA*						
SULFUR DIOXIDE (SO_2)	*02*						
NITROGEN OXIDES (NOx)	*NA*						
CARBON MONOXIDE (CO)	*NA*						
VOLATILE ORGANIC COMPOUNDS (VOC)	*02*						
LEAD	*NA*						
OTHER	*NA*						

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
See Appendix C of Report								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
Air toxics will not exceed the current permit limits for air toxics as the result of the project.					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURCE

Attach Additional Sheets As Necessary

.

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **B**

EMISSION SOURCE DESCRIPTION: *IXM Membrane Process*	EMISSION SOURCE ID NO: *NS-H*
	CONTROL DEVICE ID NO(S): *NA*
OPERATING SCENARIO *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-H*

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

A 3rd hydrolysis line will be installed in the IXM Membrane Process area. A flow diagram of the process is included in the accompanying report.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: *Startup 4th Quarter of 2023* | DATE MANUFACTURED: *NA*

MANUFACTURER / MODEL NO.: *NA* | EXPECTED OP. SCHEDULE: *24* HR/DAY *7* DAY/WK *50* WK/YR

IS THIS SOURCE SUBJECT TO? ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB *26.1* MAR-MAY *26.1* JUN-AUG *26.1* SEP-NOV *21.7*

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	*NA*	*See Appendix C of the Report*					
PARTICULATE MATTER<10 MICRONS (PM_{10})	*NA*						
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)	*NA*						
SULFUR DIOXIDE (SO_2)	*NA*						
NITROGEN OXIDES (NOx)	*NA*						
CARBON MONOXIDE (CO)	*NA*						
VOLATILE ORGANIC COMPOUNDS (VOC)	*NA*						
LEAD	*NA*						
OTHER	*NA*						

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
See Appendix C of the Report								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
Air toxics will not exceed the current permit limits for air toxics as the result of the project.					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURCE

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **B**

EMISSION SOURCE DESCRIPTION: *Semiworks Polymerization Operation*	EMISSION SOURCE ID NO: *SW-1*
	CONTROL DEVICE ID NO(S): *NCD-Q1 and NCD-Q2*
OPERATING SCENARIO *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-Q2*

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

Semiworks is a research & development area that operates under a wide range of conditions. This project is changing the control device for SW-1 from the Carbon Adsorber to the Thermal Oxidizer/Scrubber system.

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: *Start-up 4th Quarter of 2023* | DATE MANUFACTURED: *NA*

MANUFACTURER / MODEL NO.: *NA* | EXPECTED OP. SCHEDULE: *24* HR/DAY *7* DAY/WK *50* WK/YR

IS THIS SOURCE SUBJECT TO? ☐ NSPS (SUBPARTS?): ____ ☐ NESHAP (SUBPARTS?): ____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB *26.1* MAR-MAY *26.1* JUN-AUG *26.1* SEP-NOV 21*.7*

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	*NA*						
PARTICULATE MATTER<10 MICRONS (PM_{10})	*NA*						
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)	*NA*						
SULFUR DIOXIDE (SO2)	*NA*						
NITROGEN OXIDES (NOx)	*NA*						
CARBON MONOXIDE (CO)	*NA*						
VOLATILE ORGANIC COMPOUNDS (VOC)	*NA*						
LEAD	*NA*						
OTHER	*NA*						

See Appendix C of the Report

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
See Appendix C of the Report								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
Air toxics will not exceed the current permit limits for air toxics as the result of the project.					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURCE

Attach Additional Sheets As Necessary

FORM B

SPECIFIC EMISSION SOURCE INFORMATION (REQUIRED FOR ALL SOURCES)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **B**

EMISSION SOURCE DESCRIPTION: *Semiworks Indoor Fugitives*	EMISSION SOURCE ID NO: *SW-3*
	CONTROL DEVICE ID NO(S): *SCD-SW1*
OPERATING SCENARIO *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *EP-SCD-SW1*

DESCRIBE IN DETAILTHE EMISSION SOURCE PROCESS (ATTACH FLOW DIAGRAM):

The Semiworks Indoor Fugitves (with a new ID SW-3) that was previously part of the SW-1 will continue to vent to the existing carbon bed (SCD-SW1).

TYPE OF EMISSION SOURCE (CHECK AND COMPLETE APPROPRIATE FORM B1-B9 ON THE FOLLOWING PAGES):

- ☐ Coal,wood,oil, gas, other burner (Form B1)
- ☐ Int.combustion engine/generator (Form B2)
- ☐ Liquid storage tanks (Form B3)
- ☐ Woodworking (Form B4)
- ☐ Coating/finishing/printing (Form B5)
- ☐ Storage silos/bins (Form B6)
- ☐ Manuf. of chemicals/coatings/inks (Form B7)
- ☐ Incineration (Form B8)
- ☑ Other (Form B9)

START CONSTRUCTION DATE: *NA*	DATE MANUFACTURED: *NA*
MANUFACTURER / MODEL NO.: *NA*	EXPECTED OP. SCHEDULE: *24* HR/DAY *7* DAY/WK *50* WK/YR

IS THIS SOURCE SUBJECT TO? ☐ NSPS (SUBPARTS?):_____ ☐ NESHAP (SUBPARTS?):_____

PERCENTAGE ANNUAL THROUGHPUT (%): DEC-FEB *26.1* MAR-MAY *26.1* JUN-AUG *26.1* SEP-NOV *21.7*

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

AIR POLLUTANT EMITTED	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
PARTICULATE MATTER (PM)	*NA*	*See Appendix C of the Report*					
PARTICULATE MATTER<10 MICRONS (PM_{10})	*NA*						
PARTICULATE MATTER<2.5 MICRONS ($PM_{2.5}$)	*NA*						
SULFUR DIOXIDE (SO2)	*NA*						
NITROGEN OXIDES (NOx)	*NA*						
CARBON MONOXIDE (CO)	*NA*						
VOLATILE ORGANIC COMPOUNDS (VOC)	*NA*						
LEAD	*NA*						
OTHER	*NA*						

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

HAZARDOUS AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) lb/hr	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr
See Appendix C of the Report								

TOXIC AIR POLLUTANT EMISSIONS INFORMATION FOR THIS SOURCE

TOXIC AIR POLLUTANT	CAS NO.	SOURCE OF EMISSION FACTOR	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr
Air toxics will not exceed the current permit limits for air toxics as the result of the project.					

Attachments: (1) emissions calculations and supporting documentation; (2) indicate all requested state and federal enforceable permit limits (e.g. hours of operation, emission rates) and describe how these are monitored and with what frequency; and (3) describe any monitoring devices, gauges, or test ports for this source.

COMPLETE THIS FORM AND COMPLETE AND ATTACH APPROPRIATE B1 THROUGH B9 FORM FOR EACH SOURCE

Attach Additional Sheets As Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: *Vinyl Ethers North*	EMISSION SOURCE ID NO: *NS-B*
	CONTROL DEVICE ID NO(S): *NCD-1 and NCD-2*
OPERATING SCENARIO: *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-Q2*

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Vinyl Ethers North process - See Appendix B of attached report.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)
See Appendix C			

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED:	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR):
MAX. CAPACITY HOURLY FUEL USE:	REQUESTED CAPACITY ANNUAL FUEL USE:

COMMENTS:

Attach Additional Sheets as Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: *Vinyl Ethers South*	EMISSION SOURCE ID NO: *NS-C*
	CONTROL DEVICE ID NO(S): *NCD-1 and NCD-2*
OPERATING SCENARIO: *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-Q2*

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Vinyl Ethers South process - See Appendix B of attached report.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)
See Appendix C			

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED:	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR):
MAX. CAPACITY HOURLY FUEL USE:	REQUESTED CAPACITY ANNUAL FUEL USE:

COMMENTS:

Attach Additional Sheets as Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: *IXM Membrane Process*	EMISSION SOURCE ID NO: *NS-H*
	CONTROL DEVICE ID NO(S): *N/A*
OPERATING SCENARIO: *1* OF *1*	EMISSION POINT (STACK) ID NO(S): *NEP-H*

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

IXM Membrane process - See Appendix B of attached report.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)
See Appendix C			

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED:	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR):
MAX. CAPACITY HOURLY FUEL USE:	REQUESTED CAPACITY ANNUAL FUEL USE:

COMMENTS:

Attach Additional Sheets as Necessary

FORM B9

EMISSION SOURCE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **B9**

EMISSION SOURCE DESCRIPTION: ***Semiworks Indoor Fugitives***	EMISSION SOURCE ID NO: ***SW-3***
	CONTROL DEVICE ID NO(S): ***SCD-SW1***
OPERATING SCENARIO: ***1*** OF ***1***	EMISSION POINT (STACK) ID NO(S): ***EP-SCD-SW1***

DESCRIBE IN DETAIL THE PROCESS (ATTACH FLOW DIAGRAM):

Semiworks Indoor Fugitives (previously included with SW-1) - See Appendix B of attached report.

MATERIALS ENTERING PROCESS - CONTINUOUS PROCESS		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/HR)	LIMITATION(UNIT/HR)

MATERIALS ENTERING PROCESS - BATCH OPERATION		MAX. DESIGN	REQUESTED CAPACITY
TYPE	UNITS	CAPACITY (UNIT/BATCH)	LIMITATION (UNIT/BATCH)
See Appendix C			

MAXIMUM DESIGN (BATCHES / HOUR):	
REQUESTED LIMITATION (BATCHES / HOUR):	(BATCHES/YR):
FUEL USED:	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR):
MAX. CAPACITY HOURLY FUEL USE:	REQUESTED CAPACITY ANNUAL FUEL USE:

COMMENTS:

Attach Additional Sheets as Necessary

FORM C3

CONTROL DEVICE (THERMAL OR CATALYTIC)

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **C3**

AS REQUIRED BY 15A NCAC 2Q .0112, THIS FORM MUST BE SEALED BY A PROFESSIONAL ENGINEER (P.E.) LICENSED IN NORTH CAROLINA.

CONTROL DEVICE ID NO: ***NCD-Q1***	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ***Refer to Permit & Application***
EMISSION POINT (STACK) ID NO(S): ***NEP-Q2***	POSITION IN SERIES OF CONTROLS NO. ***1*** OF ***2*** UNITS
MANUFACTURER: ***Linde***	MODEL NO: ***LV-10***
OPERATING SCENARIO:	
Max. Permit Design Basis	

TYPE ☑ AFTERBURNER ☐ REGENERATIVE THERMAL OXIDATION ☐ RECUPERATIVE THERMAL OXIDATION ☐ CATALYTIC OXIDATION

EXPECTED LIFE OF CATALYST (YRS): N/A | METHOD OF DETECTING WHEN CATALYST NEEDS REPLACMENT: N/A

CATALYST MASKING AGENT IN AIR STREAM ☐ HALOGEN ☐ SILICONE ☐ PHOSPHOROUS COMPOUND ☐ HEAVY METAL ☐ SULFUR COMPOUND ☐ OTHER (SPECIFY) _____ ☑ NONE

TYPE OF CATALYST: N/A | CATALYST VOL (FT^3):N/A | VELOCITY THROUGH CATALYST (FPS): N/A

SCFM THROUGH CATALYST: N/A

DESCRIBE CONTROL SYSTEM, INCLUDING RELATION TO OTHER CONTROL DEVICES AND SOURCES, AND ATTACH DIAGRAM OF SYSTEM:

The fluorocarbon vent destruction unit is a natural gas-fired Thermal Oxidizer (model number LV-10 with a nominal rating of 10 MMBtu/hr burner heat release) rated for up to 11.6 MMBtu/hr max heat release with vapor feeds. The combustion chamber is followed by use of an SGL corporation rapid quench system followed by a series of packed bed scrubbing towers with the final scrubbing tower (final control device) consisting of a packed bed scrubber contact of the flue gas with dilute caustic, pH controlled. Note: The scrubbing efficiency and resulting emissions after scrubbing are reported on a separate C-9 form.

POLLUTANT(S) COLLECTED:	***VOC***			
BEFORE CONTROL EMISSION RATE (LB/HR):	***2,098***			
CAPTURE EFFICIENCY:	***100*** %	%	%	%
CONTROL DEVICE EFFICIENCY:	***99.99*** %	%	%	%
CORRESPONDING OVERALL EFFICIENCY:	***99.99*** %	%	%	%
EFFICIENCY DETERMINATION CODE:	***0***			
TOTAL AFTER CONTROL EMISSION RATE (LB/HR) :	***0.21***			

PRESSURE DROP (IN. H_2O): MIN MAX	OUTLET TEMPERATURE (°F): _____ MIN ***1,800*** MAX
INLET TEMPERATURE (°F): MIN MAX	RESIDENCE TIME (SECONDS): ***>1.2***
INLET AIR FLOW RATE (ACFM): (SCFM):	COMBUSTION TEMPERATURE (°F): ***>1,800***
COMBUSTION CHAMBER VOLUME (FT^3):	INLET MOISTURE CONTENT (%):
% EXCESS AIR: ***10%***	CONCENTRATION (ppmv) _____ INLET _____ OUTLET
AUXILIARY FUEL USED: ***Natural Gas***	TOTAL MAXIMUM FIRING RATE (MILLION BTU/HR): ***10 MMBtu/hr (11.6 MMBtu/hr with vapor feeds)***

DESCRIBE MAINTENANCE PROCEDURES:

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:

COMMENTS:

Attach Additional Sheets As Necessary

FORM C9 - Thermal Converter Flue Gas Scrubber

CONTROL DEVICE (OTHER)

REVISED 09/22/16 **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** **C9**

CONTROL DEVICE ID NO: **NCD-Q2**	CONTROLS EMISSIONS FROM WHICH EMISSION SOURCE ID NO(S): ***NCD-Q1***
EMISSION POINT (STACK) ID NO(S): **NEP-Q2**	POSITION IN SERIES OF CONTROLS: NO. ***2*** OF ***2*** UNITS
OPERATING SCENARIO:	
Max. Permit Design Basis	P.E. SEAL REQUIRED (PER 2Q .0112)? ☑ YES ☐ NO

DESCRIBE CONTROL SYSTEM: ***The combustion flue gas from the thermal oxidizer is rapidly quenched using a SGL Diabon open pipe spray quencher to rapidly drop the temperature of the combustion gases from 1,800 deg F (nominal) to 150 deg F (nominal). The quenched flue gas is introduced into the bottom of a Liquid Mist Separator which consists of a packed bed scrubber containing 10 feet of packing height with primary purpose to remove liquid mist from the SGL Diabon open pipe spray quencher discharge. The flue gas exiting the Liquid Mist Separator is scrubbed by counter current contact with < 1 wt% HF in Stage 1 packed bed, followed by counter current scrubbing with <0.1 wt % HF in Stage 2, and 0.01 wt% HF in Stage 3 followed by counter-current scrubbing contact with dilute caustic in Stage 4 scrubber. The Stage 4 (caustic scrubber) is defined as the "Final Control Device".***

POLLUTANT(S) COLLECTED:	**HF**		**SO_2**				
BEFORE CONTROL EMISSION RATE (LB/HR):	**1,518**		**3.8**				
CAPTURE EFFICIENCY:	**100**	%	**100**	%		%	%
CONTROL DEVICE EFFICIENCY:	**99.95**	%	**99.95**	%		%	%
CORRESPONDING OVERALL EFFICIENCY:	**99.95**	%	**99.95**	%		%	%
EFFICIENCY DETERMINATION CODE:	**4**		**4**				
TOTAL AFTER CONTROL EMISSION RATE (LB/HR):	**0.77**		**0.002**				

PRESSURE DROP (IN. H_20): _____ MIN _____ MAX	BULK PARTICLE DENSITY (LB/FT^3)
INLET TEMPERATURE (^oF): _____ MIN _____ MAX	OUTLET TEMPERATURE (^oF): _____ MIN _____ MAX
INLET AIR FLOW RATE (ACFM):	OUTLET AIR FLOW RATE (ACFM):
INLET AIR FLOW VELOCITY (FT/SEC):	OUTLET AIR FLOW VELOCITY (FT/SEC):
INLET MOISTURE CONTENT (%):	☐ FORCED AIR ☐ INDUCED AIR
COLLECTION SURFACE AREA (FT^2):	FUEL USED: / FUEL USAGE RATE:

DESCRIBE MAINTENANCE PROCEDURES:

DESCRIBE ANY AUXILIARY MATERIALS INTRODUCED INTO THE CONTROL SYSTEM:

DESCRIBE ANY MONITORING DEVICES, GAUGES, TEST PORTS, ETC:

ATTACH A DIAGRAM OF THE RELATIONSHIP OF THE CONTROL DEVICE TO ITS EMISSION SOURCE(S):

COMMENTS: ***The thermal oxidizer is vented to the scrubber to control acid gas, HF and SO_2.***

Attach manufacturer's specifications, schematics, and all other drawings necessary to describe this control.

Attach Additional Sheets As Necessary

FORM D1

FACILITY-WIDE EMISSIONS SUMMARY

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **D1**

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

	EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)
AIR POLLUTANT EMITTED	tons/yr	tons/yr	tons/yr
PARTICULATE MATTER (PM)	*<5*	*<100*	*<100*
PARTICULATE MATTER < 10 MICRONS (PM_{10})	*<5*	*<100*	*<100*
PARTICULATE MATTER < 2.5 MICRONS ($PM_{2.5}$)	*<5*	*<100*	*<50*
SULFUR DIOXIDE (SO_2)	*<1*	*<5*	*<5*
NITROGEN OXIDES (NOx)	*<100*	*>100*	*>100*
CARBON MONOXIDE (CO)	*<50*	*>100*	*>100*
VOLATILE ORGANIC COMPOUNDS (VOC)	*>100*	*>100*	*>100*
LEAD	*<1*	*<1*	*<1*
GREENHOUSE GASES (GHG) (SHORT TONS)	*<75,000*	*>100,000*	*>100,000*
OTHER			

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

		EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITATIONS)	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITATIONS)
HAZARDOUS AIR POLLUTANT EMITTED	CAS NO.	tons/yr	tons/yr	tons/yr
toluene	*108-88-3*	*<2*	*<5*	*<5*
ethyl benzene	*100-41-4*	*<1*	*<5*	*<5*
xylene	*1330-020-7*	*<2*	*<5*	*<5*
methanol	*67-56-1*	*<20*	*<20*	*<20*
benzene	*71-43-2*	*<0.01*	*<0.03*	*<0.03*
methylene chloride	*75-09-2*	*<5*	*<10*	*<10*
acetenitrile	*75-05-8*	*<0.2*	*<1*	*<0.3*
hydrogen chloride	*7647-01-0*	*<0.5*	*<20*	*<20*
hydrogen fluoride	*7664-39-3*	*<2*	*NA [a]*	*<2*
sulfuric acid	*7664-93-9*	*<2*	*<5*	*<5*
other HAPs		*>10*	*>10*	*>10*
Total HAPs		*>25*	*>25*	*>25*

TOXIC AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

INDICATE REQUESTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS. EMISSIONS ABOVE THE TOXIC PERMIT EMISSION RATE (TPER) IN 15A NCAC 2Q .0711 MAY REQUIRE AIR DISPERSION MODELING. USE NETTING FORM D2 IF NECESSARY.

					Modeling Required ?		
TOXIC AIR POLLUTANT EMITTED	CAS NO.	lb/hr	lb/day	lb/year	Yes	No	
Air toxics will not exceed the current TAP permit limits as the result of the Proposed Project.							

COMMENTS:

aThe thermal oxidizer will create hydrogen fluoride by the chemical conversion of the fluoronated hydrocarbons being controlled by the thermal oxidizer. The hydrogen fluoride produced in the thermal oxidzer will then be controlled by the scrubber.

Attach Additional Sheets As Necessary

FORM D2A

AIR POLLUTANT "PROJECT ONLY" NETTING WORKSHEET

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operat** | **D2A**

PURPOSE OF NETTING: ***PREVENTION OF SIGNIFICANT DETERIORATION (PSD)***

PSD AIR POLLUTANT: **VOC**

EMISSION SOURCE ID NO. AND DESCRIPTION: **See attached report and Appendix C for complete calculation details.**

EMISSION SOURCE ID NO. AND DESCRIPTION:

EMISSION SOURCE ID NO. AND DESCRIPTION:

EMISSION SOURCE ID NO. AND DESCRIPTION:

SECTION A - EMISSION OFFSETTING ANALYSIS FOR MODIFIED/NEW SOURCES IN PROJECT

Summarize in this section using the B forms	EMISSIONS TONS/YR
MODIFICATION INCREASE	*--*
- MINUS -	
MODIFICATION DECREASE	*--*
= EQUALS =	
"PROJECT" NET CHANGE FROM MODIFICATION	*>40*
PSD SIGNIFICANCE LEVEL FOR SPECIFIC POLLUTANT [40 CFR 51.166(b)(23)]	*40*

IS THE "PROJECT" NET CHANGE LESS THAN THE SIGNIFICANCE LEVEL? ☐ YES ☑ NO

If YES, no further analysis is required.

If NO, then a further evaluation should be done using creditable emissions at the facility for each specific pollutant over a contemporaneous time period.

COMMENTS: **The emissions of other NSR pollutants *were less than SERs for the Proposed Project and therefore netting was not required, with the exception of VOC. The VOC netting analysis is included in the attached report and Appendix C. The net emissions increase of VOC is less than the PSD SER; therefore, PSD is not triggered for this application.***

Attach Additional Sheets As Necessary

FORM D5

TECHNICAL ANALYSIS TO SUPPORT PERMIT APPLICATION

REVISED 09/22/16 | **NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate** | **D5**

PROVIDE DETAILED TECHNICAL CALCULATIONS TO SUPPORT ALL EMISSION, CONTROL, AND REGULATORY DEMONSTRATIONS MADE IN THIS APPLICATION. INCLUDE A COMPREHENSIVE PROCESS FLOW DIAGRAM AS NECESSARY TO SUPPORT AND CLARIFY CALCULATIONS AND ASSUMPTIONS. ADDRESS THE FOLLOWING SPECIFIC ISSUES ON SEPARATE PAGES:

A **SPECIFIC EMISSIONS SOURCE (EMISSION INFORMATION) (FORM B and B1 through B9) -** SHOW CALCULATIONS USED, INCLUDING EMISSION FACTORS, MATERIAL BALANCES, AND/OR OTHER METHODS FROM WHICH THE POLLUTANT EMISSION RATES IN THIS APPLICATION WERE DERIVED. INCLUDE CALCULATION OF POTENTIAL BEFORE AND, WHERE APPLICABLE, AFTER CONTROLS. CLEARLY STATE ANY ASSUMPTIONS MADE AND PROVIDE ANY REFERENCES AS NEEDED TO SUPPORT MATERIAL BALANCE CALCULATIONS.

B **SPECIFIC EMISSION SOURCE (REGULATORY INFORMATION)(FORM E2 - TITLE V ONLY) -** PROVIDE AN ANALYSIS OF ANY REGULATIONS APPLICABLE TO INDIVIDUAL SOURCES AND THE FACILITY AS A WHOLE. INCLUDE A DISCUSSION OUTING METHODS (e.g. FOR TESTING AND/OR MONITORING REQUIREMENTS) FOR COMPLYING WITH APPLICABLE REGULATIONS, PARTICULARLY THOSE REGULATIONS LIMITING EMISSIONS BASED ON PROCESS RATES OR OTHER OPERATIONAL PARAMETERS. PROVIDE JUSTIFICATION FOR AVOIDANCE OF ANY FEDERAL REGULATIONS (PREVENTION OF SIGNIFICANT DETERIORATION (PSD), NEW SOURCE PERFORMANCE STANDARDS (NSPS), NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), TITLE V), INCLUDING EXEMPTIONS FROM THE FEDERAL REGULATIONS WHICH WOULD OTHERWISE BE APPLICABLE TO THIS FACILITY. SUBMIT ANY REQUIRED INFORMATION TO DOCUMENT COMPLIANCE WITH ANY REGULATIONS. INCLUDE EMISSION RATES CALCULATED IN ITEM "A" ABOVE, DATES OF MANUFACTURE, CONTROL EQUIPMENT, ETC. TO SUPPORT THESE CALCULATIONS.

C **CONTROL DEVICE ANALYSIS (FORM C and C1 through C9) -** PROVIDE A TECHNICAL EVALUATION WITH SUPPORTING REFERENCES FOR ANY CONTROL EFFICIENCIES LISTED ON SECTION C FORMS, OR USED TO REDUCE EMISSION RATES IN CALCULATIONS UNDER ITEM "A" ABOVE. INCLUDE PERTINENT OPERATING PARAMETERS (e.g. OPERATING CONDITIONS, MANUFACTURING RECOMMENDATIONS, AND PARAMETERS AS APPLIED FOR IN THIS APPLICATION) CRITICAL TO ENSURING PROPER PERFORMANCE OF THE CONTROL DEVICES). INCLUDE AND LIMITATIONS OR MALFUNCTION POTENTIAL FOR THE PARTICULAR CONTROL DEVICES AS EMPLOYED AT THIS FACILITY. DETAIL PROCEDURES FOR ASSURING PROPER OPERATION OF THE CONTROL DEVICE INCLUDING MONITORING SYSTEMS AND MAINTENANCE TO BE PERFORMED.

D **PROCESS AND OPERATIONAL COMPLIANCE ANALYSIS - (FORM E3 - TITLE V ONLY)** - SHOWING HOW COMPLIANCE WILL BE ACHIEVED WHEN USING PROCESS, OPERATIONAL, OR OTHER DATA TO DEMONSTRATE COMPLIANCE. REFER TO COMPLIANCE REQUIREMENTS IN THE REGULATORY ANALYSIS IN ITEM "B" WHERE APPROPRIATE. LIST ANY CONDITIONS OR PARAMETERS THAT CAN BE MONITORED AND REPORTED TO DEMONSTRATE COMPLIANCE WITH THE APPLICABLE REGULATIONS.

E **PROFESSIONAL ENGINEERING SEAL -** PURSUANT TO 15A NCAC 2Q .0112 "APPLICATION REQUIRING A PROFESSIONAL ENGINEERING SEAL," A PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA SHALL BE REQUIRED TO SEAL TECHNICAL PORTIONS OF THIS APPLICATION FOR NEW SOURCES AND MODIFICATIONS OF EXISTING SOURCES. (SEE INSTRUCTIONS FOR FURTHER APPLICABILITY).

I, ***Jeffrey Twaddle, P.E.*** *attest that this application for* ***vinyl ethers expansion*** *has been reviewed by me and is accurate, complete and consistent with the information supplied in the engineering plans, calculations, and all other supporting documentation to the best of my knowledge. I further attest that to the best of my knowledge the proposed design has been prepared in accordance with the applicable regulations. Although certain portions of this submittal package may have been developed by other professionals, inclusion of these materials under my seal signifies that I have reviewed this material and have judged it to be consistent with the proposed design. Note: In accordance with NC General Statutes 143-215.6A and 143-215.6B, any person who knowingly makes any false statement, representation, or certification in any application shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed $10,000 as well as civil penalties up to $25,000 per violation.*

(PLEASE USE BLUE INK TO COMPLETE THE FOLLOWING)

NAME:	***Jeffrey Twaddle***
DATE:	***10/28/2022***
COMPANY:	***ERM***
ADDRESS:	***5000 Meridian Blvd, Suite 300, Franklin, TN 37067***
TELEPHONE:	***615-618-4715***
SIGNATURE:	
PAGES CERTIFIED:	***Associated C Forms (C3 and C9)***

(IDENTIFY ABOVE EACH PERMIT FORM AND ATTACHMENT THAT IS BEING CERTIFIED BY THIS SEAL)

PLACE NORTH CAROLINA SEAL HERE

Attach Additional Sheets As Necessary

Appendix B **PROCESS FLOW DIAGRAMS**

Figure B-1: Vinyl Ethers North Process Modifications

Confidential Business Information

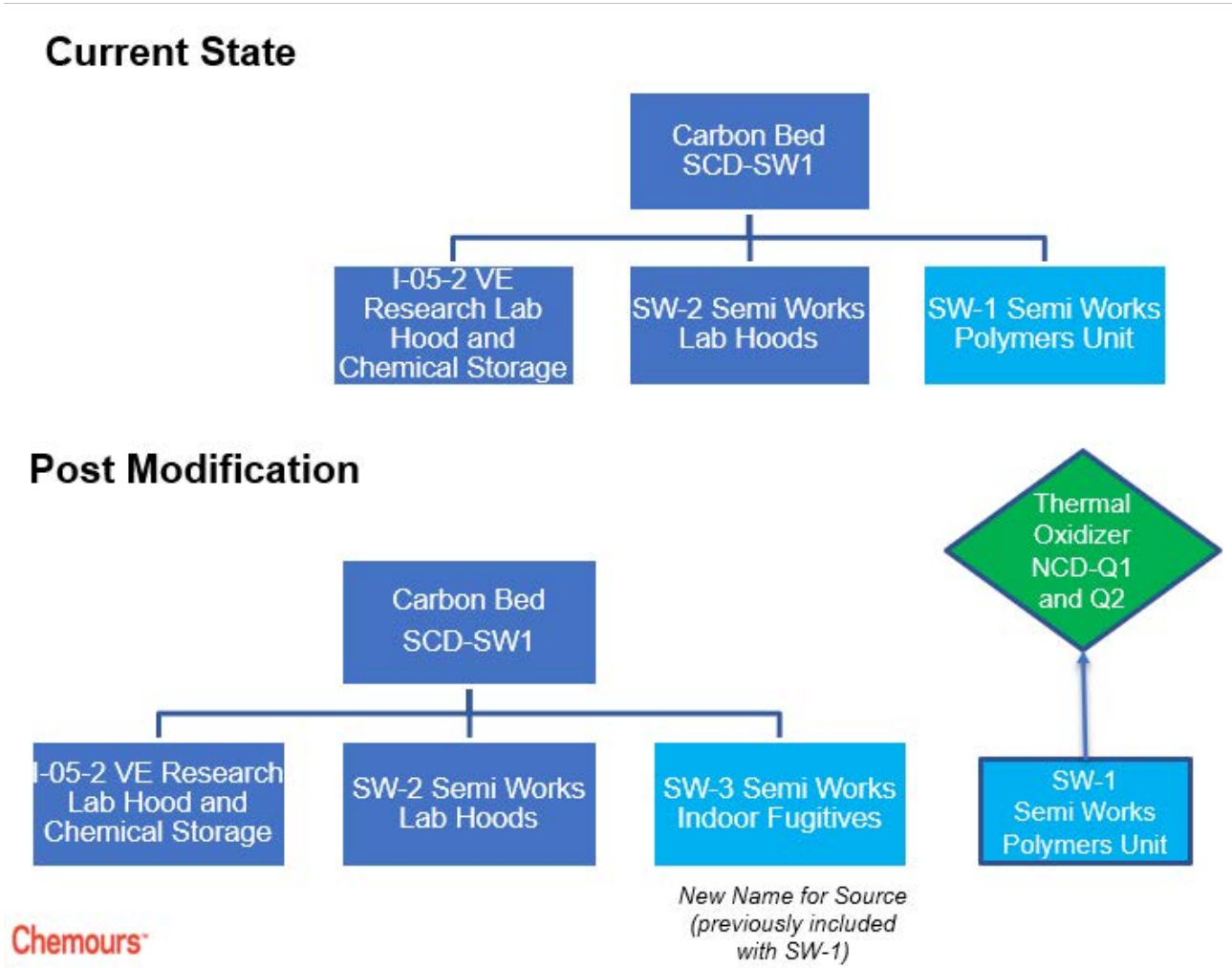
Figure B-2: Vinyl Ethers South Process Modifications

Confidential Business Information

Figure B-3: Proposed Third Hydrolysis Line

Confidential Business Information

Figure B-4: Current and Post-Modification Semiworks Process



Appendix C DETAILED EMISSIONS CALCULATIONS

Project Emission Summary

				HFPO (NS-A)			VE-North (NS-B)			VE-South (NS-C)			RSU (NS-D)			Membrane Treatment (NS-H)			Membrane Coating (NS-I)			TFE/CO2 (NS-M)		
Abbreviated Compound Name	**Full Compound Name**	**CAS No.**	**HAP/TAP**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions[1] (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions[1] (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions[1] (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**
HFPO	Hexafluoropropylene oxide	428-59-1			950.45	921.61		553.14	839.23		393.51	511.52		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
HFP	Hexafluoropropylene	116-15-4			1,853.87	1,856.50		70.50	105.32		12.46	17.36		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
COF2	Carbonyl fluoride	353-50-4			129.34	137.88		0.00	0.00		79.18	106.63		7.25	26.82		0.00	0.00		0.00	0.00		0.00	0.00
PAF	Perfluoroacetyl fluoride	354-34-7			105.85	111.69		0.00	0.00		81.35	110.21		161.02	55.26		0.00	0.00		0.00	0.00		0.00	0.00
PMCP	Perfluoromethylcyclopropane	379-16-8			70.38	75.01		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=4 TFF)	Carbonofluoridic acid, 1,1,3,3,5,5,7,7,9,9,9- undeca	21703-48-0			32.54	30.03		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=1 TAF)	[difluoro(trifluoromethoxy)methoxy]difluoro acetyl fluo	21703-43-5			7.97	7.97		0.00	0.00		0.00	0.00		7.38	28.17		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=2 TAF)	[[difluoro(trifluoromethoxy)methoxy]difluoromethoxy]f	21703-45-7			11.62	7.97		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=3 TAF)	1,1,1,3,3,5,5,7,7,9,9-undecafluoro-2,4,6,8-tetraoxac	21703-47-9			6.13	6.13		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=4 TAF)	1,1,1,3,3,5,5,7,7,9,9,11,11-tridecafluoro-2,4,6,8,10-	21703-49-1			7.97	7.97		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Benzene	Benzene	71-43-2	H,T		2.99	2.99		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Toluene	Methylbenzene	108-88-3	H		74.53	74.50		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Other A/F Compounds	Other A/F Compounds (not speciated)	NA			29.02	48.75		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
CO2	Carbon dioxide	124-38-9			588,398.01	842,819.97		148,919.01	398,545.98		469,571.81	705,846.81		8,195.54	85,093.09		0.00	0.00		0.00	0.00		50,926.30	144,752.56
SO2	Sulfur dioxide	7446-09-5	Criteria	0.00	0.00	0.00	0	0.04	0.01	0	0.00	0.00	9.20	0.94	9.78	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
HF	Hydrogen Fluoride	7664-39-3	H,T		378.45	383.03		15.00	41.34		441.12	453.87		62.50	249.60		149.85	779.39		0.00	0.00		22.95	65.42
PPF	Perfluoropropionyl fluoride	422-61-7			0.00	0.00		21.29	39.01		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Diglyme	Diethylene glycol dimethyl ether	111-96-6			0.00	0.00		9.37	10.14		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
AN	Acetonitrile	75-05-8	H		0.00	0.00		40.04	75.77		43.29	56.27		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
ADN	Adiponitrile	111-69-3			0.00	0.00		0.16	0.07		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TTG	Tetraglyme	143-24-8			0.00	0.00		0.02	0.01		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
DA	Tetrafluoro-2[hexafluoro-2-(tetrafluoro-2-(fluorosulfor	4089-58-1			0.00	0.00		35.53	37.56		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MA	Tetrafluoro-2-(tetrafluoro-2-(fluorosulfonyl)ethoxy)-pro	4089-57-0			0.00	0.00		1.55	1.67		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TA	2,3,3,3-Tetrafluoro-2-(1,1,2,3,3,3-hexafluoro-2-(1,1,2	4628-44-8			0.00	0.00		1.26	1.37		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
RSU	2,2-Difluoro-2-(fluorosulfonyl) acetyl fluoride	677-67-8			0.00	0.00		0.63	0.68		0.00	0.00		54.67	1,011.82		0.00	0.00		0.00	0.00		0.00	0.00
MAE	Methyl perfluoro (5-(fluoroformyl)-4-oxahexanoate)	69116-72-9			0.00	0.00		3.51	1.60		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MMF	Methyl-2,2-difluoromalonyl fluoride	69116-71-8			0.00	0.00		2.09	0.96		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
DAE	Methyl perfloro (8-fluoroformyl)-5-methyl-4,7-dioxan	69116-73-0			0.00	0.00		5.58	2.48		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TAE	Methyl perfluoro (11-(fluoroformyl)-5,8-dimethyl-4,7,	69116-67-2			0.00	0.00		0.24	0.11		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
HFPO Trimer	Perfluoro-2,5-dimethyl-3,6-dioxanonanoyl fluoride	2641-34-1			0.00	0.00		6.76	10.87		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
EVE	Propanoic acid, 3-[1-[difluoro [(trifluoroethenyl oxy)	63863-43-4			0.00	0.00		109.57	57.65		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PPVE	Perfluoropropyl vinyl ether	1623-05-8			0.00	0.00		920.08	2,105.22		6.27	8.14		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PSEPVE	Perfluoro-2-(2-Fluorosulfonylethoxy) Propyl Vinyl Eth	16090-14-5			0.00	0.00		517.52	635.16		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
hydro-EVE	3-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2	660857-95-4			0.00	0.00		5.13	2.59		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
iso-EVE	Methyl perfluoro-6-methyl-4,7-dioxanon-8 eneoate	73122-14-2			0.00	0.00		8.00	3.92		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
C4	Perfluoro-2-butene	360-89-4			0.00	0.00		136.64	298.27		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
C5	Perfluoropentene	376-87-4			0.00	0.00		0.00	0.01		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TFE	Tetrafluoroethylene	116-14-3			0.00	0.00		0.09	0.22		0.00	0.00		235.37	230.91		0.00	0.00		0.00	0.00		256.47	343.54
Hydro-PSEPVE	Tetrafluoro-2-(trifluoro-2-(1,2,2,2-tetra-fluoroethoxy)-	75549-02-9			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Iso-PSEPVE	Perfluoro-1-methyl-2-(2 fluorosulfonyl ethoxy) ethyl v	34805-58-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PMPF	Perfluoromethoxypropionyl fluoride	2927-83-5			0.00	0.00		0.00	0.00		549.04	718.77		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PEPF	Perfluoroethoxypropionyl fluoride	1682-78-6			0.00	0.00		0.00	0.00		95.60	127.33		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PMVE	Perfluoromethyl vinyl ether	1187-93-5			0.00	0.00		0.00	0.00		1,550.49	2,317.83		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PEVE	Perfluoroethyl vinyl ether	10493-43-3			0.00	0.00		0.00	0.00		1,324.23	1,979.56		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MD	2,3,3,3-Tetrafluoro-2-(1,1,2,3,3,3-hexafluoro-2-(triflu	2479-75-6			0.00	0.00		0.00	0.00		18.84	24.50		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
HydroPEVE	2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoyl fl	360798-50-5			0.00	0.00		0.00	0.00		10.02	13.03		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
E-1	Propane, 1,1,1,2,2,3,3-heptafluoro-3-(1,2,2,2- tetraf	3330-15-2			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
E-2	2H-perfluoro(5-methyl-3,6-dioxanonane)	3330-14-1			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
E-3	2H-perfluoro-5,8-dimethyl-3,6,9-trioxadodecane	3330-16-3			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Ethanol	Ethanol	64-17-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		59,840.74	67,499.27		0.00	0.00
n-Propanol	n-Propanol	71-23-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		9,025.96	10,181.12		0.00	0.00
Isopropanol	Isopropanol	67-63-0			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		18,759.22	21,160.05		0.00	0.00
PM	Particulate Matter (TSP)	PM Total	Criteria	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	214.22	244.74	285.16	0.00	0.00	0.00
PM-10	PM10 (< 10 micron)	PM10	Criteria	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	214.22	244.74	276.07	0.00	0.00	0.00
PM-2.5	PM2.5 (< 2.5 micron)	PM2.5	Criteria	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	214.22	244.74	276.07	0.00	0.00	0.00
CO	carbon monoxide	630-08-0	Criteria	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOx	Nitrogen oxide	11104-93-1	Criteria	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetic Acid	Acetic Acid	64-19-7	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		753.48	3,919.07		0.00	0.00		0.00	0.00
DMSO	Dimethyl sulfoxide	67-68-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		48,293.19	251,185.86		0.00	0.00		0.00	0.00
Nitric Acid	Nitric Acid	7697-37-2	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		13.56	70.51		0.00	0.00		0.00	0.00
MeOH	Methanol	67-56-1	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
F-113	1,1,2-Trichloro-1,2,2-trifluoro ethane	76-13-1	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
SU	3,3,4,4-tetrafluoro-1,2-oxathietane 2,2-dioxide	697-18-7			0.00	0.00		0.00	0.00		0.00	0.00		5.05	331.22		0.00	0.00		0.00	0.00		0.00	0.00
EDC	1,2-Dichloroethane	107-06-2	H,T		0.00	0.00		0.00	0.00		0.00	0.00		21.68	113.70		0.00	0.00		0.00	0.00		0.00	0.00
H2SO4	Sulfuric acid	7664-93-9	T	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	194.66	193.56	960.48	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
HCl	Hydrochloric Acid	7647-01-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MeCl	Methylene Chloride	75-09-2	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Initiator	Peroxide, bis[2,3,3,3-tetrafluoro-2-(heptafluoropropo	56347-79-6			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Acetaldehyde	Acetaldehyde	75-07-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Acrolein	Acrolein	107-02-8	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Ammonia	Ammonia	7664-41-7	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Arsenic unlisted compounds	Arsenic unlisted compounds	ASC-other	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Benzo(a)pyrene	Benzo(a)pyrene	50-32-8	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Beryllium metal (unreacted)	Beryllium metal (unreacted)	7440-41-7	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Cadmium metal (elemental unreacted)	Cadmium metal (elemental unreacted)	7440-43-9	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Chromic acid (VI)	Chromic acid (VI)	7738-94-5	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Cobalt unlisted compounds	COC-other	H			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Formaldehyde	Formaldehyde	50-00-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Hexane, n-	Hexane, n-	110-54-3	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Lead unlisted compounds	Lead unlisted compounds	PBC-other	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Manganese unlisted compounds	Manganese unlisted compounds	MNC-other	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Mercury vapor	Mercury vapor	7439-97-6	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Napthalene	Napthalene	99 91-20-3	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Nickel metal	Nickel metal	7440-02-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Selenium compounds	Selenium compounds	7782-49-2	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Fluoroform*	HFC-23	75-46-7			5.83	6.77		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Total VOC	Total VOC	NA	Criteria	82,380	3,282.65	3,288.97	29,802	2,448.72	4,229.89	10,976	4,164.28	5,991.16	3,328	492.43	1,797.89	38,705	49,046.68	255,104.93	89,198	87,625.92	98,840.44	38,862	256.47	343.54

Notes:
1) Values have been updated from CY2021 AEI submittal. These changes are associated with updated components counts (VE-N), inclusion of carbon bed control (VE-N, VE-S, Semiworks), and equipment speciation updates (RSU).
2) Post modification values were obtained from the Thermal Oxidizer application (potential to emit - combustion of natural gas).
3) Utilized 2020/2021 data since the system did not operate in CY2018/2019.
4) Values obtained from PS-A DAQ Natural Gas Combustion_PTE workbook.

				HFPO Container Decontamination (NS-N)			VE-N Container Decontamination (NS-O)			VE-S Container Decontamination (NS-P)			Semi-Works (SW-1/2)			Lime Silo (NS-R1)			Lime Slaker (NS-R2)			Thermal Oxidizer (TO)		
Abbreviated Compound Name	**Full Compound Name**	**CAS No.**	**HAP/TAP**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions[1] (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**Actual Emissions[3] (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions[2] (lb/yr)**	**Actual Emissions[3] (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions[2] (lb/yr)**	**CY2020/21 Actual Emissions[3] (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions[2] (lb/yr)**
HFPO	Hexafluoropropylene oxide	428-59-1			2.29	3.43		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
HFP	Hexafluoropropylene	116-15-4			3.07	4.61		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
COF2	Carbonyl fluoride	353-50-4			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PAF	Perfluoroacetyl fluoride	354-34-7			0.00	0.00		0.00	0.00		0.00	0.00		49.29	4.93		0.00	0.00		0.00	0.00		0.00	0.00
PMCP	Perfluoromethylcyclopropane	379-16-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=4 TFF)	Carbonofluoridic acid, 1,1,3,3,5,5,7,7,9,9,9- undeca	21703-48-0			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=1 TAF)	(difluoro(trifluoromethoxy)methoxy)difluoro acetyl fluo	21703-43-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=2 TAF)	[(difluoro(trifluoromethoxy)methoxy)difluoromethoxy)(	21703-45-7			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=3 TAF)	1,1,1,3,3,5,5,7,7,9,9-undecafluoro-2,4,6,8-tetraoxac	21703-47-9			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
A/F Solvent (n=4 TAF)	1,1,1,3,3,5,5,7,7,9,9,11,11-tridecafluoro-2,4,6,8,10-	21703-49-1			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Benzene	Benzene	71-43-2	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.13	0.18
Toluene	Methylbenzene	108-88-3	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.22	0.29
Other A/F Compounds	Other A/F Compounds (not speciated)	NA			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
CO2	Carbon dioxide	124-38-9			45,232.97	67,852.54		437.00	873.61		1,778.40	3,556.96		0.00	1,742.81		0.00	0.00		0.00	0.00		0.00	0.00
SO2	Sulfur dioxide	7446-09-5	Criteria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	39.24	38.45	51.00
HF	Hydrogen Fluoride	7664-39-3	H,T		20.56	30.84		0.19	0.38		0.81	1.62		8.53	0.69		0.00	0.00		0.00	0.00		0.00	0.00
PPF	Perfluoropropionyl fluoride	422-61-7			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Diglyme	Diethylene glycol dimethyl ether	111-96-6			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
AN	Acetonitrile	75-05-8	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
ADN	Adiponitrile	111-69-3			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TTG	Tetraglyme	143-24-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
DA	Tetrafluoro-2[hexafluoro-2-(tetrafluoro-2-(fluorosulfor	4089-58-1			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MA	Tetrafluoro-2-(tetrafluoro-2-(fluorosulfonyl)ethoxy)-pro	4089-57-0			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TA	2,3,3,3-Tetrafluoro-2-(1,1,2,3,3,3-hexafluoro-2-(1,1,2	4628-44-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
RSU	2,2-Difluoro-2-(fluorosulfonyl) acetyl fluoride	677-67-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MAE	Methyl perfluoro (5-(fluoroformyl)-4-oxahexanoate)	69116-72-9			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MMF	Methyl-2,2-difluoromalonyl fluoride	69116-71-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
DAE	Methyl perfloro (8-fluoroformyl-5-methyl-4,7-dioxan	69116-73-0			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TAE	Methyl perfluoro (11-(fluoroformyl)-5,8-dimethyl-4,7,	69116-67-2			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
HFPO Trimer	Perfluoro-2,5-dimethyl-3,6-dioxanonanoyl fluoride	2641-34-1			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
EVE	Propanoic acid, 3-[1-[difluoro [(trifluoroethenyl oxy) (	63863-43-4			0.00	0.00		0.01	0.02		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PPVE	Perfluoropropyl vinyl ether	1623-05-8			0.00	0.00		0.04	0.09		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PSEPVE	Perfluoro-2-(2-Fluorosulfonylethoxy) Propyl Vinyl Eth	16090-14-5			0.00	0.00		0.00	0.00		0.00	0.00		212.10	4.38		0.00	0.00		0.00	0.00		0.00	0.00
hydro-EVE	3-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2	660857-95-4			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
iso-EVE	Methyl perfluoro-6-methyl-4,7-dioxanon-8 eneoate	73122-14-2			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
C4	Perfluoro-2-butene	360-89-4			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
C5	Perfluoropentene	376-87-4			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
TFE	Tetrafluoroethylene	116-14-3			0.00	0.00		0.00	0.00		0.00	0.00		246.05	24.63		0.00	0.00		0.00	0.00		0.00	0.00
Hydro-PSEPVE	Tetrafluoro-2-(trifluoro-2-(1,2,2,2-tetra-fluoroethoxy)-	75549-02-9			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Iso-PSEPVE	Perfluoro-1-methyl-2-(2 fluorosulfonyl ethoxy) ethyl v	34805-58-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PMPF	Perfluoromethoxypropionyl fluoride	2927-83-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PEPF	Perfluoroethoxypropionyl fluoride	1682-78-6			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PMVE	Perfluoromethyl vinyl ether	1187-93-5			0.00	0.00		0.00	0.00		0.19	0.38		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PEVE	Perfluoroethyl vinyl ether	10493-43-3			0.00	0.00		0.00	0.00		0.03	0.07		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MD	2,3,3,3-Tetrafluoro-2-(1,1,2,3,3,3-hexafluoro-2-(triflu	2479-75-6			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
HydroPEVE	2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoyl fl	360796-50-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
E-1	Propane, 1,1,1,2,2,3,3-heptafluoro-3-(1,2,2,2- tetraf	3330-15-2			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
E-2	2H-perfluoro(5-methyl-3,6-dioxanonane)	3330-14-1			0.00	0.00		0.00	0.00		0.00	0.00		172.44	10.42		0.00	0.00		0.00	0.00		0.00	0.00
E-3	2H-perfluoro-5,8-dimethyl-3,6,9-trioxadodecane	3330-16-3			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Ethanol	Ethanol	64-17-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
n-Propanol	n-Propanol	71-23-8			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Isopropanol	Isopropanol	67-63-0			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
PM	Particulate Matter (TSP)	PM Total	Criteria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.43	9.94	1501.71	28.42	29.19	162.15	34.01	33.32	649.00
PM-10	PM10 (< 10 micron)	PM10	Criteria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.43	9.94	1501.71	28.42	29.19	162.15	34.01	33.32	649.00
PM-2.5	PM2.5 (< 2.5 micron)	PM2.5	Criteria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.43	9.94	1501.71	28.42	29.19	162.15	28.12	27.55	649.00
CO	carbon monoxide	630-08-0	Criteria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5493.18	5382.72	7172.00
NOx	Nitrogen oxide	11104-93-1	Criteria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6539.50	6408.00	8540.00
Acetic Acid	Acetic Acid	64-19-7	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
DMSO	Dimethyl sulfoxide	67-68-5			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Nitric Acid	Nitric Acid	7697-37-2	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
MeOH	Methanol	67-56-1	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
F-113	1,1,2-Trichloro-1,2,2-trifluoro ethane	76-13-1	T		0.00	0.00		0.00	0.00		0.00	0.00	2928.59	2,071.51	188.34		0.00	0.00		0.00	0.00		0.00	0.00
SU	3,3,4,4-tetrafluoro-1,2-oxathietane 2,2-dioxide	697-18-7			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
EDC	1,2-Dichloroethane	107-06-2	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
H2SO4	Sulfuric acid	7664-93-9	T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HCl	Hydrochloric Acid	7647-01-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		69.28	92.86
MeCl	Methylene Chloride	75-09-2	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Initiator	Peroxide, bis[2,3,3,3-tetrafluoro-2-(heptafluoropropo	56347-79-6			0.00	0.00		0.00	0.00		0.00	0.00		20.77	2.08		0.00	0.00		0.00	0.00		0.00	0.00
Acetaldehyde	Acetaldehyde	75-07-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Acrolein	Acrolein	107-02-8	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Ammonia	Ammonia	7664-41-7	T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		205.06	273.00
Arsenic unlisted compounds	Arsenic unlisted compounds	ASC-other	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.01	0.02
Benzo(a)pyrene	Benzo(a)pyrene	50-32-8	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Beryllium metal (unreacted)	Beryllium metal (unreacted)	7440-41-7	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Cadmium metal (elemental unreacted)	Cadmium metal (elemental unreacted)	7440-43-9	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.07	0.09
Chromic acid (VI)	Chromic acid (VI)	7738-94-5	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.09	0.12
Cobalt unlisted compounds	Cobalt unlisted compounds	COC-other	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.01	0.01
Formaldehyde	Formaldehyde	50-00-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		4.81	6.40
Hexane, n-	Hexane, n-	110-54-3	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		115.34	154.00
Lead unlisted compounds	Lead unlisted compounds	PBC-other	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.03	1.42
Manganese unlisted compounds	Manganese unlisted compounds	MNC-other	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.02	0.03
Mercury vapor	Mercury vapor	7439-97-6	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.02	0.02
Napthalene	Napthalene	99 91-20-3	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.04	0.05
Nickel metal	Nickel metal	7440-02-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.02	0.18
Selenium compounds	Selenium compounds	7782-49-2	H		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Fluoroform*	HFC-23	75-46-7			0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Total VOC	Total VOC	NA	Criteria	31,857	5.36	8.04	547	0.05	0.10	1,148	0.22	0.45	1,531	701.52	46.43	0.00	0.00	0.00	0.00	0.00	0.00	359.68	352.44	470.00

Notes:
1) Values have been updated from CY2021 AEI submittal. These changes are associated with updated components counts (VE-N), inclusion of
2) Post modification values were obtained from the Thermal Oxidizer application (potential to emit - combustion of natural gas).
3) Utilized 2020/2021 data since the system did not operate in CY2018/2019.
4) Values obtained from PS-A DAQ Natural Gas Combustion_PTE workbook.

				Boilers (PS-A/B/X)			Waste DMSO (I-02)			MeCl (I-03)			TOTAL		
Abbreviated Compound Name	**Full Compound Name**	**CAS No.**	**HAP/TAP**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions[4] (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**	**CY2018/19 Actual Emissions (lb/yr)**	**CY2021 Actual Emissions (lb/yr)**	**Post-Mod Potential Emissions (lb/yr)**
HFPO	Hexafluoropropylene oxide	428-59-1			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1,899.38	2,275.80
HFP	Hexafluoropropylene	116-15-4			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1,939.91	1,983.78
COF2	Carbonyl fluoride	353-50-4			0.00	0.00		0.00	0.00		0.00	0.00	0.00	215.78	271.33
PAF	Perfluoroacetyl fluoride	354-34-7			0.00	0.00		0.00	0.00		0.00	0.00	0.00	397.52	282.10
PMCP	Perfluoromethylcyclopropane	379-16-8			0.00	0.00		0.00	0.00		0.00	0.00	33,821.42	70.38	75.01
A/F Solvent (n=4 TFF)	Carbonofluoridic acid, 1,1,3,3,5,5,7,7,9,9,9- undeca	21703-48-0			0.00	0.00		0.00	0.00		0.00	0.00	0.00	32.54	30.03
A/F Solvent (n=1 TAF)	(difluoro(trifluoromethoxy)methoxy)difluoro acetyl fluo	21703-43-5			0.00	0.00		0.00	0.00		0.00	0.00	0.00	15.35	36.14
A/F Solvent (n=2 TAF)	[(difluoro(trifluoromethoxy)methoxy)difluoromethoxy](	21703-45-7			0.00	0.00		0.00	0.00		0.00	0.00	0.00	11.62	7.97
A/F Solvent (n=3 TAF)	1,1,1,3,3,5,5,7,7,9,9-undecafluoro-2,4,6,8-tetraoxac	21703-47-9			0.00	0.00		0.00	0.00		0.00	0.00	0.00	6.13	6.13
A/F Solvent (n=4 TAF)	1,1,1,3,3,5,5,7,7,9,9,11,11-tridecafluoro-2,4,6,8,10-	21703-49-1			0.00	0.00		0.00	0.00		0.00	0.00	0.00	7.97	7.97
Benzene	Benzene	71-43-2	H,T		1.02	1.25		0.00	0.00		0.00	0.00	0.00	4.14	4.41
Toluene	Methylbenzene	108-88-3	H		1.65	2.02		0.00	0.00		0.00	0.00	0.00	76.40	76.81
Other A/F Compounds	Other A/F Compounds (not speciated)	NA			0.00	0.00		0.00	0.00		0.00	0.00	0.00	29.02	48.75
CO2	Carbon dioxide	124-38-9			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1,313,459.05	2,251,084.32
SO2	Sulfur dioxide	7446-09-5	Criteria	421.41	291.86	360.00	0.00	0.00	0.00	0.00	0.00	0.00	469.85	331.28	420.99
HF	Hydrogen Fluoride	7664-39-3	H,T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	1,099.96	2,006.16
PPF	Perfluoropropionyl fluoride	422-61-7			0.00	0.00		0.00	0.00		0.00	0.00	0.00	21.29	39.01
Diglyme	Diethylene glycol dimethyl ether	111-96-6			0.00	0.00		0.00	0.00		0.00	0.00	0.00	9.37	10.14
AN	Acetonitrile	75-05-8	H		0.00	0.00		0.00	0.00		0.00	0.00	0.00	83.33	132.04
ADN	Adiponitrile	111-69-3			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.16	0.07
TTG	Tetraglyme	143-24-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.02	0.01
DA	Tetrafluoro-2[hexafluoro-2-(tetrafluoro-2-(fluorosulfor	4089-58-1			0.00	0.00		0.00	0.00		0.00	0.00	0.00	35.53	37.56
MA	Tetrafluoro-2-(tetrafluoro-2-(fluorosulfonyl)ethoxy)-pr	4089-57-0			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1.55	1.67
TA	2,3,3,3-Tetrafluoro-2-(1,1,2,3,3,3-hexafluoro-2-(1,1,2	4628-44-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1.26	1.37
RSU	2,2-Difluoro-2-(fluorosulfonyl) acetyl fluoride	677-67-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	55.30	1,012.51
MAE	Methyl perfluoro (5-(fluoroformyl)-4-oxahexanoate)	69116-72-9			0.00	0.00		0.00	0.00		0.00	0.00	0.00	3.51	1.60
MMF	Methyl-2,2-difluoromalonyl fluoride	69116-71-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	2.09	0.96
DAE	Methyl perfloro (8-(fluoroformyl)-5-methyl-4,7-dioxan	69116-73-0			0.00	0.00		0.00	0.00		0.00	0.00	0.00	5.58	2.48
TAE	Methyl perfluoro (11-(fluoroformyl)-5,8-dimethyl-4,7,	69116-67-2			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.24	0.11
HFPO Trimer	Perfluoro-2,5-dimethyl-3,6-dioxanonanoyl fluoride	2641-34-1			0.00	0.00		0.00	0.00		0.00	0.00	0.00	6.76	10.87
EVE	Propanoic acid, 3-[1-[difluoro [(trifluoroethenyl oxy) (	63863-43-4			0.00	0.00		0.00	0.00		0.00	0.00	0.00	109.58	57.67
PPVE	Perfluoropropyl vinyl ether	1623-05-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	926.39	2,113.46
PSEPVE	Perfluoro-2-(2-Fluorosulfonylethoxy) Propyl Vinyl Eth	16090-14-5			0.00	0.00		0.00	0.00		0.00	0.00	0.00	729.62	639.53
hydro-EVE	3-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2	660857-95-4			0.00	0.00		0.00	0.00		0.00	0.00	0.00	5.13	2.59
iso-EVE	Methyl perfluoro-6-methyl-4,7-dioxanon-8 eneoate	73122-14-2			0.00	0.00		0.00	0.00		0.00	0.00	0.00	8.00	3.92
C4	Perfluoro-2-butene	360-89-4			0.00	0.00		0.00	0.00		0.00	0.00	0.00	136.64	298.27
C5	Perfluoropentene	376-87-4			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.01
TFE	Tetrafluoroethylene	116-14-3			0.00	0.00		0.00	0.00		0.00	0.00	0.00	737.98	599.30
Hydro-PSEPVE	Tetrafluoro-2-(trifluoro-2-(1,2,2,2-tetra-fluoroethoxy)-	75549-02-9			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Iso-PSEPVE	Perfluoro-1-methyl-2-(2 fluorosulfonyl ethoxy) ethyl v	34805-58-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
PMPF	Perfluoromethoxypropionyl fluoride	2927-83-5			0.00	0.00		0.00	0.00		0.00	0.00	0.00	549.04	718.77
PEPF	Perfluoroethoxypropionyl fluoride	1682-78-6			0.00	0.00		0.00	0.00		0.00	0.00	0.00	95.60	127.33
PMVE	Perfluoromethyl vinyl ether	1187-93-5			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1,550.68	2,318.21
PEVE	Perfluoroethyl vinyl ether	10493-43-3			0.00	0.00		0.00	0.00		0.00	0.00	0.00	1,324.26	1,979.63
MD	2,3,3,3-Tetrafluoro-2-(1,1,2,3,3,3-hexafluoro-2-(triflu	2479-75-6			0.00	0.00		0.00	0.00		0.00	0.00	0.00	18.84	24.50
HydroPEVE	2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoyl fl	360796-50-5			0.00	0.00		0.00	0.00		0.00	0.00	0.00	10.02	13.03
E-1	Propane, 1,1,1,2,2,3,3-heptafluoro-3-(1,2,2,2- tetraf	3330-15-2			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
E-2	2H-perfluoro(5-methyl-3,6-dioxanonane)	3330-14-1			0.00	0.00		0.00	0.00		0.00	0.00	0.00	172.44	10.42
E-3	2H-perfluoro-5,8-dimethyl-3,6,9-trioxadodecane	3330-16-3			0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Ethanol	Ethanol	64-17-5			0.00	0.00		0.00	0.00		0.00	0.00	0.00	59,840.74	67,499.27
n-Propanol	n-Propanol	71-23-8			0.00	0.00		0.00	0.00		0.00	0.00	0.00	9,025.96	10,181.12
Isopropanol	Isopropanol	67-63-0			0.00	0.00		0.00	0.00		0.00	0.00	0.00	18,759.22	21,160.05
PM	Particulate Matter (TSP)	PM Total	Criteria	409.39	252.94	300.00	0.00	0.00	0.00	0.00	0.00	0.00	695.45	570.14	2,898.02
PM-10	PM10 (< 10 micron)	PM10	Criteria	153.64	97.29	120.00	0.00	0.00	0.00	0.00	0.00	0.00	439.71	414.48	2,708.93
PM-2.5	PM2.5 (< 2.5 micron)	PM2.5	Criteria	303.39	209.16	260.00	0.00	0.00	0.00	0.00	0.00	0.00	583.58	520.60	2,848.93
CO	carbon monoxide	630-08-0	Criteria	58646.18	40,860.12	49,980.00	0.00	0.00	0.00	0.00	0.00	0.00	64139.36	46,242.84	57,152.00
NOx	Nitrogen oxide	11104-93-1	Criteria	127925.15	70,842.40	113,060.00	0.00	0.00	0.00	0.00	0.00	0.00	134464.65	77,250.40	121,600.00
Acetic Acid	Acetic Acid	64-19-7	T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	753.48	3,919.07
DMSO	Dimethyl sulfoxide	67-68-5			0.00	0.00		896.36	901.26		0.00	0.00	0.00	49,189.56	252,087.12
Nitric Acid	Nitric Acid	7697-37-2	T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	13.56	70.51
MeOH	Methanol	67-56-1	H		0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
F-113	1,1,2-Trichloro-1,2,2-trifluoro ethane	76-13-1	T		0.00	0.00		0.00	0.00		0.00	0.00	2928.59	2,071.51	188.34
SU	3,3,4,4-tetrafluoro-1,2-oxathietane 2,2-dioxide	697-18-7			0.00	0.00		0.00	0.00		0.00	0.00	0.00	5.05	331.22
EDC	1,2-Dichloroethane	107-06-2	H,T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	21.68	113.70
H2SO4	Sulfuric acid	7664-93-9	T	0.00	0.00	0.00		0.00	0.00		0.00	0.00	194.66	193.56	960.48
HCl	Hydrochloric Acid	7647-01-0	H,T		525.93	643.31		0.00	0.00		0.00	0.00	786.57	595.21	736.17
MeCl	Methylene Chloride	75-09-2	H,T		0.00	0.00		0.00	0.00		1,159.00	1,390.80	0.00	1,159.00	1,390.80
Initiator	Peroxide, bis[2,3,3,3-tetrafluoro-2-(heptafluoropropo	56347-79-6			0.00	0.00		0.00	0.00		0.00	0.00	0.00	20.77	2.08
Acetaldehyde	Acetaldehyde	75-07-0	H,T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Acrolein	Acrolein	107-02-8	H,T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.01	0.00
Ammonia	Ammonia	7664-41-7	T		1,556.58	1,904.00		0.00	0.00		0.00	0.00	0.00	1,761.63	2,177.00
Arsenic unlisted compounds	Arsenic unlisted compounds	ASC-other	H,T		0.10	0.12		0.00	0.00		0.00	0.00	0.00	0.11	0.14
Benzo(a)pyrene	Benzo(a)pyrene	50-32-8	H,T		0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Beryllium metal (unreacted)	Beryllium metal (unreacted)	7440-41-7	H,T		0.01	0.01		0.00	0.00		0.00	0.00	0.00	0.01	0.01
Cadmium metal (elemental unreacted)	Cadmium metal (elemental unreacted)	7440-43-9	H,T		0.54	0.65		0.00	0.00		0.00	0.00	0.00	0.61	0.75
Chromic acid (VI)	Chromic acid (VI)	7738-94-5	H,T		0.68	0.83		0.00	0.00		0.00	0.00	0.00	0.77	0.95
Cobalt unlisted compounds	COC-other	H			0.04	0.05		0.00	0.00		0.00	0.00	0.00	0.05	0.06
Formaldehyde	Formaldehyde	50-00-0	H,T		36.48	44.63		0.00	0.00		0.00	0.00	0.00	41.29	51.03
Hexane, n-	Hexane, n-	110-54-3	H,T		875.57	1,071.00		0.00	0.00		0.00	0.00	0.00	990.92	1,225.00
Lead unlisted compounds	Lead unlisted compounds	PBC-other	H		0.24	0.30		0.00	0.00		0.00	0.00	0.00	0.28	1.72
Manganese unlisted compounds	Manganese unlisted compounds	MNC-other	H,T		0.18	0.23		0.00	0.00		0.00	0.00	0.00	0.21	0.26
Mercury vapor	Mercury vapor	7439-97-6	H,T		0.13	0.15		0.00	0.00		0.00	0.00	0.00	0.14	0.18
Napthalene	Napthalene	99 91-20-3	H		0.30	0.36		0.00	0.00		0.00	0.00	0.00	0.34	0.42
Nickel metal	Nickel metal	7440-02-0	H,T		1.02	1.25		0.00	0.00		0.00	0.00	0.00	1.04	1.43
Selenium compounds	Selenium compounds	7782-49-2	H		0.01	0.01		0.00	0.00		0.00	0.00	0.00	0.01	0.02
Fluoroform*	HFC-23	75-46-7			0.00	0.00		0.00	0.00				13,141.17	5.83	6.77
Total VOC	Total VOC	NA	Criteria	3838.12	2,675.37	3,280.00	914	896.36	901.26	2,923	1,159.00	1,390.80	336365.85	153,107.47	375,693.92
												VOC (TPY)	168.18	76.55	187.85

Notes:
1) Values have been updated from CY2021 AEI submittal. These changes are associated with updated components counts (VE-N), inclusion of
2) Post modification values were obtained from the Thermal Oxidizer application (potential to emit - combustion of natural gas).
3) Utilized 2020/2021 data since the system did not operate in CY2018/2019.
4) Values obtained from PS-A DAQ Natural Gas Combustion_PTE workbook.

Abbreviated Compound Name	Full Compound Name	CAS No.	GWP	2021 Actual Emissions (lb/yr)	Future Potential Emissions (lb/yr)	Emissions Increase (lb/yr)	Project Potential CO_2e Emissions (lb/yr)
PEVE	Perfluoroethyl vinyl ether	10493-43-3	1.00	1,324.26	1,979.63	655.37	655.37
TFE	Tetrafluoroethylene	116-14-3	0.004	737.98	599.30	-138.68	-0.55
HFP	Hexafluoroproplyene	116-15-4	0.050	1,939.91	1,983.78	43.87	2.19
PMVE	Perfluoromethyl vinyl ether	1187-93-5	0.17	1,550.68	2,318.21	767.53	130.48
CO2	Carbon dioxide	124-38-9	1.00	1,313,459.05	2,251,084.32	937,625.28	937,625.28
TTG	Tetraglyme	143-24-8	1.00	0.02	0.01	-0.01	-0.01
PSEPVE	Perfluoro-2-(2-Fluorosulfonylethoxy) Propyl Vinyl Ether	16090-14-5	2,000.00	729.62	639.53	-90.08	-180,169.22
PPVE	Perfluoropropyl vinyl ether	1623-05-8	1.00	926.39	2,113.46	1,187.06	1,187.06
PEPF	Perfluoroethoxypropionyl fluoride	1682-78-6	2,000.00	95.60	127.33	31.73	63,463.44
A/F Solvent (n=1 TAF)	[difluoro(trifluoromethoxy)methoxy]difluoro acetyl fluoride	21703-43-5	2,000.00	15.35	36.14	20.78	41,569.49
A/F Solvent (n=2 TAF)	[[difluoro(trifluoromethoxy)methoxy]difluoromethoxy]difluoro-acetyl fluoride	21703-45-7	2,000.00	11.62	7.97	-3.65	-7,306.19
A/F Solvent (n=3 TAF)	1,1,1,3,3,5,5,7,7,9,9-undecafluoro-2,4,6,8-tetraoxadecan-10-oyl fluoride	21703-47-9	2,000.00	6.13	6.13	0.00	-4.40
A/F Solvent (n=4 TFF)	Carbonofluoridic acid, 1,1,3,3,5,5,7,7,9,9,9- undecafluoro-2,4,6,8-tetraoxanon-1-yl ester	21703-48-0	2,000.00	32.54	30.03	-2.52	-5,031.09
A/F Solvent (n=4 TAF)	1,1,1,3,3,5,5,7,7,9,9,11,11-tridecafluoro-2,4,6,8,10-pentaoxadodecan-12-oyl fluoride	21703-49-1	2,000.00	7.97	7.97	0.00	-4.15
MD	2,3,3,3-Tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-(trifluoromethoxy)propoxy]-propanoyl fluoride	2479-75-6	2,000.00	18.84	24.50	5.65	11,302.51
HFPO Trimer	Perfluoro-2,5-dimethyl-3,6-dioxanononanoyl fluoride	2641-34-1	2,000.00	6.76	10.87	4.11	8,217.53
PMPF	Perfluoromethoxypropionyl fluoride	2927-83-5	2,000.00	549.04	718.77	169.74	339,470.47
E-2	2H-perfluoro(5-methyl-3,6-dioxanonane)	3330-14-1	2,000.00	172.44	10.42	-162.02	-324,042.64
E-1	Propane, 1,1,1,2,2,3,3-heptafluoro-3-(1,2,2,2- tetrafluoroethoxy)-	3330-15-2	6,490.00	0.00	0.00	0.00	0.00
E-3	2H-perfluoro-5,8-dimethyl-3,6,9-trioxadodecane	3330-16-3	2,000.00	0.00	0.00	0.00	0.00
Iso-PSEPVE	Perfluoro-1-methyl-2-(2 fluorosulfonyl ethoxy) ethyl vinyl ether	34805-58-8	2,000.00	0.00	0.00	0.00	1.19
COF2	Carbonyl fluoride	353-50-4	5,700.00	215.78	271.33	55.55	316,623.62
PAF	Perfluoroacetyl fluoride	354-34-7	2,000.00	397.52	282.10	-115.43	-230,852.35
HydroPEVE	2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoyl fluoride	360796-50-5	2,000.00	10.02	13.03	3.01	6,012.82
C4	Perfluoro-2-butene	360-89-4	1.82	136.64	298.27	161.63	294.17
C5	Perfluoropentene	376-87-4	1.00	0.00	0.01	0.00	0.00
PMCP	Perfluoromethylcyclopropane	379-16-8	10,000.00	70.38	75.01	4.63	46,323.01
MA	Tetrafluoro-2-[tetrafluoro-2-(fluorosulfonyl)ethoxy]-propanoyl fluoride	4089-57-0	2,000.00	1.55	1.67	0.12	246.86
DA	Tetrafluoro-2[hexafluoro-2-(tetrafluoro-2-{fluorosulfonyl}ethoxy) propoxy propionyl fluoride	4089-58-1	2,000.00	35.53	37.56	2.03	4,063.44
PPF	Perfluoropropionyl fluoride	422-61-7	2,000.00	21.29	39.01	17.72	35,441.21
HFPO	Hexafluoropropylene oxide	428-59-1	10,000.00	1,899.38	2,275.80	376.41	3,764,118.53
TA	2,3,3,3-Tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-[1,1,2,3,3,3-hexafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]propoxy]propoxy] propanoyl fluoride	4628-44-8	2,000.00	1.26	1.37	0.10	206.81
Initiator	Peroxide, bis[2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-1-oxopropyl]	56347-79-6	2000	20.77	2.08	-18.69	-37,378.05
EVE	Propanoic acid, 3-[1-[difluoro [(trifluoroethenyl oxy] methyl]-1,2,2,2-tetrafluoroethoxy] -2,2,3,3-tetrafluoro-, methyl ester	63863-43-4	1.00	109.58	57.67	-51.91	-51.91
hydro-EVE	3-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester propanoic acid	660857-95-4	2,000.00	5.13	2.59	-2.54	-5,073.95
RSU	2,2-Difluoro-2-(fluorosulfonyl) acetyl fluoride	677-67-8	2,000.00	55.30	1,012.51	957.20	1,914,408.15
TAE	Methyl perfluoro (11-(fluoroformyl)-5,8-dimethyl-4,7,10-trioxadodecanoate)	69116-67-2	270.00	0.24	0.11	-0.13	-34.83
MMF	Methyl-2,2-difluoromalonyl fluoride	69116-71-8	2,000.00	2.09	0.96	-1.13	-2,269.39
MAE	Methyl perfluoro (5-(fluoroformyl)-4-oxahexanoate)	69116-72-9	2,000.00	3.51	1.60	-1.90	-3,809.84
DAE	Methyl perfloro (8-(fluoroformyl)-5-methyl-4,7-dioxanonanoate)	69116-73-0	270.00	5.58	2.48	-3.11	-838.41
SU	3,3,4,4-tetrafluoro-1,2-oxathietane 2,2-dioxide	697-18-7	2,000.00	5.05	331.22	326.18	652,351.41
iso-EVE	Methyl perfluoro-6-methyl-4,7-dioxanon-8 eneoate	73122-14-2	2,000.00	8.00	3.92	-4.09	-8,174.56
Fluoroform*	HFC-23	75-46-7	14,800.00	5.83	6.77	0.94	13,912.00
Hydro-PSEPVE	Tetrafluoro-2-[trifluoro-2-(1,2,2,2-tetra-fluoroethoxy)-1-(trifluoromethyl) ethoxy]-ethane sulfonyl fluoride	75549-02-9	2,000.00	0.00	0.00	0.00	0.40
F-113	1,1,2-Trichloro-1,2,2-trifluoro ethane	76-13-1	2000	2,071.51	188.34	-1,883.17	-3,766,336.87
			Total CO_2e Emissions from the Project				1,793.12

Carbon Bed Controlled Emissions

Compound Name	CAS No.	Carbon Bed Adsorbability Rating	Assumed Control Efficiencies	VEN (NS-B) - 2021 Indoor Equipment Emissions	VEN (NS-B) - Proposed Indoor Equipment Emissions	VEN (NS-B) - 2021 Controlled Indoor Equipment Emissions	VEN (NS-B) - Proposed Controlled Indoor Equipment Emissions	VES (NS-C) - 2021 Indoor Equipment Emissions	VES (NS-C) - Proposed Indoor Equipment Emissions	VES (NS-C) - 2021 Controlled Indoor Equipment Emissions	VES (NS-C) - Proposed Controlled Indoor Equipment Emissions	Semi-Works (SW-1/2) - Proposed Indoor Equipment Emissions	Semi-Works (SW-1/2) - Proposed Controlled Indoor Equipment Emissions	VEN (NS-B) - Proposed (Actual Hours) Indoor Equipment Emissions	VEN (NS-B) - Proposed (Actual Hours) Controlled Indoor Equipment Emissions	VES (NS-C) - Proposed (Actual Hours) Indoor Equipment Emissions	VES (NS-C) - Proposed (Actual Hours) Controlled Indoor Equipment Emissions
HFPO	428-59-1	very poor	0%	551.44	834.42	551.44	834.42	393.49	511.50	393.49	511.50	0.00	0.00	656.69	656.69	440.09	440.09
HFP	116-15-4	very poor	0%	11.39	29.28	11.39	29.28	6.55	8.51	6.55	8.51	0.00	0.00	31.12	31.12	7.33	7.33
COF2	353-50-4	very poor	0%	0.00	0.00	0.00	0.00	60.95	79.22	60.95	79.22	0.00	0.00	0.00	0.00	68.16	68.16
PAF	354-34-7	very poor	0%	0.00	0.00	0.00	0.00	59.36	77.17	59.36	77.17	4.93	4.93	0.00	0.00	66.39	66.39
PMCP	379-16-8		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=4 TFF)	21703-48-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=1 TAF)	21703-43-5	moderate	50%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=2 TAF)	21703-45-7		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=3 TAF)	21703-47-9		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=4 TAF)	21703-49-1		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene	71-43-2		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	108-88-3		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other A/F Compounds	NA		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	124-38-9		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO2	7446-09-5		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HF	7664-39-3	poor	20%	0.00	0.00	0.00	0.00	125.54	163.19	100.43	130.55	0.00	0.00	0.00	0.00	140.41	112.32
PPF	422-61-7	poor	20%	25.27	44.82	20.22	35.85	0.00	0.00	0.00	0.00	0.00	0.00	27.87	22.30	0.00	0.00
Diglyme	111-96-6	very good	90%	93.72	101.41	9.37	10.14	0.00	0.00	0.00	0.00	0.00	0.00	122.07	12.21	0.00	0.00
AN	75-05-8	good	70%	133.11	251.53	39.93	75.46	144.30	187.57	43.29	56.27	0.00	0.00	140.24	42.07	161.38	48.42
ADN	111-69-3	extremely good	99%	16.31	7.46	0.16	0.07	0.00	0.00	0.00	0.00	0.00	0.00	29.34	0.29	0.00	0.00
TTG	143-24-8	extremely good	99%	1.63	0.75	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	2.93	0.03	0.00	0.00
DA	4089-58-1	very good	90%	345.13	375.48	34.51	37.55	0.00	0.00	0.00	0.00	0.00	0.00	451.96	45.20	0.00	0.00
MA	4089-57-0	extremely good	99%	154.68	167.38	1.55	1.67	0.00	0.00	0.00	0.00	0.00	0.00	201.47	2.01	0.00	0.00
TA	4628-44-8	very good	90%	12.63	13.67	1.26	1.37	0.00	0.00	0.00	0.00	0.00	0.00	16.45	1.65	0.00	0.00
RSU	677-67-8	moderate	50%	1.27	1.37	0.63	0.68	0.00	0.00	0.00	0.00	0.00	0.00	1.65	0.82	0.00	0.00
MAE	69116-72-9	very good	90%	35.07	16.04	3.51	1.60	0.00	0.00	0.00	0.00	0.00	0.00	63.10	6.31	0.00	0.00
MMF	69116-71-8	good	70%	6.97	3.19	2.09	0.96	0.00	0.00	0.00	0.00	0.00	0.00	12.54	3.76	0.00	0.00
DAE	69116-73-0	very good	90%	53.83	24.78	5.38	2.48	0.00	0.00	0.00	0.00	0.00	0.00	97.51	9.75	0.00	0.00
TAE	69116-67-2	very good	90%	2.37	1.09	0.24	0.11	0.00	0.00	0.00	0.00	0.00	0.00	4.27	0.43	0.00	0.00
HFPO Trimer	2641-34-1	good	70%	22.55	36.24	6.76	10.87	0.00	0.00	0.00	0.00	0.00	0.00	25.72	7.71	0.00	0.00
EVE	63863-43-4	very good	90%	9.87	18.77	0.99	1.88	0.00	0.00	0.00	0.00	0.00	0.00	73.84	7.38	0.00	0.00
PPVE	1623-05-8	moderate	50%	83.81	1,169.54	41.91	584.77	12.53	16.29	6.27	8.14	0.00	0.00	652.09	326.04	14.01	7.01
PSEPVE	16090-14-5	very good	90%	50.95	229.18	5.09	22.92	0.00	0.00	0.00	0.00	43.37	4.34	275.86	27.59	0.00	0.00
hydro-EVE	660857-95-4	very good	90%	0.58	1.10	0.06	0.11	0.00	0.00	0.00	0.00	0.00	0.00	4.34	0.43	0.00	0.00
iso-EVE	73122-14-2	very good	90%	1.05	1.99	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.00	7.82	0.78	0.00	0.00
C4	360-89-4	poor	20%	5.55	49.72	4.44	39.78	0.00	0.00	0.00	0.00	0.00	0.00	36.23	28.99	0.00	0.00
C5	376-87-4		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TFE	116-14-3	very poor	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.60	24.60	0.00	0.00	0.00	0.00
Hydro-PSEPVE	75549-02-9		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iso-PSEPVE	34805-58-8		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PMPF	2927-83-5	poor	20%	0.00	0.00	0.00	0.00	654.49	850.76	523.59	680.61	0.00	0.00	0.00	0.00	731.99	585.59
PEPF	1682-78-6	good	70%	0.00	0.00	0.00	0.00	266.95	347.01	80.09	104.10	0.00	0.00	0.00	0.00	298.57	89.57
PMVE	1187-93-5		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PEVE	10493-43-3		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MD	2479-75-6	good	70%	0.00	0.00	0.00	0.00	62.81	81.65	18.84	24.50	0.00	0.00	0.00	0.00	70.25	21.08
HydroPEVE	360796-50-5	poor	20%	0.00	0.00	0.00	0.00	12.53	16.29	10.02	13.03	0.00	0.00	0.00	0.00	14.01	11.21
E-1	3330-15-2		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-2	3330-14-1	good	70%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.62	10.39	0.00	0.00	0.00	0.00
E-3	3330-16-3		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethanol	64-17-5		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Propanol	71-23-8		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isopropanol	67-63-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM	PM Total		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-10	PM10		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-2.5	PM2.5		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO	630-08-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOx	11104-93-1		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetic Acid	64-19-7		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMSO	67-68-5		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitric Acid	7697-37-2		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeOH	67-56-1		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F-113	76-13-1	poor (per Steven)	20%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	235.16	188.13	0.00	0.00	0.00	0.00
SU	697-18-7	moderate	50%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EDC	107-06-2		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2SO4	7664-93-9		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HCl	7647-01-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeCl	75-09-2		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initiator	56347-79-6		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	2.08	0.00	0.00	0.00	0.00
Acetaldehyde	75-07-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acrolein	107-02-8		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ammonia	7664-41-7		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic unlisted compounds	ASC-other		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo(a)pyrene	50-32-8		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beryllium metal (unreacted)	7440-41-7		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium metal (elemental unreacted)	7440-43-9		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromic acid (VI)	7738-94-5		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt unlisted compounds	COC-other		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Formaldehyde	50-00-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexane, n-	110-54-3		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lead unlisted compounds	PBC-other		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese unlisted compounds	MNC-other		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury vapor	7439-97-6		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Napthalene	99 91-20-3		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel metal	7440-02-0		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium compounds	7782-49-2		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoroform*	75-46-7		0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total VOC				1,619.17	3,379.19	741.06	1,692.18	1,673.97	2,175.98	1,202.45	1,563.06	109.60	46.33	2,935.11	1,233.57	1,872.19	1,344.84

Revised CY2021 Air Emissions

		VEN (NS-B) - 2021			VES (NS-C) - 2021			VEN (NS-B) - Proposed			VES (NS-C) - Proposed		
Compound Name	**CAS No.**	**Process**	**Indoor Equipment Emissions**	**Outdoor Equipment Emissions**	**Process**	**Indoor Equipment Emissions**	**Outdoor Equipment Emissions**	**Process**	**Indoor Equipment Emissions**	**Outdoor Equipment Emissions**	**Process**	**Indoor Equipment Emissions**	**Outdoor Equipment Emissions**
HFPO	428-59-1	1.70	551.44	0.00	0.01	393.49	0.00	4.80	834.42	0.00	0.02	511.50	0.00
HFP	116-15-4	0.73	11.39	58.38	0.48	6.55	5.43	2.10	29.28	73.94	0.73	8.51	8.11
COF2	353-50-4	0.00	0.00	0.00	18.23	60.95	0.00	0.00	0.00	0.00	27.41	79.22	0.00
PAF	354-34-7	0.00	0.00	0.00	21.98	59.36	0.00	0.00	0.00	0.00	33.05	77.17	0.00
PMCP	379-16-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=4 TFF)	21703-48-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=1 TAF)	21703-43-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=2 TAF)	21703-45-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=3 TAF)	21703-47-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=4 TAF)	21703-49-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene	71-43-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	108-88-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other A/F Compounds	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	124-38-9	148,919.01	0.00	0.00	469,571.81	0.00	0.00	398,545.98	0.00	0.00	705,846.81	0.00	0.00
SO2	7446-09-5	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
HF	7664-39-3	15.00	0.00	0.00	338.99	100.43	1.70	41.34	0.00	0.00	320.77	130.55	2.55
PPF	422-61-7	1.07	20.22	0.00	0.00	0.00	0.00	3.16	35.85	0.00	0.00	0.00	0.00
Diglyme	111-96-6	0.00	9.37	0.00	0.00	0.00	0.00	0.00	10.14	0.00	0.00	0.00	0.00
AN	75-05-8	0.11	39.93	0.00	0.00	43.29	0.00	0.31	75.46	0.00	0.00	56.27	0.00
ADN	111-69-3	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
TTG	143-24-8	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
DA	4089-58-1	0.01	34.51	1.00	0.00	0.00	0.00	0.01	37.55	0.00	0.00	0.00	0.00
MA	4089-57-0	0.00	1.55	0.00	0.00	0.00	0.00	0.00	1.67	0.00	0.00	0.00	0.00
TA	4628-44-8	0.00	1.26	0.00	0.00	0.00	0.00	0.00	1.37	0.00	0.00	0.00	0.00
RSU	677-67-8	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00
MAE	69116-72-9	0.00	3.51	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00	0.00	0.00
MMF	69116-71-8	0.00	2.09	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00
DAE	69116-73-0	0.00	5.38	0.20	0.00	0.00	0.00	0.00	2.48	0.00	0.00	0.00	0.00
TAE	69116-67-2	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
HFPO Trimer	2641-34-1	0.00	6.76	0.00	0.00	0.00	0.00	0.00	10.87	0.00	0.00	0.00	0.00
EVE	63863-43-4	0.01	0.99	108.57	0.00	0.00	0.00	0.00	1.88	55.78	0.00	0.00	0.00
PPVE	1623-05-8	0.16	41.91	878.01	0.00	6.27	0.00	0.33	584.77	1,520.12	0.00	8.14	0.00
PSEPVE	16090-14-5	0.03	5.09	512.39	0.00	0.00	0.00	0.00	22.92	612.23	0.00	0.00	0.00
hydro-EVE	660857-95-4	0.00	0.06	5.07	0.00	0.00	0.00	0.00	0.11	2.48	0.00	0.00	0.00
iso-EVE	73122-14-2	0.00	0.10	7.90	0.00	0.00	0.00	0.00	0.20	3.72	0.00	0.00	0.00
C4	360-89-4	0.20	4.44	132.00	0.00	0.00	0.00	0.49	39.78	258.00	0.00	0.00	0.00
C5	376-87-4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
TFE	116-14-3	0.09	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00
Hydro-PSEPVE	75549-02-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iso-PSEPVE	34805-58-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PMPF	2927-83-5	0.00	0.00	0.00	14.59	523.59	10.85	0.00	0.00	0.00	21.93	680.61	16.23
PEPF	1682-78-6	0.00	0.00	0.00	4.66	80.09	10.85	0.00	0.00	0.00	7.00	104.10	16.23
PMVE	1187-93-5	0.00	0.00	0.00	3.75	0.00	1,546.74	0.00	0.00	0.00	5.64	0.00	2,312.20
PEVE	10493-43-3	0.00	0.00	0.00	0.00	0.00	1,324.23	0.00	0.00	0.00	0.00	0.00	1,979.56
MD	2479-75-6	0.00	0.00	0.00	0.00	18.84	0.00	0.00	0.00	0.00	0.00	24.50	0.00
HydroPEVE	360796-50-5	0.00	0.00	0.00	0.00	10.02	0.00	0.00	0.00	0.00	0.00	13.03	0.00
E-1	3330-15-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-2	3330-14-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-3	3330-16-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethanol	64-17-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Propanol	71-23-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isopropanol	67-63-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM	PM Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-10	PM10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-2.5	PM2.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO	630-08-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOx	11104-93-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetic Acid	64-19-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMSO	67-68-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitric Acid	7697-37-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeOH	67-56-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F-113	76-13-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SU	697-18-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EDC	107-06-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2SO4	7664-93-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HCl	7647-01-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeCl	75-09-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initiator	56347-79-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	75-07-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acrolein	107-02-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ammonia	7664-41-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic unlisted compounds	ASC-other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo(a)pyrene	50-32-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beryllium metal (unreacted)	7440-41-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium metal (elemental unreacted)	7440-43-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromic acid (VI)	7738-94-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt unlisted compounds	COC-other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Formaldehyde	50-00-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexane, n-	110-54-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lead unlisted compounds	PBC-other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese unlisted compounds	MNC-other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury vapor	7439-97-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Napthalene	99 91-20-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel metal	7440-02-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium compounds	7782-49-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoroform*	75-46-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total VOC		4.14	741.06	1,703.51	63.72	1,202.45	2,898.11	11.44	1,692.18	2,526.28	95.77	1,563.06	4,332.32

Equipment Emissions Determination

Equipment Emissions (EE) are a function of the number of emission points in the plant (valves, flanges, pump seals). For the equipment emission calculations the inventory shown below is conservative and based on plant and process diagrams.

A. Equipment Emissions from Condensation Reactor System

Condensation Tower (vents to stack)

* Emission Factors found on Fugitive Emission Leak rates worksheet

Valve emissions:	462 valves	X	0.00039	lbs/hr/valve	=	0.180	lbs/hr VOC from EE
Flange emissions:	924 flanges	X	0.00018	lbs/hr/flange	=	0.166	lbs/hr VOC from EE
Pump emissions:	0 pumps	X	0.00115	lbs/hr/pump	=	0.000	lbs/hr VOC from EE
				Total fugitive emission rate	=	0.347	lbs/hr VOC from EE

Condensation Tower VOC by campaign

Campaign	EVE	PPVE	PSEPVE	1VE
Operating Hours	468	3,171	2,360	0
Total VOC generated per campaign	162	1099	818	0

Component	EVE	After control**	PPVE	After control**	PSEPVE	After control**	1VE	After control**
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
HFP	1	1	4	4	2	2	0	0
HFPO	38	38	324	324	189	189	0	0
PPF	1	1	22	22	2	2	0	0
Diglyme	0	0	0	0	94	94	0	0
AN	0	0	133	133	0	0	0	0
ADN	16	16	0	0	0	0	0	0
TTG	2	2	0	0	0	0	0	0
DA	0	0	0	0	345	345	0	0
MA	0	0	0	0	155	155	0	0
TA	0	0	0	0	13	13	0	0
RSU	0	0	0	0	1	1	0	0
MAE	35	35	0	0	0	0	0	0
MMF	7	7	0	0	0	0	0	0
DAE	54	54	0	0	0	0	0	0
TAE	2	2	0	0	0	0	0	0
HFPO Trimer	0	0	15	15	8	8	0	0
n1 adduct	0	0	0	0	0	0	0	0
n1 TAF	0	0	0	0	0	0	0	0
Total	**157**	**157**	**499**	**499**	**807**	**807**	**0**	**0**

Note: Speciated equipment emissions were estimated by assuming typical volumes of each component in the system, and applying the fraction of each component to the total estimated emissions. The worksheet "vessel compositions" shows the factors used in this calculation.

B. Equipment Emissions from Agitated Bed Reactor System

PPVE:

Valve emissions:	84 valves	X	0.00039	lbs/hr/valve	=	0.033	lbs/hr VOC from EE
Flange emissions:	296 flanges	X	0.00018	lbs/hr/flange	=	0.053	lbs/hr VOC from EE
Pump emissions:	0 pumps	X	0.00115	lbs/hr/pump	=	0.000	lbs/hr VOC from EE
				Total fugitive emission rate	=	0.086	lbs/hr VOC from EE

PSEPVE & EVE:

Valve emissions:	35 valves	X	0.00039	lbs/hr/valve	=	0.014	lbs/hr VOC from EE
Flange emissions:	124 flanges	X	0.00018	lbs/hr/flange	=	0.022	lbs/hr VOC from EE
Pump emissions:	0 pumps	X	0.00115	lbs/hr/pump	=	0.000	lbs/hr VOC from EE
				Total fugitive emission rate	=	0.036	lbs/hr VOC from EE

ABR/crude VOC by campaign

Campaign	EVE	PPVE	PSEPVE	1VE
Operating Hours	468	3,171	2,360	0
Total VOC per campaign	17	273	85	0.00

Component	EVE	PPVE	PSEPVE	1VE
	lb	lb	lb	lb
HFP	0	0	6	0
EVE	14	0	0	0
PPVE	0	262	0	0
DA	0	0	1	0
DAE	0	0	0	0
PSEPVE	0	0	74	0
hydro-EVE	1	0	0	0
iso-EVE	2	0	0	0
C4	0	8	4	0.00
1VE	0	0	0	0.00
Total	**17**	**270**	**85**	**0**

Worst case, assume all acid fluorides are released in the portion of the feed line outside the ABR room and are not removed by the WGS.

PPVE

Inside	Outside
32%	68%

PSEPVE & EVE

Inside	Outside
69%	31%

C. Equipment Emissions from Crude Receiver

Valve emissions:	33 valves	X	0.00039	lbs/hr/valve	=	0.013	lbs/hr VOC from EE
Flange emissions:	102 flanges	X	0.00018	lbs/hr/flange	=	0.018	lbs/hr VOC from EE
Pump emissions:	0 pumps	X	0.00115	lbs/hr/pump	=	0.000	lbs/hr VOC from EE
				Total fugitive emission rate	=	0.031	lbs/hr VOC from EE

Crude VOC by campaign

Campaign	EVE	PPVE	PSEPVE	1VE
Operating Hours	468	3,171	2,360	0
Total VOC per campaign	15	99	74	0.00

Component	EVE	PPVE	PSEPVE	1VE
	lb	lb	lb	lb
HFP	0	0	5	0
EVE	12	0	0	0
PPVE	0	95	0	0
DA	0	0	1	0
DAE	0	0	0	0
PSEPVE	0	0	64	0
hydro-EVE	1	0	0	0
iso-EVE	1	0	0	0
C4	0	3	4	0.00
1VE	0	0	0	0.00
Total	**15**	**98**	**74**	**0**

All components are currently outdoors.

D. Equipment Emissions from Refining System

Valve emissions:	232 valves	X	0.00039	lbs/hr/valve	=	0.090	lbs/hr VOC from EE
Flange emissions:	707 flanges	X	0.00018	lbs/hr/flange	=	0.127	lbs/hr VOC from EE
Pump emissions:	0 pumps	X	0.00115	lbs/hr/pump	=	0.000	lbs/hr VOC from EE
				Total fugitive emission rate	=	0.218	lbs/hr VOC from EE

Refining System VOC by campaign

Campaign	EVE	PPVE	PSEPVE	1VE
Operating Hours	468	3,171	2,360	0
Total VOC per campaign	101.90232	690	514	0.00

Component	EVE	PPVE	PSEPVE	1VE
	lbs	lbs	lbs	lbs
HFP	0	0	51	0
EVE	92	0	0	0
PPVE	0	605	0	0
PSEPVE	0	0	425	0
hydro-EVE	4	0	0	0
iso-EVE	6	0	0	0
C4	0	81	37	0.00
1VE	0	0	0	0.00
Total	**102**	**686**	**514**	**0**

All Refining equipment is located outside of the tower so releases will be directly to atmosphere.

Fugitive and Equipment Emissions Determination (Non-point Source):

Fugitive (FE) and Equipment Emissions (EE) are a function of the number of emission points in the plant (valves, flanges, pump seals). The inventory shown below is conservative and based on plant and process diagrams. Note that the calculations below include equipment emissions inside as well as equipment emissions outside (fugitive emissions).

A. Equipment emissions from SU Reactor, Rearranger, RSU Still and RSU Hold Tank:

Emissions are vented from equipment located inside the RSU barricade and are vented to a vent stack.

Barricade:

Valve emissions:	250 valves x 0.00036 lb/hr/valve	=	0.090	lb/hr EE
Flange emissions:	550 flanges x 0.00018 lb/hr/flang	=	0.099	lb/hr EE
Total equipment emission rate		=	0.189	lb/hr EE

Hours of operation = 2,409

On average 0.13 lbs of HF are produced for every 1 lb of RSU, SU or PAF.

VOC:	0.189	lb/hr EE		**HF:**	0.189	lb/hr EE	
x	2409	hours/yr		x	2409	hours/yr	
=	**455.3**	**lb/yr VOC from EE**		x	0.13	lb HF per lb VOC	
				=	**59.2**	**lb/yr HF from EE**	

B. Fugitive Emissions From SO3 Storage Tank and Vaporizer

This equipment is not inside a building, therefore emissions are true Fugitive Emissions

Valve emissions:	85 valves x 0.00036 lb/hr/valve	=	0.031	lb/hr FE
Flange emissions:	180 flanges x 0.00018 lb/hr/flang	=	0.032	lb/hr FE
Total fugitive emission rate		=	0.063	lb/hr FE

SO3:	0.063	lb. FE/hr		**H2SO4:**	0.063	lb. FE/hr	
x	2409	hours/yr		x	2409	hours/yr	
=	**151.8**	**lb/yr SO3 from EE**		x	1.225	lb H2SO4 per lb SO3	
				=	**185.9**	**lb/yr H2SO4 from FE**	

C. Fugitive Emissions From EDC Tank

This equipment is not inside a building, therefore emissions are true Fugitive Emissions

Valve emissions:	20 valves x 0.00036 lb/hr/valve	=	0.007	lb/hr FE
Flange emissions:	10 flanges x 0.00018 lb/hr/flange	=	0.002	lb/hr FE
Total fugitive emission rate		=	0.009	lb/hr FE

VOC:	0.009	lb/hr FE	HF:	0
x	2409	hours/yr		
=	**21.7**	**lb/yr VOC from FE**		

D. Total RSU Plant Non-Point Source Emissions

	Equipment Emissions		Fugitive Emissions		
Emission Source	**VOC lb/yr**	**HF lb/yr**	**VOC lb/yr**	**SO3 lb/yr**	**H2SO4 lb/yr**
A. Equipment Emissions from SU Reactor, Rearranger, Still and Hold Tank	455.3	59.2	0	0	0
B. Fugitive Emissions From SO3 Storage Tank and Vaporizer	0	0	0	151.8	185.9
C. Fugitive Emissions From EDC Tank	0	0	21.7	0	0
Total for 2021	**455.3**	**59.2**	**21.7**	**151.8**	**185.9**

E. VOC Emission by Source Type

Nafion® Compound	Emissions from Stack (lb)	Equipment Emissions (lb)	Fugitive Emissions (lb)	Accidental Releases (lb)	Total Emissions (lb)
TFE	0.4	62.3	0	0	62.7
PAF	0.3	14.4	0	0	14.7
RSU	0.1	278.0	0	0.0	278.1
SU	0.0	91.1	0	0	91.1
EDC	0	10	21.7	0	31.3
Total	**0.8**	**455.3**	**21.7**	**0.0**	**477.8**

Equipment Speciation (%)
0.14
0.03
0.61
0.20
0.02

Note: Speciated equipment emissions were estimated by assuming that each compound's equipment emission concentration was equal to that compound's stack emission fraction of the total stack emission.

Example: The TFE equipment emissions were determined by the ratio of the TFE stack emission divided by the total stack emission, multiplied by the total equipment emissions.

Specifically: $\frac{0.4}{0.8} \times 455.3 = 235.0$ lb. TFE

SEMIWORKS SUMMARY

Year: 2021

Campaign Starts:	**1/20/2021**	**5/11/2021**	**9/22/2021**
Campaign Ends:	**2/3/2021**	**5/18/2021**	**9/30/2021**
Month	**2**	**5**	**9**
	Uncontrolled by CB	Controlled by CB	Controlled by CB

SW-1		21-SXF-1.0	21-SXF-2.0	21-SXF-3.0	Total	Carbon Bed	Revised CY2021
VOC's	**lbs**	440.9	428.46	226.62	1096.00	Control Efficiency	W/ Carbon Bed Controls
F-113	**lbs**	951.0	775.83	624.75	2351.63	20%	2071.51
TFE	**lbs**	130.4	73.4	42.2	246.05	0	246.05
PSEPVE	**lbs**	187.5	157.6	88.6	433.66	90%	212.10
E2	**lbs**	98.0	169.5	78.8	346.23	70%	172.44
Initiator	**lbs**	8.5	8.6	3.7	20.77	0	20.77
PAF	**lbs**	16.6	19.3	13.4	49.29	0	49.29

PSD Netting Analysis

Pollutant	Full Compound Name	CAS No.	HAP/TAP	Change from Proposed Modification	Remediation Treatment RICE (I-RICE-05)	Thermal Oxidizer RICE (I-RICE-04)	Cooling Tower (I-CT)	Barrier Wall RICE (I-RICE-06 thru 23)	Total Netted Projects	
				Emissions Change (lb/yr)	Potential Emissions (lb/yr)	Potential Emissions (lb/yr)	Potential Emissions (lb/yr)	Potential Emissions (lb/yr)	(lb/yr)	(TPY)
SO2	Sulfur dioxide	7446-09-5	Criteria	-48.86	3.73	3.00	0.00	26.32	-15.81	-0.01
PM	Particulate Matter (TSP)	PM Total	Criteria	2,202.57	102.02	53.00	1,576.80	693.99	4,628.38	2.31
PM-10	PM10 (< 10 micron)	PM10	Criteria	2,269.22	102.02	53.00	1,576.80	693.99	4,695.03	2.35
PM-2.5	PM2.5 (< 2.5 micron)	PM2.5	Criteria	2,265.35	102.02	53.00	1,576.80	693.99	4,691.16	2.35
CO	carbon monoxide	630-08-0	Criteria	-6,987.36	1,768.34	917.00	0.00	11,774.61	7,472.59	3.74
NOx	Nitrogen oxide	11104-93-1	Criteria	-12,864.65	1,887.56	979.00	0.00	7,258.25	-2,739.84	-1.37
Total VOC	Total VOC	VOC	Criteria	39,328.08	152.83	79.00	0.00	881.90	40,441.81	20.22

Pollutant	Full Compound Name	CAS No.	HAP/TAP	Change from Proposed Modification	Remediation Treatment RICE (I-RICE-05)	Thermal Oxidizer RICE (I-RICE-04)	Cooling Tower (I-CT)	Barrier Wall RICE (I-RICE-06 thru 24)	Total Netted Projects Emission Rate	PSD Significant Emission Rate
				Emissions Change (TPY)	Potential Emissions (TPY)	Potential Emissions (TPY)	Potential Emissions (TPY)	Potential Emissions (TPY)	(TPY)	(TPY)
SO2	Sulfur dioxide	7446-09-5	Criteria	-0.02	0.002	0.002	0.00	0.01	-0.01	40.00
PM	Particulate Matter (TSP)	PM Total	Criteria	1.10	0.05	0.03	0.79	0.35	2.31	25.00
PM-10	PM10 (< 10 micron)	PM10	Criteria	1.13	0.05	0.03	0.79	0.35	2.35	15.00
PM-2.5	PM2.5 (< 2.5 micron)	PM2.5	Criteria	1.13	0.05	0.03	0.79	0.35	2.35	10.00
CO	carbon monoxide	630-08-0	Criteria	-3.49	0.88	0.46	0.00	5.89	3.74	100.00
NOx	Nitrogen oxide	11104-93-1	Criteria	-6.43	0.94	0.49	0.00	3.63	-1.37	40.00
Total VOC	Total VOC	VOC	Criteria	19.66	0.08	0.04	0.00	0.44	20.22	40.00

TAP Emissions Summary

							Permitted Limit			Maximum Emission Rate (2Q22)		
Compound Name	**HAP/TAP**	**CY2021 Facility-Wide Totals (lb/yr)**	**CY2021 Project Totals (lb/yr)**	**TAPS from Non-Affected Areas (lb/yr)**	**Post Project Totals (for Affected Areas) (lb/yr)**	**Post Project Totals (Facility-wide) (lb/yr)**	**lb/hr**	**lb/day**	**lb/yr**	**lb/hr**	**lb/day**	**lb/yr**
Benzene	H,T	4.26	4.14	0.12	4.41	4.53			192			9.13
HF	H,T	1,366.54	1,099.96	266.58	2,006.16	2,272.73	2.7	19.4		0.50	11.91	
Acetic Acid	T	757.89	753.48	4.41	3,919.07	3,923.48	54.1			0.8		
Nitric Acid	T	23.48	13.56	9.92	70.51	80.43	14.6			0.01		
F-113	T	2,351.63	2,071.51	280.12	188.34	468.46	13,885			4.33		
EDC	H,T	21.68	21.68	0.00	113.70	113.70			6,081			21
H2SO4	T	354.10	193.56	160.54	960.48	1,121.02	1.46	10.5		0.49	8.37	
HCl	H,T	596.06	595.21	0.85	736.17	737.02	10.2			0.26		
MeCl	H,T	1,159.00	1,159.00	0.00	1,390.80	1,390.80	24.85		38,409	0.03		559
Acetaldehyde	H,T	0.10	0.00	0.10	0.00	0.10	395			5.7E-03		
Acrolein	H,T	0.02	0.01	0.01	0.00	0.01	1.17			8.1E-04		
Ammonia	T	2,959.03	1,761.63	1,197.39	2,177.00	3,374.39	39.5			1.2		
Arsenic unlisted compounds	H,T	0.11	0.11	0.00	0.14	0.14			0.37			0.11
Benzo(a)pyrene	H,T	0.00	0.00	0.00	0.00	0.00			52.8			6.6E-04
Beryllium metal (unreacted)	H,T	0.01	0.01	0.00	0.01	0.01			6.56			0.01
Cadmium metal (elemental unreacted)	H,T	0.61	0.61	0.00	0.75	0.75			8.8			5.8E-01
Chromic acid (VI)	H,T	0.77	0.77	0.00	0.95	0.95		0.54			0.02	
Formaldehyde	H,T	41.44	41.29	0.15	51.03	51.17	2.19			0.09		
Hexane, n-	H,T	990.92	990.92	0.00	1,225.00	1,225.00		965			10	
Manganese unlisted compounds	H,T	0.21	0.21	0.00	0.26	0.26		27.2			0.03	
Mercury vapor	H,T	0.14	0.14	0.00	0.18	0.18	0.53			7.1E-04		
Nickel metal	H,T	1.16	1.04	0.12	1.43	1.55		5.26			0.02	

Sources	Current Permit Limits		Expected Emissions Post-Modification	
	lb/hr	lb/day	lb/hr	lb/day
Carbon Adsorber (ID No. NCD-Hdr3) stack controlling VE-North Indoor Fugitive Emissions (ID No. NS-B-2)	7.28	52.45	0.63	15.10
Thermal Oxidizer and 4-Stage Caustic Scrubber System (ID Nos. NCD-Q1 and NCD-Q2) stack controlling: HFPO, Vinyl Ethers North, Vinyl Ethers South, RSU, FPS Liquid Waste Stabilization, MMF, IXM Resins (except Fluorinator), E-2, TFE/CO2 Separation, HFPO Product Container Decontamination, VEN Product Decontamination, and VES Product Container Decontamination Processes (ID Nos. NS-A, NS-B, NS-C, NS-D-1, NS-E, NS-F, NS-G-1, NS-K, NS-M, NS-N, NS-O, and NS-P)				
Polymer Processing Aid Stack including Carbon Adsorber (ID No. ACD-A2) installed on Wet Scrubber (ID No. ACD-A1) and heating and ventilation building exhaust				
All other sources not identified above	2.7	19.4	0.41	9.94

Emission Unit ID	Emission Source Description	Proposed HF Emissions (lb/hr)			
		Process	Indoor Air	Outdoor	
AS-A	PPA	2.90E-05		--	
NS-A	HFPO	0.07361481	--	--	*Used max of last four quarters - was higher than new potential / 8760 hours
NS-B	VE-North	0.004718632	--	--	
NS-C	VE-South	0.036617187	0.014903124	0.000290807	
NS-D	RSU	0.009380316	0.02457	--	
NS-E	Waste Liquid Stabilization	--	--	0.0231621	
NS-F	MMF	--	--	0.100260417	
NS-G	Resins	0.009179944	--	--	
NS-H	Membrane Treatment	0.266	--	--	*Used max of last four quarters - was higher than new potential / 8760 hours
NS-K	E2	0.000103842	--	--	
NS-M	TFE-CO2	0.003406318	--	--	
NS-N	HFPO Container Decon	0.437376671	--	--	*Assumes 1 container per hour.
NS-O	VEN Container Decon	0.002632097	--	--	*Assumes 1 container per hour.
NS-P	VES Container Decon	0.017960348	--	--	*Assumes 1 container per hour.
SW-12	Semiworks	0.0191163			*Used max of last four quarters - was higher than new potential / 8760 hours

Sources affected by this modification.

Note: For sources not affected by this modification, the highest hourly emission rate from the last 4 quarters was utilized.

Fluorinated Organic Compound (FOC) Emissions Summary

Compound Name	CAS No.	HAP/TAP	Fluorinated Organic Compounds (FOC)	HFPO (NS-A) - 2021		HFPO (NS-A) - Proposed		VEN (NS-B) - 2021			VEN (NS-B) - Proposed (Actual Hours)			VES (NS-C) - 2021			VES (NS-C) - Proposed (Actual Hours)			HFPO Cont Decon (NS-N) - 2021	HFPO Cont Decon (NS-N) - Proposed	VEN Cont Decon (NS-O) - 2021	VEN Cont Decon (NS-O) - Proposed
				Process	Equipment Emissions	Process	Equipment Emissions	Process	Indoor Equipment Emissions	Outdoor Equipment Emissions	Process	Indoor Equipment Emissions	Outdoor Equipment Emissions	Process	Indoor Equipment Emissions	Outdoor Equipment Emissions	Process	Indoor Equipment Emissions	Outdoor Equipment Emissions	Process	Process	Process	Process
HFPO	428-59-1		FOC	34.66	915.78	5.83	915.78	1.70	551.44	0.00	4.80	656.69	0.00	0.01	393.49	0.00	0.02	440.09	0.00	2.29	3.43	0.00	0.00
HFP	116-15-4		FOC	5.04	1,848.83	7.67	1,848.83	0.73	11.39	58.38	2.10	31.12	89.00	0.48	6.55	5.43	0.73	7.33	6.98	3.07	4.61	0.00	0.00
COF2	353-50-4		FOC	13.61	115.73	22.14	115.73	0.00	0.00	0.00	0.00	0.00	0.00	18.23	60.95	0.00	27.41	68.16	0.00	0.00	0.00	0.00	0.00
PAF	354-34-7		FOC	9.31	96.55	15.15	96.55	0.00	0.00	0.00	0.00	0.00	0.00	21.98	59.36	0.00	33.05	66.39	0.00	0.00	0.00	0.00	0.00
PMCP	379-16-8		FOC	6.83	63.55	11.46	63.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=4 TFF)	21703-48-0		FOC	2.52	30.03	0.00	30.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=1 TAF)	21703-43-5		FOC	0.00	7.97	0.00	7.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=2 TAF)	21703-45-7		FOC	3.65	7.97	0.00	7.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=3 TAF)	21703-47-9		FOC	0.00	6.13	0.00	6.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A/F Solvent (n=4 TAF)	21703-49-1		FOC	0.00	7.97	0.00	7.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene	71-43-2	H,T		0.00	2.99	0.00	2.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	108-88-3	H		0.03	74.50	0.00	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other A/F Compounds	NA		FOC	29.02	0.00	48.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	124-38-9			588,398.01	0.00	842,819.97	0.00	148,919.01	0.00	0.00	398,545.98	0.00	0.00	469,571.81	0.00	0.00	705,846.81	0.00	0.00	45,232.97	67,852.54	437.00	873.61
SO2	7446-09-5	Criteria		0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HF	7664-39-3	H,T		254.58	123.87	383.03	0.00	15.00	0.00	0.00	41.34	0.00	0.00	338.99	100.43	1.70	320.77	112.32	2.19	20.56	30.84	0.19	0.38
PPF	422-61-7		FOC	0.00	0.00	0.00	0.00	1.07	20.22	0.00	3.16	22.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diglyme	111-96-6			0.00	0.00	0.00	0.00	0.00	9.37	0.00	0.00	12.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AN	75-05-8	H		0.00	0.00	0.00	0.00	0.11	39.93	0.00	0.31	42.07	0.00	0.00	43.29	0.00	0.00	48.42	0.00	0.00	0.00	0.00	0.00
ADN	111-69-3			0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TTG	143-24-8			0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DA	4089-58-1		FOC	0.00	0.00	0.00	0.00	0.01	34.51	1.00	0.01	45.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MA	4089-57-0		FOC	0.00	0.00	0.00	0.00	0.00	1.55	0.00	0.00	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TA	4628-44-8		FOC	0.00	0.00	0.00	0.00	0.00	1.26	0.00	0.00	1.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSU	677-67-8		FOC	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAE	69116-72-9		FOC	0.00	0.00	0.00	0.00	0.00	3.51	0.00	0.00	6.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MMF	69116-71-8		FOC	0.00	0.00	0.00	0.00	0.00	2.09	0.00	0.00	3.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DAE	69116-73-0		FOC	0.00	0.00	0.00	0.00	0.00	5.38	0.20	0.00	9.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TAE	69116-67-2		FOC	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HFPO Trimer	2641-34-1		FOC	0.00	0.00	0.00	0.00	0.00	6.76	0.00	0.00	7.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EVE	63863-43-4		FOC	0.00	0.00	0.00	0.00	0.01	0.99	108.57	0.00	7.38	219.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
PPVE	1623-05-8		FOC	0.00	0.00	0.00	0.00	0.16	41.91	878.01	0.33	326.04	847.56	0.00	6.27	0.00	0.00	7.01	0.00	0.00	0.00	0.04	0.09
PSEPVE	16090-14-5		FOC	0.00	0.00	0.00	0.00	0.03	5.09	512.39	0.00	27.59	736.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
hydro-EVE	660857-95-4		FOC	0.00	0.00	0.00	0.00	0.00	0.06	5.07	0.00	0.43	9.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
iso-EVE	73122-14-2		FOC	0.00	0.00	0.00	0.00	0.00	0.10	7.90	0.00	0.78	14.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	360-89-4		FOC	0.00	0.00	0.00	0.00	0.20	4.44	132.00	0.49	28.99	178.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	376-87-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TFE	116-14-3		FOC	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydro-PSEPVE	75549-02-9		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iso-PSEPVE	34805-58-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PMPF	2927-83-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.59	523.59	10.85	21.93	585.59	13.96	0.00	0.00	0.00	0.00
PEPF	1682-78-6		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.66	80.09	10.85	7.00	89.57	13.96	0.00	0.00	0.00	0.00
PMVE	1187-93-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.75	0.00	1,546.74	5.64	0.00	1,989.39	0.00	0.00	0.00	0.00
PEVE	10493-43-3		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,324.23	0.00	0.00	1,703.19	0.00	0.00	0.00	0.00
MD	2479-75-6		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.84	0.00	0.00	21.08	0.00	0.00	0.00	0.00	0.00
HydroPEVE	360796-50-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.02	0.00	0.00	11.21	0.00	0.00	0.00	0.00	0.00
E-1	3330-15-2		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-2	3330-14-1		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-3	3330-16-3		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethanol	64-17-5			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Propanol	71-23-8			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isopropanol	67-63-0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM	PM Total	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-10	PM10	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-2.5	PM2.5	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO	630-08-0	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOx	11104-93-1	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetic Acid	64-19-7	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMSO	67-68-5			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitric Acid	7697-37-2	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeOH	67-56-1	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F-113	76-13-1	T	FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SU	697-18-7		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EDC	107-06-2	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2SO4	7664-93-9	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HCl	7647-01-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeCl	75-09-2	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initiator	56347-79-6		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	75-07-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acrolein	107-02-8	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ammonia	7664-41-7	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic unlisted compounds	ASC-other	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo(a)pyrene	50-32-8	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beryllium metal (unreacted)	7440-41-7	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium metal (elemental unreacted)	7440-43-9	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromic acid (VI)	7738-94-5	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt unlisted compounds	COC-other	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Formaldehyde	50-00-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexane, n-	110-54-3	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lead unlisted compounds	PBC-other	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese unlisted compounds	MNC-other	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury vapor	7439-97-6	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Napthalene	99 91-20-3	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel metal	7440-02-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium compounds	7782-49-2	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoroform*	75-46-7		FOC	1.38	4.45	2.32	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total VOC		Criteria		104.68	3,177.98	111.00	3,177.98	4.14	741.06	1,703.51	11.44	1,233.57	2,095.59	63.72	1,202.45	2,898.11	95.77	1,344.84	3,727.48	5.36	8.04	0.05	0.10
TOTAL FOCs				***106.02***	***3,104.95***	***113.31***	***3,104.95***	***4.03***	***691.58***	***1,703.51***	***11.13***	***1,178.97***	***2,095.59***	***63.72***	***1,159.16***	***2,898.11***	***95.77***	***1,296.43***	***3,727.48***	***5.36***	***8.04***	***0.05***	***0.10***

FOCs Summary	2021	Proposed
Process Emissions (lb/yr)	2,958.37	256.60
Indoor Equipment Emissions (lb/yr)	5,415.79	6,492.72
Outdoor Equipment Emissions (lb/yr)	4,852.35	6,150.26
Pre-Project to Post-Project Difference		***-326.93***

Compound Name	CAS No.	HAP/TAP	Fluorinated Organic Compounds (FOC)	VES Cont Decon (NS-P) - 2021	VES Cont Decon (NS-P) - Proposed	TFE/CO2 (NS-M) - 2021		TFE/CO2 (NS-M) - Proposed		RSU (NS-D) - 2021			RSU (NS-D) - Proposed (Actual Hours)			Semi-Works (SW-1/2) - 2021	Semi-Works (SW-1/2) - Proposed		FOC Project Affected Areas 2021 Totals	FOC Project Affected Areas Post-Project Potential to Emit Totals	DIFFERENCE
				Process	Process	Process	Outdoor Equipment Emissions	Process	Outdoor Equipment Emissions	Process	Indoor Equipment Emissions	Outdoor Equipment Emissions	Process	Indoor Equipment Emissions	Outdoor Equipment Emissions	Process	Indoor Equipment Emissions	Process			
HFPO	428-59-1		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,899.38	2,026.65	127.27
HFP	116-15-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,939.91	1,998.36	58.45
COF2	353-50-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.07	7.19	0.00	0.68	0.00	0.00	0.00	0.00	0.00	215.78	234.13	18.35
PAF	354-34-7		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.29	14.38	0.00	2.97	21.87	0.00	49.29	4.93	0.00	251.16	240.91	-10.25
PMCP	379-16-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.38	75.01	4.63
A/F Solvent (n=4 TFF)	21703-48-0		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.54	30.03	-2.52
A/F Solvent (n=1 TAF)	21703-43-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.20	7.19	0.00	2.03	0.00	0.00	0.00	0.00	0.00	15.35	10.00	-5.36
A/F Solvent (n=2 TAF)	21703-45-7		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.62	7.97	-3.65
A/F Solvent (n=3 TAF)	21703-47-9		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.13	6.13	0.00
A/F Solvent (n=4 TAF)	21703-49-1		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.97	7.97	0.00
Benzene	71-43-2	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.99	2.99	0.00
Toluene	108-88-3	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74.53	74.50	-0.03
Other A/F Compounds	NA		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.02	48.75	19.74
CO2	124-38-9			1,778.40	3,556.96	50,675.57	250.73	144,425.38	327.19	8,195.54	0.00	0.00	85,093.09	0.00	0.00	0.00	0.00	1,742.81	1,313,459.05	2,251,084.32	937,625.28
SO2	7446-09-5	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.00	0.00	9.78	0.00	0.00	0.00	0.00	0.20	0.98	9.99	9.01
HF	7664-39-3	H,T		0.81	1.62	22.95	0.00	65.42	0.00	3.31	59.19	0.00	34.37	90.02	0.00	8.53	0.00	0.69	950.12	1,082.98	132.86
PFF	422-61-7		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.29	25.45	4.16
Diglyme	111-96-6			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.37	12.21	2.83
AN	75-05-8	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.33	90.80	7.47
ADN	111-69-3			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.29	0.13
TTG	143-24-8			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.01
DA	4089-58-1		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	45.21	9.68
MA	4089-57-0		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	2.02	0.46
TA	4628-44-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	1.65	0.38
RSU	677-67-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.10	277.97	0.00	1.01	422.79	0.00	0.00	0.00	0.00	278.70	424.62	145.92
MAE	69116-72-9		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.51	6.31	2.80
MMF	69116-71-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.09	3.76	1.67
DAE	69116-73-0		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.58	9.75	4.17
TAE	69116-67-2		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.43	0.19
HFPO Trimer	2641-34-1		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.76	7.72	0.95
EVE	63863-43-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	109.58	226.85	117.28
PPVE	1623-05-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	926.39	1,181.03	254.64
PSEPVE	16090-14-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	212.10	4.34	0.04	729.62	768.91	39.29
hydro-EVE	660857-95-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.13	10.19	5.06
iso-EVE	73122-14-2		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	15.41	7.41
C4	360-89-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	136.64	207.73	71.09
C5	376-87-4		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
TFE	116-14-3		FOC	0.00	0.00	5.74	250.73	16.36	327.19	0.42	62.30	0.00	4.34	94.76	0.00	246.05	24.60	0.02	565.33	467.50	-97.83
Hydro-PSEPVE	75549-02-9		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iso-PSEPVE	34805-58-8		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PMPF	2927-83-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	549.04	621.48	72.45
PEPF	1682-78-6		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.60	110.53	14.93
PMVE	1187-93-5		FOC	0.19	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,550.68	1,995.40	444.72
PEVE	10493-43-3		FOC	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,324.26	1,703.26	379.00
MD	2479-75-6		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.84	21.08	2.23
HydroPEVE	360796-50-5		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.02	11.21	1.19
E-1	3330-15-2		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-2	3330-14-1		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	172.44	10.39	0.03	172.44	10.42	-162.02
E-3	3330-16-3		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethanol	64-17-5			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Propanol	71-23-8			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isopropanol	67-63-0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM	PM Total	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-10	PM10	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM-2.5	PM2.5	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO	630-08-0	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NOx	11104-93-1	Criteria		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetic Acid	64-19-7	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMSO	67-68-5			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitric Acid	7697-37-2	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeOH	67-56-1	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F-113	76-13-1	T	FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,071.51	188.13	0.21	2,071.51	188.34	-1,883.17
SU	697-18-7		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.01	91.06	0.00	0.09	138.50	0.00	0.00	0.00	0.00	91.07	138.59	47.52
EDC	107-06-2	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.59	21.68	0.00	14.58	32.98	0.00	0.00	0.00	31.27	47.55	16.29
H2SO4	7664-93-9	T		0.00	0.00	0.00	0.00	0.00	0.00	7.64	0.00	185.91	0.00	0.00	282.77	0.00	0.00	0.00	193.56	282.77	89.21
HCl	7647-01-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeCl	75-09-2	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initiator	56347-79-6		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.77	2.08	0.00	20.77	2.08	-18.69
Acetaldehyde	75-07-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acrolein	107-02-8	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ammonia	7664-41-7	T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arsenic unlisted compounds	ASC-other	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo(a)pyrene	50-32-8	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beryllium metal (unreacted)	7440-41-7	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cadmium metal (elemental unreacted)	7440-43-9	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chromic acid (VI)	7738-94-5	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cobalt unlisted compounds	COC-other	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Formaldehyde	50-00-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexane, n-	110-54-3	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lead unlisted compounds	PBC-other	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manganese unlisted compounds	MNC-other	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury vapor	7439-97-6	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Napthalene	99 91-20-3	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel metal	7440-02-0	H,T		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium compounds	7782-49-2	H		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoroform*	75-46-7		FOC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.83	6.77	0.94
Total VOC		Criteria		0.22	0.45	5.74	250.73	16.36	327.19	1.07	469.68	21.68	11.13	692.50	32.98	701.52	46.33	0.10	11,351.70	12,932.83	1,581.13
TOTAL FOCs				***0.22***	***0.45***	***5.74***	***250.73***	***16.36***	***327.19***	***1.07***	***460.09***	***0.00***	***11.13***	***677.92***	***0.00***	***2,772.16***	***234.46***	***0.31***	***13,226.51***	***12,899.58***	***-326.93***

FOCs Summary	2021	Proposed
Process Emissions (lb/yr)	2,958.37	256.60
Indoor Equipment Emissions (lb/yr)	5,415.79	6,492.72
Outdoor Equipment Emissions (lb/yr)	4,852.35	6,150.26
Pre-Project to Post-Project Difference		***-326.93***

Detailed Process Unit Calculations

HFPO			
	Compound Name	**CY2021 Actual HFPO Emissions (lb/yr)**	**HFPO Post-Mod Controlled Emissions (lb/yr)**
A.	HFPO	950.45	921.61
B.	HFP	1,853.87	1,856.50
C.	COF2	129.34	137.88
D.	PAF	105.85	111.69
E.	PMCP	70.38	75.01
F.	A/F Solvent (n=4 TFF)	32.54	30.03
G.	A/F Solvent (n=1 TAF)	7.97	7.97
H.	A/F Solvent (n=2 TAF)	11.62	7.97
I.	A/F Solvent (n=3 TAF)	6.13	6.13
J.	A/F Solvent (n=4 TAF)	7.97	7.97
K.	Benzene	2.99	2.99
L.	Toluene	74.53	74.50
M.	Other A/F Compounds	29.02	48.75
N.	CO2	588,398.01	842,819.97
O.	SO2	0.00	0.00
P.	HF	378.45	383.03
TOTAL VOC[(1)]		**3,282.65**	**3,288.97**

Note: A decrease in emissions is shown for some pollutants because the CY2021 emissions included emissions from accidental releases.

Emission Estimates for HFPO Post-Modification

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 HFPO process emissions, CY2021 total HFPO Production, and the production capacity after the proposed VE modification. Note that the production capacity was obtained using the maximum new production volume.

CY2021 HFPO Production = 134,147 units/yr
Post Modification Production Capacity = 225,403 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	HFPO Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	HFPO Post-Mod Controlled Emissions (lb/yr)
A.	COF2	131,785.67	0.9824	221,435.04	99.99%	22.14
B.	PAF	90,151.87	0.6720	151,479.17	99.99%	15.15
C.	A/F Solvent (n=4 TFF)	0.00	0.0000	0.00	99.99%	0.00
D.	A/F Solvent (n=2 TAF)	0.00	0.0000	0.00	99.99%	0.00
E.	HFP	45,624.07	0.3401	76,660.59	99.99%	7.67
F.	HFPO	34,687.55	0.2586	58,284.33	99.99%	5.83
G.	PMCP	68,197.02	0.5084	114,589.17	99.99%	11.46
H.	Other A/F Compounds	290,150.10	2.1629	487,529.49	99.99%	48.75
I.	CO_2	--	--	--	--	842,819.97
J.	SO_2	--	--	--	--	0.00
K.	HF	--	--	--	--	383.03
TOTAL VOC[(1)]		660,596.28	--	1,109,977.78	--	111.00

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by hours of operation utilized in the CY2021 emission calculations, which assumed the entire year (8,760 hours). It is assumed that no additional equipment will be required to handle the increase in production in the HFPO facility; therefore, equipment emissions remain unaffected.

CY2021 (Assumed) Hours of Operation = 8,760 hr/yr
Post Modification Maximum Hours of Operation = 8,760 hr/yr

	Component	Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	COF2	115.73	115.73
B.	PAF	96.55	96.55
C.	A/F Solvent (n=4 TFF)	30.03	30.03
D.	A/F Solvent (n=1 TAF)	7.97	7.97
E.	HFP	1848.83	1848.83
F.	HFPO	915.78	915.78
G.	Benzene	2.99	2.99
H.	Toluene	74.50	74.50
I.	A/F Solvent (n=2 TAF)	7.97	7.97
J.	A/F Solvent (n=3 TAF)	6.13	6.13
K.	A/F Solvent (n=4 TAF)	7.97	7.97
M.	PMCP	63.55	63.55
	VOC Total	**3,177.98**	**3,177.98**

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)
A.	COF2	2	66.01	134,179.47	99.95%	67.09
B.	PAF	4	116.01	104,448.04	99.95%	52.22
D.	TFF	12	396.03	0.00	99.95%	0.00
E.	n=2 TAF	10	314.03	0.00	99.95%	0.00
F.	HFP	6	150.02	61,314.98	99.95%	30.66
G.	HFPO	6	166.02	42,124.72	99.95%	21.06
H.	PMCP	8	200.02	91,651.17	99.95%	45.83
I.	Other A/F Compounds	6.9	201.16	332,342.31	99.95%	166.17
Total HF Emissions			**--**	**--**	**--**	**383.03**

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)
A.	COF2	0	66.01	0.00	99.95%	0.00
B.	PAF	0	116.01	0.00	99.95%	0.00
D.	TFF	0	396.03	0.00	99.95%	0.00
E.	n=2 TAF	0	314.03	0.00	99.95%	0.00
F.	HFP	0	150.02	0.00	99.95%	0.00
G.	HFPO	0	166.02	0.00	99.95%	0.00
H.	PMCP	0	200.02	0.00	99.95%	0.00
I.	Other A/F Compounds	0	201.16	0.00	99.95%	0.00
Total SO2 Emissions			**--**	**--**	**--**	**0.00**

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	COF2	1	66.01	147,624.25	0.00%	147,624.25
B.	PAF	2	116.01	114,913.74	0.00%	114,913.74
D.	TFF	6	396.03	0.00	0.00%	0.00
E.	n=2 TAF	5	314.03	0.00	0.00%	0.00
F.	HFP	3	150.02	67,458.74	0.00%	67,458.74
G.	HFPO	3	166.02	46,345.62	0.00%	46,345.62
H.	PMCP	4	200.02	100,834.62	0.00%	100,834.62
I.	Other A/F Compounds	3.42857143	201.16	365,643.01	0.00%	365,643.01
Total CO2 Emissions			**--**	**--**	**--**	**842,819.97**

Vinyl Ethers - North						
Compound Name		**CY2021 Actual VE-North Emissions (lb/yr)**	**VE-North Post-Mod Controlled Emissions EVE (lb/yr)**	**VE-North Post-Mod Controlled Emissions PPVE (lb/yr)**	**VE-North Post-Mod Controlled Emissions PSEPVE (lb/yr)**	**VE-North Post-Mod Controlled Emissions All Campaigns (lb/yr)**
A.	HFP	70.50	0.62	11.31	69.18	81.11
B.	HFPO	553.14	16.67	687.12	150.81	854.60
C.	PPF	26.34	0.47	50.48	1.42	52.37
D.	Diglyme	93.72	0.00	0.00	74.32	74.32
E.	AN	133.22	0.00	281.00	0.00	281.00
F.	ADN	16.31	7.02	0.00	0.00	7.02
G.	TTG	1.63	0.70	0.00	0.00	0.70
H.	DA	346.14	0.00	0.00	275.19	275.19
I.	MA	154.68	0.00	0.00	122.67	122.67
J.	TA	12.63	0.00	0.00	10.02	10.02
K.	RSU	1.27	0.00	0.00	1.00	1.00
M.	MAE	35.07	15.10	0.00	0.00	15.10
N.	MMF	6.97	3.00	0.00	0.00	3.00
O.	DAE	54.03	23.34	0.00	0.00	23.34
P.	TAE	2.37	1.02	0.00	0.00	1.02
Q.	HFPO Trimer	22.55	0.00	30.93	6.25	37.18
R.	EVE	118.46	70.20	0.00	0.00	70.20
S.	PPVE	961.99	0.00	3,001.79	0.00	3,001.79
T.	PSEPVE	563.37	0.00	0.00	616.66	616.66
U.	hydro-EVE	5.65	3.37	0.00	0.00	3.37
V.	iso-EVE	8.95	5.37	0.00	0.00	5.37
W.	C4	137.75	0.00	269.35	49.10	318.45
X.	HF	15.00	1.06	33.35	6.93	41.34
Y.	CO2	148,919.01	23,008.72	179,543.54	195,993.72	398,545.98
Z.	SO2	0.04	0.00	0.00	0.01	0.01
BB.	C5	0.00	0.00	0.01	0.00	0.01
CC.	TFE	0.09	0.02	0.01	0.19	0.22
DD.	Hydro-PSEPVE	0.00	0.00	0.00	0.00	0.00
EE.	Iso-PSEPVE	0.00	0.00	0.00	0.00	0.00
TOTAL VOC(1)		3,353.64	146.92	4,331.99	1,376.82	5,855.72

Emission Estimates for VE-North Post-Modification (EVE)

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-North EVE process emissions, CY2021 total EVE Production, and the production capacity after the proposed modification. Note that the production capacity was obtained using the maximum production volume.

CY2021 EVE Production = 1,177 units/yr
Post Modification Production Capacity = 2,706 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-North Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-North Post-Mod Controlled Emissions (lb/yr)
A.	HFP	632.14	0.5372	1,453.86	99.99%	0.15
B.	HFPO	465.79	0.3959	1,071.27	99.99%	0.11
C.	TFE	99.83	0.0848	229.61	99.99%	0.02
D.	MAE	0.14	0.0001	0.32	99.99%	0.00
E.	EVE	0.02	0.0000	0.04	99.99%	0.00
F.	TTG	0.00	0.0000	0.00	99.99%	0.00
G.	ADN	0.00	0.0000	0.00	99.99%	0.00
I.	CO_2	8,989.55	7.6402	20,675.14	0.00%	23,008.72
J.	SO_2	--	--	--	--	0.00
K.	HF	--	--	--	--	1.06
	TOTAL VOC[1]	1,197.92	--	2,755.10	--	0.28

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by an approximate ratio of hours per year (based on production ratio). It is assumed that there is no additional equipment / components added to the Condensation Reactor System. Additional equipment in the Agitated Bed Reactor System is assumed to be double the existing. Additional refining equipment may be added so an increase of 33% of equipment components has been assumed for this system.

CY2021 EVE Hours of Operation = 468 hr/yr
Post Modification Maximum Hours of Operation = 202 hr/yr

		Condensation Reactor System		Agitated Bed Reactor System		Crude Receiver		Refining System		Total Equipment Emissions	
	Component	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	HFP	1.09	0.47	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.47
B.	HFPO	38.45	16.56	0.00	0.00	0.00	0.00	0.00	0.00	38.45	16.56
C.	PPF	1.09	0.47	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.47
D.	Diglyme	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E.	AN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F.	ADN	16.31	7.02	0.00	0.00	0.00	0.00	0.00	0.00	16.31	7.02
G.	TTG	1.63	0.70	0.00	0.00	0.00	0.00	0.00	0.00	1.63	0.70
H.	DA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I.	MA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J.	TA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K.	RSU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M.	MAE	35.07	15.10	0.00	0.00	0.00	0.00	0.00	0.00	35.07	15.10
N.	MMF	6.97	3.00	0.00	0.00	0.00	0.00	0.00	0.00	6.97	3.00
O.	DAE	53.71	23.13	0.17	0.14	0.15	0.06	0.00	0.00	54.03	23.34
P.	TAE	2.37	1.02	0.00	0.00	0.00	0.00	0.00	0.00	2.37	1.02
Q.	HFPO Trimer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R.	EVE	0.00	0.00	14.31	12.32	12.42	5.35	91.71	52.53	118.44	70.20
S.	PPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T.	PSEPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U.	hydro-EVE	0.00	0.00	0.84	0.72	0.73	0.31	4.08	2.33	5.65	3.37
V.	iso-EVE	0.00	0.00	1.52	1.30	1.32	0.57	6.11	3.50	8.94	5.37
W.	C4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VOC Total	**156.70**	**67.49**	**16.83**	**14.50**	**14.62**	**6.29**	**101.90**	**58.37**	**290.05**	**146.65**

Emission Estimates for VE-North Post-Modification (PPVE)

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-North PPVE process emissions, CY2021 total PPVE Production, and the production capacity after the proposed modification. Note that the production capacity was obtained using the maximum production volume.

CY2021 PPVE Production = 30,294 units/yr
Post Modification Production Capacity = 89,782 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-North Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-North Post-Mod Controlled Emissions (lb/yr)
A.	HFP	6,177.11	0.2039	18,307.33	99.99%	1.83
B.	HFPO	12,448.28	0.4109	36,893.42	99.99%	3.69
C.	PPF	10,436.50	0.3445	30,931.05	99.99%	3.09
D.	TFE	17.14	0.0006	50.80	99.99%	0.01
E.	PPVE	1,110.14	0.0366	3,290.16	99.99%	0.33
F.	C4	197.09	0.0065	584.12	99.99%	0.06
G.	C5	22.49	0.0007	66.67	99.99%	0.01
H.	AN	1,045.84	0.0345	3,099.58	99.99%	0.31
I.	CO_2	33,578.75	1.1084	99,518.58	0.00%	179,543.54
J.	SO_2	--	--	--	--	0.00
K.	HF	--	--	--	--	33.35
	TOTAL VOC[(1)]	30,408.76	--	90,123.55	--	9.01

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by an approximate ratio of hours per year (based on production ratio). It is assumed that there is no additional equipment / components added to the Condensation Reactor System. Additional equipment in the Agitated Bed Reactor System is assumed to be double the existing. No additional equipment in the crude receiver area as part of the new project. Additional refining equipment may be added so an increase of 33% of equipment components has been assumed for this system.

CY2021 PPVE Hours of Operation = 3,171 hr/yr
Post Modification Maximum Hours of Operation = 6,687 hr/yr

	Component	Condensation Reactor System		Agitated Bed Reactor System		Crude Receiver		Refining System		Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	HFP	4.49	9.48	0.00	0.00	0.00	0.00	0.00	0.00	4.49	9.48
B.	HFPO	324.09	683.43	0.00	0.00	0.00	0.00	0.00	0.00	324.09	683.43
C.	PPF	22.47	47.39	0.00	0.00	0.00	0.00	0.00	0.00	22.47	47.39
D.	Diglyme	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E.	AN	133.11	280.69	0.00	0.00	0.00	0.00	0.00	0.00	133.11	280.69
F.	ADN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G.	TTG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H.	DA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I.	MA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J.	TA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K.	RSU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M.	MAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N.	MMF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O.	DAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P.	TAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Q.	HFPO Trimer	14.67	30.93	0.00	0.00	0.00	0.00	0.00	0.00	14.67	30.93
R.	EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.	PPVE	0.00	0.00	261.92	1104.64	95.07	200.48	604.84	1696.34	961.83	3001.46
T.	PSEPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U.	hydro-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
V.	iso-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W.	C4	0.00	0.00	8.18	34.52	2.97	6.26	81.47	228.50	92.63	269.29
	VOC Total	**498.84**	**1,051.92**	**270.10**	**1,139.16**	**98.04**	**206.74**	**686.31**	**1,924.85**	**1,553.29**	**4,322.66**

Emission Estimates for VE-North Post-Modification (PSEPVE)

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-North PSEPVE process emissions, CY2021 total PSEPVE Production, and the production capacity after the proposed modification. Note that the production capacity was obtained using the maximum production volume.

CY2021 PSEPVE Production = 9,858 units/yr
Post Modification Production Capacity = 25,130 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-North Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-North Post-Mod Controlled Emissions (lb/yr)
A.	HFP	480.16	0.0487	1,224.05	99.99%	0.12
B.	HFPO	3,952.84	0.4010	10,076.88	99.99%	1.01
C.	PPF	246.37	0.0250	628.06	99.99%	0.06
D.	TFE	762.41	0.0773	1,943.58	99.99%	0.19
E.	PSEPVE	19.24	0.0020	49.06	99.99%	0.00
F.	C4	1,704.23	0.1729	4,344.56	99.99%	0.43
G.	HFPO Trimer	3.85	0.0004	9.81	99.99%	0.00
H.	MA	1.28	0.0001	3.27	99.99%	0.00
I.	DA	37.20	0.0038	94.84	99.99%	0.01
J.	Hydro-PSEPVE	1.28	0.0001	3.27	99.99%	0.00
K.	Iso-PSEPVE	3.85	0.0004	9.81	99.99%	0.00
M.	Diglyme	0.00	0.0000	0.00	99.99%	0.00
N.	CO_2	70,903.74	7.1928	180,753.24	0.00%	195,993.72
O.	SO_2	--	--	--	--	0.01
P.	HF	--	--	--	--	6.93
	TOTAL VOC(1)	7,169.10	--	18,276.01	--	1.83

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by an approximate ratio of hours per year (based on production ratio). It is assumed that there is no additional equipment / components added to the Condensation Reactor System. Additional equipment in the Agitated Bed Reactor System is assumed to be double the existing. No additional equipment in the crude receiver area as part of the new project. Additional refining equipment may be added so an increase of 33% of equipment components has been assumed for this system.

CY2021 PM/PEVE Hours of Operation = 2,360 hr/yr
Post Modification Maximum Hours of Operation = 1,872 hr/yr

	Component	Condensation Reactor System		Agitated Bed Reactor System		Crude Receiver		Refining System		Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	HFP	1.71	1.36	5.94	9.42	5.16	4.09	51.38	54.19	64.18	69.06
B.	HFPO	188.89	149.80	0.00	0.00	0.00	0.00	0.00	0.00	188.89	149.80
C.	PPF	1.71	1.36	0.00	0.00	0.00	0.00	0.00	0.00	1.71	1.36
D.	Diglyme	93.72	74.32	0.00	0.00	0.00	0.00	0.00	0.00	93.72	74.32
E.	AN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F.	ADN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G.	TTG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H.	DA	344.55	273.25	0.85	1.35	0.74	0.58	0.00	0.00	346.13	275.18
I.	MA	154.68	122.67	0.00	0.00	0.00	0.00	0.00	0.00	154.68	122.67
J.	TA	12.63	10.02	0.00	0.00	0.00	0.00	0.00	0.00	12.63	10.02
K.	RSU	1.27	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	1.00
M.	MAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N.	MMF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O.	DAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P.	TAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Q.	HFPO Trimer	7.88	6.25	0.00	0.00	0.00	0.00	0.00	0.00	7.88	6.25
R.	EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.	PPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T.	PSEPVE	0.00	0.00	73.84	117.12	64.11	50.84	425.39	448.69	563.34	616.65
U.	hydro-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
V.	iso-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W.	C4	0.00	0.00	4.24	6.73	3.68	2.92	36.99	39.02	44.92	48.67
	VOC Total	**807.02**	**640.02**	**84.87**	**134.62**	**73.69**	**58.44**	**513.76**	**541.90**	**1,479.34**	**1,374.98**

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)	
A.	HFP	6	150.02	1,162.83	99.95%	0.58	
B.	HFPO	6	166.02	774.25	99.95%	0.39	
D.	TFE	4	100.01	183.65	99.95%	0.09	
E.	MAE	9	322.07	0.18	99.95%	0.00	
F.	EVE	13	423.09	0.02	99.95%	0.00	EVE
G.	TTG	0	222.27	0.00	99.95%	0.00	
H.	ADN	0	108.14	0.00	99.95%	0.00	
I.	CO2	0	44.01	0.00	99.95%	0.00	
A.	HFP	6	150.02	14,642.64	99.95%	7.32	
B.	HFPO	6	166.02	26,664.55	99.95%	13.33	
C.	PPF	6	166.02	22,355.27	99.95%	11.18	
D.	TFE	4	100.01	40.63	99.95%	0.02	
E.	PPVE	10	266.03	2,473.29	99.95%	1.24	PPVE
F.	C4	8	200.02	467.20	99.95%	0.23	
G.	C5	10	250.03	53.32	99.95%	0.03	
H.	AN	0	41.05	0.00	99.95%	0.00	
J.	CO2	0	44.01	0.00	99.95%	0.00	

A.	HFP	6	150.02	979.03	99.95%	0.49
B.	HFPO	6	166.02	7,283.02	99.95%	3.64
C.	PPF	6	166.02	453.93	99.95%	0.23
D.	TFE	4	100.01	1,554.52	99.95%	0.78
E.	PSEPVE	14	447.11	30.72	99.95%	0.02
F.	C4	8	200.02	3,474.89	99.95%	1.74
G.	HFPO Trimer	18	498.05	7.09	99.95%	0.00
H.	MA	10	346.09	1.89	99.95%	0.00
I.	DA	16	512.11	59.26	99.95%	0.03
J.	Hydro-PSEPVE	15	466.11	2.10	99.95%	0.00
K.	Iso-PSEPVE	14	446.10	6.16	99.95%	0.00
M.	Diglyme	0	134.17	0.00	99.95%	0.00
N.	CO2	0	44.01	0.00	99.95%	0.00
Total HF Emissions			**--**	**--**	**--**	**41.34**

PSEPVE

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)
A.	HFP	0	150.02	0.00	99.95%	0.00
B.	HFPO	0	166.02	0.00	99.95%	0.00
D.	TFE	0	100.01	0.00	99.95%	0.00
E.	MAE	0	322.07	0.00	99.95%	0.00
F.	EVE	0	423.09	0.00	99.95%	0.00
G.	TTG	0	222.27	0.00	99.95%	0.00
H.	ADN	0	108.14	0.00	99.95%	0.00
I.	CO2	0	44.01	0.00	99.95%	0.00
A.	HFP	0	150.02	0.00	99.95%	0.00

EVE

B.	HFPO	0	166.02	0.00	99.95%	0.00	
C.	PPF	0	166.02	0.00	99.95%	0.00	
D.	TFE	0	100.01	0.00	99.95%	0.00	
E.	PPVE	0	266.03	0.00	99.95%	0.00	PPVE
F.	C4	0	200.02	0.00	99.95%	0.00	
G.	C5	0	250.03	0.00	99.95%	0.00	
H.	AN	0	41.05	0.00	99.95%	0.00	
J.	CO2	0	44.01	0.00	99.95%	0.00	
A.	HFP	0	150.02	0.00	99.95%	0.00	
B.	HFPO	0	166.02	0.00	99.95%	0.00	
C.	PPF	0	166.02	0.00	99.95%	0.00	
D.	TFE	0	100.01	0.00	99.95%	0.00	
E.	PSEPVE	1	447.11	7.03	99.95%	0.00	
F.	C4	0	200.02	0.00	99.95%	0.00	
G.	HFPO Trimer	0	498.05	0.00	99.95%	0.00	PSEPVE
H.	MA	1	346.09	0.61	99.95%	0.00	
I.	DA	1	512.11	11.86	99.95%	0.01	
J.	Hydro-PSEPVE	1	466.11	0.45	99.95%	0.00	
K.	Iso-PSEPVE	1	446.10	1.41	99.95%	0.00	
M.	Diglyme	0	134.17	0.00	99.95%	0.00	
N.	CO2	0	44.01	0.00	99.95%	0.00	
Total SO2 Emissions			**--**	**--**	**--**	**0.01**	

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

Compound Name		# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	HFP	3	150.02	1,279.35	0.00%	1,279.35
B.	HFPO	3	166.02	851.83	0.00%	851.83

D.	TFE	2	100.01	202.05	0.00%	202.05	
E.	MAE	7	322.07	0.31	0.00%	0.31	
F.	EVE	9	423.09	0.04	0.00%	0.04	EVE
G.	TTG	10	222.27	0.00	0.00%	0.00	
H.	ADN	6	108.14	0.00	0.00%	0.00	
I.	CO2	--	--	20,675.14	0.00%	20,675.14	
A.	HFP	3	150.02	16,109.84	0.00%	16,109.84	
B.	HFPO	3	166.02	29,336.33	0.00%	29,336.33	
C.	PPF	3	166.02	24,595.27	0.00%	24,595.27	
D.	TFE	2	100.01	44.70	0.00%	44.70	
E.	PPVE	5	266.03	2,721.11	0.00%	2,721.11	PPVE
F.	C4	4	200.02	514.01	0.00%	514.01	
G.	C5	5	250.03	58.66	0.00%	58.66	
H.	AN	2	41.05	6,645.04	0.00%	6,645.04	
J.	CO2	--	--	99,518.58	0.00%	99,518.58	
A.	HFP	3	150.02	1,077.13	0.00%	1,077.13	
B.	HFPO	3	166.02	8,012.78	0.00%	8,012.78	
C.	PPF	3	166.02	499.41	0.00%	499.41	
D.	TFE	2	100.01	1,710.29	0.00%	1,710.29	
E.	PSEPVE	7	447.11	33.80	0.00%	33.80	
F.	C4	4	200.02	3,823.07	0.00%	3,823.07	
G.	HFPO Trimer	9	498.05	7.80	0.00%	7.80	PSEPVE
H.	MA	5	346.09	2.08	0.00%	2.08	
I.	DA	8	512.11	65.20	0.00%	65.20	
J.	Hydro-PSEPVE	7	466.11	2.16	0.00%	2.16	
K.	Iso-PSEPVE	7	446.10	6.77	0.00%	6.77	
M.	Diglyme	6	134.17	0.00	0.00%	0.00	
N.	CO2	--	--	180,753.24	0.00%	180,753.24	
Total CO2 Emissions			**--**	**--**	**--**	**398,545.98**	

Vinyl Ethers - North						
Compound Name		**CY2021 Actual VE-North Emissions (lb/yr)**	**VE-North Post-Mod Controlled Emissions EVE (lb/yr)**	**VE-North Post-Mod Controlled Emissions PPVE (lb/yr)**	**VE-North Post-Mod Controlled Emissions PSEPVE (lb/yr)**	**VE-North Post-Mod Controlled Emissions All Campaigns (lb/yr)**
A.	HFP	70.50	2.11	6.57	113.55	122.22
B.	HFPO	553.14	69.29	345.16	247.05	661.50
C.	PPF	26.34	1.96	26.77	2.29	31.02
D.	Diglyme	93.72	0.00	0.00	122.07	122.07
E.	AN	133.22	0.00	140.55	0.00	140.55
F.	ADN	16.31	29.34	0.00	0.00	29.34
G.	TTG	1.63	2.93	0.00	0.00	2.93
H.	DA	346.14	0.00	0.00	451.97	451.97
I.	MA	154.68	0.00	0.00	201.47	201.47
J.	TA	12.63	0.00	0.00	16.45	16.45
K.	RSU	1.27	0.00	0.00	1.65	1.65
M.	MAE	35.07	63.10	0.00	0.00	63.10
N.	MMF	6.97	12.54	0.00	0.00	12.54
O.	DAE	54.03	97.51	0.00	0.00	97.51
P.	TAE	2.37	4.27	0.00	0.00	4.27
Q.	HFPO Trimer	22.55	0.00	15.45	10.26	25.72
R.	EVE	118.46	293.29	0.00	0.00	293.29
S.	PPVE	961.99	0.00	1,499.98	0.00	1,499.98
T.	PSEPVE	563.37	0.00	0.00	1,012.80	1,012.80
U.	hydro-EVE	5.65	14.10	0.00	0.00	14.10
V.	iso-EVE	8.95	22.45	0.00	0.00	22.45
W.	C4	137.75	0.00	134.61	80.37	214.98
X.	HF	15.00	1.06	33.35	6.93	41.34
Y.	CO2	148,919.01	23,008.72	179,543.54	195,993.72	398,545.98
Z.	SO2	0.04	0.00	0.00	0.01	0.01
BB.	C5	0.00	0.00	0.01	0.00	0.01
CC.	TFE	0.09	0.02	0.01	0.19	0.22
DD.	Hydro-PSEPVE	0.00	0.00	0.00	0.00	0.00
EE.	Iso-PSEPVE	0.00	0.00	0.00	0.00	0.00
TOTAL VOC[(1)]		3,353.64	612.91	2,169.10	2,260.12	5,042.13

Emission Estimates for VE-North Post-Modification (EVE)

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-North EVE process emissions, CY2021 total EVE Production, and the production capacity after the proposed modification. Note that the production capacity was obtained using the maximum production volume.

CY2021 EVE Production = 1,177 units/yr
Post Modification Production Capacity = 2,706 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-North Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-North Post-Mod Controlled Emissions (lb/yr)
A.	HFP	632.14	0.5372	1,453.86	99.99%	0.15
B.	HFPO	465.79	0.3959	1,071.27	99.99%	0.11
C.	TFE	99.83	0.0848	229.61	99.99%	0.02
D.	MAE	0.14	0.0001	0.32	99.99%	0.00
E.	EVE	0.02	0.0000	0.04	99.99%	0.00
F.	TTG	0.00	0.0000	0.00	99.99%	0.00
G.	ADN	0.00	0.0000	0.00	99.99%	0.00
I.	CO_2	8,989.55	7.6402	20,675.14	0.00%	23,008.72
J.	SO_2	--	--	--	--	0.00
K.	HF	--	--	--	--	1.06
	TOTAL VOC[(1)]	1,197.92	--	2,755.10	--	0.28

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by an approximate ratio of hours per year (based on production ratio). It is assumed that there is no additional equipment / components added to the Condensation Reactor System. Additional equipment in the Agitated Bed Reactor System is assumed to be double the existing. Additional refining equipment may be added so an increase of 33% of equipment components has been assumed for this system.

CY2021 EVE Hours of Operation = 468 hr/yr
Post Modification Maximum Hours of Operation = 842 hr/yr

		Condensation Reactor System		Agitated Bed Reactor System		Crude Receiver		Refining System		Total Equipment Emissions	
	Component	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	HFP	1.09	1.96	0.00	0.00	0.00	0.00	0.00	0.00	1.09	1.96
B.	HFPO	38.45	69.18	0.00	0.00	0.00	0.00	0.00	0.00	38.45	69.18
C.	PPF	1.09	1.96	0.00	0.00	0.00	0.00	0.00	0.00	1.09	1.96
D.	Diglyme	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E.	AN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F.	ADN	16.31	29.34	0.00	0.00	0.00	0.00	0.00	0.00	16.31	29.34
G.	TTG	1.63	2.93	0.00	0.00	0.00	0.00	0.00	0.00	1.63	2.93
H.	DA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I.	MA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J.	TA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K.	RSU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M.	MAE	35.07	63.10	0.00	0.00	0.00	0.00	0.00	0.00	35.07	63.10
N.	MMF	6.97	12.54	0.00	0.00	0.00	0.00	0.00	0.00	6.97	12.54
O.	DAE	53.71	96.64	0.17	0.61	0.15	0.26	0.00	0.00	54.03	97.51
P.	TAE	2.37	4.27	0.00	0.00	0.00	0.00	0.00	0.00	2.37	4.27
Q.	HFPO Trimer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R.	EVE	0.00	0.00	14.31	51.49	12.42	22.35	91.71	219.45	118.44	293.29
S.	PPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T.	PSEPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U.	hydro-EVE	0.00	0.00	0.84	3.03	0.73	1.31	4.08	9.75	5.65	14.10
V.	iso-EVE	0.00	0.00	1.52	5.45	1.32	2.37	6.11	14.63	8.94	22.45
W.	C4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VOC Total	**156.70**	**281.93**	**16.83**	**60.57**	**14.62**	**26.30**	**101.90**	**243.84**	**290.05**	**612.64**

Emission Estimates for VE-North Post-Modification (PPVE)

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-North PPVE process emissions, CY2021 total PPVE Production, and the production capacity after the proposed modification. Note that the production capacity was obtained using the maximum production volume.

CY2021 PPVE Production = 30,294 units/yr
Post Modification Production Capacity = 89,782 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-North Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-North Post-Mod Controlled Emissions (lb/yr)
A.	HFP	6,177.11	0.2039	18,307.33	99.99%	1.83
B.	HFPO	12,448.28	0.4109	36,893.42	99.99%	3.69
C.	PPF	10,436.50	0.3445	30,931.05	99.99%	3.09
D.	TFE	17.14	0.0006	50.80	99.99%	0.01
E.	PPVE	1,110.14	0.0366	3,290.16	99.99%	0.33
F.	C4	197.09	0.0065	584.12	99.99%	0.06
G.	C5	22.49	0.0007	66.67	99.99%	0.01
H.	AN	1,045.84	0.0345	3,099.58	99.99%	0.31
I.	CO_2	33,578.75	1.1084	99,518.58	0.00%	179,543.54
J.	SO_2	--	--	--	--	0.00
K.	HF	--	--	--	--	33.35
	TOTAL VOC[(1)]	30,408.76	--	90,123.55	--	9.01

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by an approximate ratio of hours per year (based on production ratio). It is assumed that there is no additional equipment / components added to the Condensation Reactor System. Additional equipment in the Agitated Bed Reactor System is assumed to be double the existing. No additional equipment in the crude receiver area as part of the new project. Additional refining equipment may be added so an increase of 33% of equipment components has been assumed for this system.

CY2021 PPVE Hours of Operation = 3,171 hr/yr
Post Modification Maximum Hours of Operation = 3,341 hr/yr

		Condensation Reactor System		Agitated Bed Reactor System		Crude Receiver		Refining System		Total Equipment Emissions	
	Component	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	HFP	4.49	4.74	0.00	0.00	0.00	0.00	0.00	0.00	4.49	4.74
B.	HFPO	324.09	341.47	0.00	0.00	0.00	0.00	0.00	0.00	324.09	341.47
C.	PPF	22.47	23.68	0.00	0.00	0.00	0.00	0.00	0.00	22.47	23.68
D.	Diglyme	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E.	AN	133.11	140.24	0.00	0.00	0.00	0.00	0.00	0.00	133.11	140.24
F.	ADN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G.	TTG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H.	DA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I.	MA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J.	TA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K.	RSU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M.	MAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N.	MMF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O.	DAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P.	TAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Q.	HFPO Trimer	14.67	15.45	0.00	0.00	0.00	0.00	0.00	0.00	14.67	15.45
R.	EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.	PPVE	0.00	0.00	261.92	551.92	95.07	100.17	604.84	847.56	961.83	1499.65
T.	PSEPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U.	hydro-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
V.	iso-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W.	C4	0.00	0.00	8.18	17.25	2.97	3.13	81.47	114.17	92.63	134.55
	VOC Total	**498.84**	**525.58**	**270.10**	**569.17**	**98.04**	**103.30**	**686.31**	**961.73**	**1,553.29**	**2,159.77**

Emission Estimates for VE-North Post-Modification (PSEPVE)

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-North PSEPVE process emissions, CY2021 total PSEPVE Production, and the production capacity after the proposed modification. Note that the production capacity was obtained using the maximum production volume.

CY2021 PSEPVE Production = 9,858 units/yr
Post Modification Production Capacity = 25,130 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-North Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-North Post-Mod Controlled Emissions (lb/yr)
A.	HFP	480.16	0.0487	1,224.05	99.99%	0.12
B.	HFPO	3,952.84	0.4010	10,076.88	99.99%	1.01
C.	PPF	246.37	0.0250	628.06	99.99%	0.06
D.	TFE	762.41	0.0773	1,943.58	99.99%	0.19
E.	PSEPVE	19.24	0.0020	49.06	99.99%	0.00
F.	C4	1,704.23	0.1729	4,344.56	99.99%	0.43
G.	HFPO Trimer	3.85	0.0004	9.81	99.99%	0.00
H.	MA	1.28	0.0001	3.27	99.99%	0.00
I.	DA	37.20	0.0038	94.84	99.99%	0.01
J.	Hydro-PSEPVE	1.28	0.0001	3.27	99.99%	0.00
K.	Iso-PSEPVE	3.85	0.0004	9.81	99.99%	0.00
M.	Diglyme	0.00	0.0000	0.00	99.99%	0.00
N.	CO_2	70,903.74	7.1928	180,753.24	0.00%	195,993.72
O.	SO_2	--	--	--	--	0.01
P.	HF	--	--	--	--	6.93
	TOTAL VOC[(1)]	7,169.10	--	18,276.01	--	1.83

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by an approximate ratio of hours per year (based on production ratio). It is assumed that there is no additional equipment / components added to the Condensation Reactor System. Additional equipment in the Agitated Bed Reactor System is assumed to be double the existing. No additional equipment in the crude receiver area as part of the new project. Additional refining equipment may be added so an increase of 33% of equipment components has been assumed for this system.

CY2021 PM/PEVE Hours of Operation = 2,360 hr/yr
Post Modification Maximum Hours of Operation = 3,074 hr/yr

	Component	Condensation Reactor System		Agitated Bed Reactor System		Crude Receiver		Refining System		Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions	CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	HFP	1.71	2.23	5.94	15.48	5.16	6.72	51.38	89.00	64.18	113.42
B.	HFPO	188.89	246.04	0.00	0.00	0.00	0.00	0.00	0.00	188.89	246.04
C.	PPF	1.71	2.23	0.00	0.00	0.00	0.00	0.00	0.00	1.71	2.23
D.	Diglyme	93.72	122.07	0.00	0.00	0.00	0.00	0.00	0.00	93.72	122.07
E.	AN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F.	ADN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G.	TTG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H.	DA	344.55	448.79	0.85	2.21	0.74	0.96	0.00	0.00	346.13	451.96
I.	MA	154.68	201.47	0.00	0.00	0.00	0.00	0.00	0.00	154.68	201.47
J.	TA	12.63	16.45	0.00	0.00	0.00	0.00	0.00	0.00	12.63	16.45
K.	RSU	1.27	1.65	0.00	0.00	0.00	0.00	0.00	0.00	1.27	1.65
M.	MAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N.	MMF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O.	DAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P.	TAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Q.	HFPO Trimer	7.88	10.26	0.00	0.00	0.00	0.00	0.00	0.00	7.88	10.26
R.	EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.	PPVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T.	PSEPVE	0.00	0.00	73.84	192.35	64.11	83.50	425.39	736.94	563.34	1012.80
U.	hydro-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
V.	iso-EVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W.	C4	0.00	0.00	4.24	11.05	3.68	4.80	36.99	64.08	44.92	79.94
	VOC Total	**807.02**	**1,051.18**	**84.87**	**221.10**	**73.69**	**95.98**	**513.76**	**890.02**	**1,479.34**	**2,258.29**

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)	
A.	HFP	6	150.02	1,162.83	99.95%	0.58	
B.	HFPO	6	166.02	774.25	99.95%	0.39	
D.	TFE	4	100.01	183.65	99.95%	0.09	
E.	MAE	9	322.07	0.18	99.95%	0.00	
F.	EVE	13	423.09	0.02	99.95%	0.00	EVE
G.	TTG	0	222.27	0.00	99.95%	0.00	
H.	ADN	0	108.14	0.00	99.95%	0.00	
I.	CO2	0	44.01	0.00	99.95%	0.00	
A.	HFP	6	150.02	14,642.64	99.95%	7.32	
B.	HFPO	6	166.02	26,664.55	99.95%	13.33	
C.	PPF	6	166.02	22,355.27	99.95%	11.18	
D.	TFE	4	100.01	40.63	99.95%	0.02	
E.	PPVE	10	266.03	2,473.29	99.95%	1.24	PPVE
F.	C4	8	200.02	467.20	99.95%	0.23	
G.	C5	10	250.03	53.32	99.95%	0.03	
H.	AN	0	41.05	0.00	99.95%	0.00	
J.	CO2	0	44.01	0.00	99.95%	0.00	

A.	HFP	6	150.02	979.03	99.95%	0.49	
B.	HFPO	6	166.02	7,283.02	99.95%	3.64	
C.	PPF	6	166.02	453.93	99.95%	0.23	
D.	TFE	4	100.01	1,554.52	99.95%	0.78	
E.	PSEPVE	14	447.11	30.72	99.95%	0.02	
F.	C4	8	200.02	3,474.89	99.95%	1.74	
G.	HFPO Trimer	18	498.05	7.09	99.95%	0.00	PSEPVE
H.	MA	10	346.09	1.89	99.95%	0.00	
I.	DA	16	512.11	59.26	99.95%	0.03	
J.	Hydro-PSEPVE	15	466.11	2.10	99.95%	0.00	
K.	Iso-PSEPVE	14	446.10	6.16	99.95%	0.00	
M.	Diglyme	0	134.17	0.00	99.95%	0.00	
N.	CO2	0	44.01	0.00	99.95%	0.00	
Total HF Emissions			**--**	**--**	**--**	**41.34**	

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)	
A.	HFP	0	150.02	0.00	99.95%	0.00	
B.	HFPO	0	166.02	0.00	99.95%	0.00	
D.	TFE	0	100.01	0.00	99.95%	0.00	
E.	MAE	0	322.07	0.00	99.95%	0.00	
F.	EVE	0	423.09	0.00	99.95%	0.00	EVE
G.	TTG	0	222.27	0.00	99.95%	0.00	
H.	ADN	0	108.14	0.00	99.95%	0.00	
I.	CO2	0	44.01	0.00	99.95%	0.00	
A.	HFP	0	150.02	0.00	99.95%	0.00	

B.	HFPO	0	166.02	0.00	99.95%	0.00	
C.	PPF	0	166.02	0.00	99.95%	0.00	
D.	TFE	0	100.01	0.00	99.95%	0.00	
E.	PPVE	0	266.03	0.00	99.95%	0.00	PPVE
F.	C4	0	200.02	0.00	99.95%	0.00	
G.	C5	0	250.03	0.00	99.95%	0.00	
H.	AN	0	41.05	0.00	99.95%	0.00	
J.	CO2	0	44.01	0.00	99.95%	0.00	
A.	HFP	0	150.02	0.00	99.95%	0.00	
B.	HFPO	0	166.02	0.00	99.95%	0.00	
C.	PPF	0	166.02	0.00	99.95%	0.00	
D.	TFE	0	100.01	0.00	99.95%	0.00	
E.	PSEPVE	1	447.11	7.03	99.95%	0.00	
F.	C4	0	200.02	0.00	99.95%	0.00	
G.	HFPO Trimer	0	498.05	0.00	99.95%	0.00	PSEPVE
H.	MA	1	346.09	0.61	99.95%	0.00	
I.	DA	1	512.11	11.86	99.95%	0.01	
J.	Hydro-PSEPVE	1	466.11	0.45	99.95%	0.00	
K.	Iso-PSEPVE	1	446.10	1.41	99.95%	0.00	
M.	Diglyme	0	134.17	0.00	99.95%	0.00	
N.	CO2	0	44.01	0.00	99.95%	0.00	
Total SO2 Emissions			**--**	**--**	**--**	**0.01**	

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

Compound Name		# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	HFP	3	150.02	1,279.35	0.00%	1,279.35
B.	HFPO	3	166.02	851.83	0.00%	851.83

D.	TFE	2	100.01	202.05	0.00%	202.05	
E.	MAE	7	322.07	0.31	0.00%	0.31	
F.	EVE	9	423.09	0.04	0.00%	0.04	EVE
G.	TTG	10	222.27	0.00	0.00%	0.00	
H.	ADN	6	108.14	0.00	0.00%	0.00	
I.	CO2	--	--	20,675.14	0.00%	20,675.14	
A.	HFP	3	150.02	16,109.84	0.00%	16,109.84	
B.	HFPO	3	166.02	29,336.33	0.00%	29,336.33	
C.	PPF	3	166.02	24,595.27	0.00%	24,595.27	
D.	TFE	2	100.01	44.70	0.00%	44.70	
E.	PPVE	5	266.03	2,721.11	0.00%	2,721.11	PPVE
F.	C4	4	200.02	514.01	0.00%	514.01	
G.	C5	5	250.03	58.66	0.00%	58.66	
H.	AN	2	41.05	6,645.04	0.00%	6,645.04	
J.	CO2	--	--	99,518.58	0.00%	99,518.58	
A.	HFP	3	150.02	1,077.13	0.00%	1,077.13	
B.	HFPO	3	166.02	8,012.78	0.00%	8,012.78	
C.	PPF	3	166.02	499.41	0.00%	499.41	
D.	TFE	2	100.01	1,710.29	0.00%	1,710.29	
E.	PSEPVE	7	447.11	33.80	0.00%	33.80	
F.	C4	4	200.02	3,823.07	0.00%	3,823.07	
G.	HFPO Trimer	9	498.05	7.80	0.00%	7.80	PSEPVE
H.	MA	5	346.09	2.08	0.00%	2.08	
I.	DA	8	512.11	65.20	0.00%	65.20	
J.	Hydro-PSEPVE	7	466.11	2.16	0.00%	2.16	
K.	Iso-PSEPVE	7	446.10	6.77	0.00%	6.77	
M.	Diglyme	6	134.17	0.00	0.00%	0.00	
N.	CO2	--	--	180,753.24	0.00%	180,753.24	
Total CO2 Emissions			**--**	**--**	**--**	**398,545.98**	

Vinyl Ethers - South			
Compound Name		**CY2021 Actual PM/PEVE Emissions (lb/yr)**	**VE-South Reamout Controlled Emissions (lb/yr)**
A.	COF2	79.18	106.63
B.	PAF	81.35	110.21
C.	PMPF	679.93	888.92
D.	PEPF	282.47	370.24
E.	PMVE	1,550.49	2,317.83
F.	PEVE	1,324.23	1,979.56
G.	HFP	12.46	17.36
H.	HFPO	393.51	511.52
I.	CO2	469,571.81	705,846.81
J.	SO2	0.00	0.00
K.	HF	338.99	486.50
L.	MD	62.81	81.65
M.	AN	144.30	187.57
N.	HydroPEVE	12.53	16.29
O.	PPVE	12.53	16.29
TOTAL VOC[(1)]		4,636.50	6,604.08

Emission Estimates for VE-South Reamout

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 VE-South PM/PEVE process emissions, CY2021 total PM/PEVE Production, and the production capacity of the proposed modification. Note that the production capacity was obtained from maximum production volume.

CY2021 PM/PEVE Production = 66,770 units/yr
VE-South Reamout Production Capacity = 100,363 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	VE-South Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	VE-South Post-Mod Controlled Emissions (lb/yr)
A.	COF2	182,348.66	2.7310	274,088.79	99.99%	27.41
B.	PAF	219,847.08	3.2926	330,452.78	99.99%	33.05
C.	PMPF	145,926.08	2.1855	219,341.91	99.99%	21.93
D.	PEPF	46,561.52	0.6973	69,986.76	99.99%	7.00
E.	PMVE	37,500.94	0.5616	56,367.77	99.99%	5.64
F.	PEVE	0.00	0.0000	0.00	99.99%	0.00
G.	HFP	4,846.29	0.0726	7,284.47	99.99%	0.73
H.	HFPO	148.26	0.0022	222.85	99.99%	0.02
I.	CO_2	--	--	--	--	705,846.81
J.	SO_2	--	--	--	--	0.00
K.	HF	--	--	--	--	320.77
	TOTAL VOC[(1)]	637,178.83	--	957,745.32	--	95.77

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by 8,760 hours per year. In addition, since the VE-South expansion project will include additional equipment in agitated bed reactor and refining area, those equipment counts were assumed to increase by 15%. Assuming no net equipment increases associated with the second vaporizer in the condensation reactor system.

CY2021 PM/PEVE Hours of Operation = 6,739 hr/yr
VE-South Reamout Maximum Hours of Operation = 8,760 hr/yr

	Component	Condensation Reactor System		Agitated Bed Reactor & Refining System		Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	VE-South Post-Mod Emissions	CY2021 Emissions (lb/yr)	VE-South Post-Mod Emissions	CY2021 Emissions (lb/yr)	VE-South Post-Mod Emissions
A.	COF2	60.95	79.22	0.00	0.00	60.95	79.22
B.	PAF	59.36	77.17	0.00	0.00	59.36	77.17
C.	PMPF	654.49	850.76	10.85	16.23	665.34	866.99
D.	PEPF	266.95	347.01	10.85	16.23	277.81	363.24
E.	PMVE	0.00	0.00	1546.74	2312.20	1546.74	2312.20
F.	PEVE	0.00	0.00	1324.23	1979.56	1324.23	1979.56
G.	HFP	6.55	8.51	5.43	8.11	11.98	16.63
H.	HFPO	393.49	511.50	0.00	0.00	393.49	511.50
K.	HF	125.54	163.19	1.70	2.55	127.24	165.74
L.	MD	62.81	81.65	0.00	0.00	62.81	81.65
M.	AN	144.30	187.57	0.00	0.00	144.30	187.57
N.	HydroPEVE	12.53	16.29	0.00	0.00	12.53	16.29
O.	PPVE	12.53	16.29	0.00	0.00	12.53	16.29
	VOC Total	**1,673.97**	**2,175.98**	**2,898.11**	**4,332.32**	**4,572.07**	**6,508.31**

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)
A.	COF2	2	66.01	166,085.23	99.95%	83.04
B.	PAF	4	116.01	227,854.07	99.95%	113.93
C.	PMPF	8	232.02	151,240.82	99.95%	75.62
D.	PEPF	10	282.03	49,626.11	99.95%	24.81
E.	PMVE	6	166.02	40,739.54	99.95%	20.37
F.	PEVE	8	216.02	0.00	99.95%	0.00
G.	HFP	6	150.02	5,826.29	99.95%	2.91
H.	HFPO	6	166.02	161.06	99.95%	0.08
Total HF Emissions			**--**	**--**	**--**	**320.77**

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)
A.	COF2	0	66.01	0.00	99.95%	0.00
B.	PAF	0	116.01	0.00	99.95%	0.00
C.	PMPF	0	232.02	0.00	99.95%	0.00
D.	PEPF	0	282.03	0.00	99.95%	0.00
E.	PMVE	0	166.02	0.00	99.95%	0.00
F.	PEVE	0	216.02	0.00	99.95%	0.00
G.	HFP	0	150.02	0.00	99.95%	0.00
H.	HFPO	0	166.02	0.00	99.95%	0.00
Total SO2 Emissions			**--**	**--**	**--**	**0.00**

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	COF2	1	66.01	182,735.27	0.00%	182,735.27
B.	PAF	2	116.01	250,696.44	0.00%	250,696.44
C.	PMPF	4	232.02	166,402.71	0.00%	166,402.71
D.	PEPF	5	282.03	54,601.12	0.00%	54,601.12
E.	PMVE	3	166.02	44,823.68	0.00%	44,823.68
F.	PEVE	4	216.02	0.00	0.00%	0.00
G.	HFP	3	150.02	6,410.38	0.00%	6,410.38
H.	HFPO	3	166.02	177.21	0.00%	177.21
Total CO2 Emissions			**--**	**--**	**--**	**705,846.81**

RSU			
Compound Name		**CY2021 Actual PM/PEVE Emissions (lb/yr)**	**RSU Post-Modification Controlled Emissions (lb/yr)**
A.	TFE	235.37	230.91
B.	PAF	161.02	55.26
C.	RSU	54.67	1,011.82
D.	SU	5.05	331.22
E.	EDC	21.68	113.70
F.	SO2	0.94	9.78
G.	H2SO4	193.56	960.48
H.	COF2	7.25	26.82
I.	A/F Solvent (n=1 TAF)	7.38	28.17
J.	CO2	8,195.54	85,093.09
K.	HF	62.50	249.60
TOTAL VOC[(1)]		**492.43**	**1,797.89**

Emission Estimates for RSU Post-Reamout

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 RSU process emissions, CY2021 total RSU Production, and the production capacity of RSU post modification. Note that the production capacity was obtained from process engineers and assumes maximum production volume.

CY2021 RSU Production = 6,975 units/yr
Post Modification Production Capacity = 72,418 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	RSU Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	RSU - Post Mod Controlled Emissions (lb/yr)
A.	TFE	4,184.49	0.5999	43,444.94	99.99%	4.34
B.	PAF	2,862.70	0.4104	29,721.62	99.99%	2.97
C.	RSU	971.90	0.1393	10,090.67	99.99%	1.01
D.	SU	89.70	0.0129	931.28	99.99%	0.09
E.	SO_2	1,505.57	0.2159	15,631.37	0.00%	9.78
F.	SO_3	3,240.86	0.4646	33,647.81	0.00%	33,647.81
G.	COF_2	652.01	0.0935	6,769.42	99.99%	0.68
H.	A/F Solvent (n=1 TAF)	1,956.03	0.2804	20,308.27	99.99%	2.03
I.	CO_2	--	--	--	--	85,093.09
K.	HF	--	--	--	--	34.37
TOTAL VOC[(1)]		**10,716.83**	**--**	**160,545.39**	**--**	**11.13**

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by 8,760 hours per year. RSU unit capacity will be increased; however, additional process equipment should not be required for the additional demand.

CY2021 RSU Hours of Operation = 2,409 hr/yr
Post-Modification RSU Maximum Hours of Operation = 8,760 hr/yr

	Component	Indoor Equipment Emissions (SU Reactor, Rearranger, Still and Hold Tank)		Outdoor Equipment Emissions (SO3 Storage Tank and Vaporizer and EDC Tank)		Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	RSU Post-Mod Emissions (lb/yr)	CY2021 Emissions (lb/yr)	RSU Post-Mod Emissions (lb/yr)	CY2021 Emissions (lb/yr)	RSU Post-Mod Emissions (lb/yr)
A.	TFE	62.30	226.56	0.00	0.00	62.30	226.56
B.	PAF	14.38	52.28	0.00	0.00	14.38	52.28
C.	RSU	277.97	1010.81	0.00	0.00	277.97	1010.81
D.	SU	91.06	331.13	0.00	0.00	91.06	331.13
E.	EDC	9.59	34.86	21.68	78.84	31.27	113.70
F.	HF	59.19	215.23	0.00	0.00	59.19	215.23
G.	SO3	0.00	0.00	151.77	551.88	151.77	551.88
H.	H2SO4	0.00	0.00	185.91	676.05	185.91	676.05
	VOC Total	**455.30**	**1,655.64**	**21.68**	**78.84**	**476.98**	**1,734.48**

**Note: Equipment emission pollutant speciation for CY2021 was updated from submitted AEI due to recent process engineer review of stream compositions.*

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)
A.	TFE	4	100.01	34,748.31	99.95%	17.37
B.	PAF	4	116.01	20,493.68	99.95%	10.25
C.	RSU	4	180.07	4,482.45	99.95%	2.24
D.	SU	4	180.07	413.69	99.95%	0.21
E.	SO2	--	--	0.00	99.95%	0.00
F.	SO3	--	--	0.00	99.95%	0.00
G.	COF2	1	66.01	2,050.98	99.95%	1.03
H.	TAF	4	248.02	6,549.84	99.95%	3.27
Total HF Emissions			**--**	**--**	**--**	**34.37**

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)
A.	TFE	0	100.01	0.00	99.95%	0.00
B.	PAF	0	116.01	0.00	99.95%	0.00
C.	RSU	1	180.07	3,589.32	99.95%	1.79
D.	SU	1	180.07	331.26	99.95%	0.17
E.	SO2	--	--	15,631.37	99.95%	7.82
F.	SO3	--	--	0.00	99.95%	0.00
G.	COF2	0	66.01	0.00	99.95%	0.00
H.	TAF	0	248.02	0.00	99.95%	0.00
Total SO2 Emissions			**--**	**--**	**--**	**9.78**

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	TFE	2	100.01	38,231.83	0.00%	38,231.83
B.	PAF	2	116.01	22,548.17	0.00%	22,548.17
C.	RSU	2	180.07	4,931.82	0.00%	4,931.82
D.	SU	2	180.07	455.16	0.00%	455.16
E.	SO2	--	--	0.00	0.00%	0.00
F.	SO3	--	--	0.00	0.00%	0.00
G.	COF2	1	66.01	4,513.18	0.00%	4,513.18
H.	TAF	4	248.02	14,412.93	0.00%	14,412.93
Total CO2 Emissions			**--**	**--**	**--**	**85,093.09**

D. H2SO4 Point Source Emission Summary

	Compound Name	H2SO4 Potential (kg/kg)	Controlled H2SO4 Emissions (lb/yr)
F.	SO_3	1.2250	20.61
F.	H2SO4	--	263.82
Total H2SO4 Emissions			**284.43**

**SO3 is assumed to be controlled by 99.95% in the Scrubber system.*

Semiworks			
Compound Name		**CY2021 Actual Emissions (lb/yr)**	**Post Modification Controlled Emissions (lb/yr)**
A.	TFE	246.05	24.63
B.	PSEPVE	212.10	43.40
C.	E-2	172.44	34.65
D.	PAF	49.29	4.93
E.	Initiator	20.77	2.08
F.	F-113	2,071.51	235.37
G.	CO2	0.00	1,742.81
H.	SO2	0.00	0.20
I.	HF	8.53	0.69
TOTAL VOC[(1)]		701.52	109.70

Emission Estimates for Semiworks Post Modification

Process Emissions

To estimate uncontrolled process emissions, it was assumed that future emissions will be equal to CY2021 (no associated increases expected in Semi-Works as a result of the Vinyl Ethers Expansion).

CY2021 Semi-Works Production = 4,321 kg/yr
Semi-Works Post Modification Production Capacity = 4,321 kg/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/kg)	SemiWorks Post Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	SemiWorks Post Mod Controlled Emissions (lb/yr)
A.	TFE	246.05	0.0569	221.44	99.99%	0.02
B.	PSEPVE	433.66	0.1004	390.29	99.99%	0.04
C.	E-2	346.23	0.0801	311.61	99.99%	0.03
D.	PAF	49.29	0.0114	44.37	99.99%	0.00
E.	Initiator	20.77	0.0048	18.69	99.99%	0.00
F.	F-113	2,351.63	0.5442	2,116.46	99.99%	0.21
G.	CO_2	--	--	--	--	1,742.81
H.	SO_2	--	--	--	--	0.20
I	HF	--	--	--	--	0.69
TOTAL VOC[(1)]		1,096.00	--	986.40	--	0.10

Equipment Emissions

For CY2021, all emissions from this unit are assumed to be process emissions. For post-modification, indoor air will be vented to the carbon bed and process emissions will be vented to the thermal oxidizer. It is assumed, based on engineering judgement, that indoor air emissions account for 10% of emissions.

	Compound Name	Post Modification Uncontrolled Emissions (lb/yr)
A.	TFE	24.60
B.	PSEPVE	43.37
C.	E-2	34.62
D.	PAF	4.93
E.	Initiator	2.08
F.	F-113	235.16

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)
A.	TFE	4	100.01	177.12	99.95%	0.09
B.	PSEPVE	14	447.11	244.39	99.95%	0.12
C.	E-2	17	452.05	234.34	99.95%	0.12
D.	PAF	4	116.01	30.59	99.95%	0.02
E.	Initiator	22	658.09	12.50	99.95%	0.01
F.	F-113	3	187.40	677.56	99.95%	0.34
Total HF Emissions			**--**	**--**	**--**	**0.69**

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)
A.	TFE	0	100.01	0.00	99.95%	0.00
B.	PSEPVE	1	447.11	55.91	99.95%	0.03
C.	E-2	8	452.05	353.23	99.95%	0.18
D.	PAF	0	116.01	0.00	99.95%	0.00
E.	Initiator	0	658.09	0.00	99.95%	0.00
F.	F-113	0	187.40	0.00	99.95%	0.00
Total SO2 Emissions			**--**	**--**	**--**	**0.20**

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	TFE	2	100.01	194.87	0.00%	194.87
B.	PSEPVE	7	447.11	268.89	0.00%	268.89
C.	E-2	4	232.02	236.40	0.00%	236.40
D.	PAF	2	116.01	33.66	0.00%	33.66
E.	Initiator	12	658.09	15.00	0.00%	15.00
F.	F-113	2	187.40	993.98	0.00%	993.98
Total CO2 Emissions			**--**	**--**	**--**	**1,742.81**

Membrane Treatment (NS-H)			
	Compound Name	**CY2021 Actual Membrane Treatment Emissions (lb/yr)**	**Membrane Treatment Post-Mod Controlled Emissions (lb/yr)**
A.	Acetic Acid	753.48	3,919.07
B.	DMSO	48,293.19	251,185.86
C.	Nitric Acid	13.56	70.51
D.	HF	149.85	779.39
TOTAL VOC[(1)]		**49,046.68**	**255,104.93**

Emission Estimates for Membrane Treatment (NS-H) Post-Modification

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 Membrane Treatment emissions, CY2021 total Membrane Treatment Production, and the production capacity after the proposed VE modification. Note that the production capacity was obtained from process engineer as post unit modification maximum production volume.

CY2021 Membrane Treatment Production = 41,849 units/yr
Post Modification Production Capacity = 217,669 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	Membrane Treatment Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	Membrane Treatment Post-Mod Controlled Emissions (lb/yr)
A.	Acetic Acid	753.48	0.0180	3,919.07	--	3,919.07
B.	DMSO	48,293.19	1.1540	251,185.86	--	251,185.86
C.	Nitric Acid	13.56	0.0003	70.51	--	70.51
D.	HF	149.85	0.0036	779.39	--	779.39
TOTAL VOC[(1)]		49,046.68	--	255,104.93	--	255,104.93

Note: Process emissions from NS-H are not controlled by the Thermal Oxidizer.

Equipment Emissions

Losses from equipment emissions would be accounted for in the Process Emissions section.

Membrane Coating (NS-I)			
	Compound Name	**CY2021 Actual Membrane Coating Emissions (lb/yr)**	**Membrane Coating Post-Mod Controlled Emissions (lb/yr)**
A.	Ethanol	59,840.74	67,499.27
B.	n-Propanol	9,025.96	10,181.12
C.	Isopropanol	18,759.22	21,160.05
D.	PM-10	244.74	276.07
E.	PM-2.5	244.74	276.07
TOTAL VOC[(1)]		**87,625.92**	**98,840.44**

Emission Estimates for Membrane Coating (NS-I) Post-Modification

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 Membrane Treatment emissions, CY2021 total Membrane Treatment Production, and the production capacity after the proposed VE modification. Note that the production capacity was obtained from process engineer given maximum production volume.

CY2021 Membrane Treatment Production = 57,357 units/yr
Post Modification Production Capacity = 64,698 units/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/unit)	Membrane Coating Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	Membrane Coating Post-Mod Controlled Emissions (lb/yr)
A.	Ethanol	59,840.74	1.0433	67,499.27	--	67,499.27
B.	n-Propanol	9,025.96	0.1574	10,181.12	--	10,181.12
C.	Isopropanol	18,759.22	0.3271	21,160.05		21,160.05
D.	PM-10	244.74	0.0043	276.07		276.07
E.	PM-2.5	244.74	0.0043	276.07		276.07
TOTAL VOC[(1)]		87,625.92	--	98,840.44	--	98,840.44

Note: Process emissions from NS-I are not controlled by the Thermal Oxidizer.

Equipment Emissions

Losses from equipment emissions would be accounted for in the Process Emissions section.

TFE/CO2 Process Area			
Compound Name		**CY2021 Actual TFE/CO2 Emissions (lb/yr)**	**TFE/CO2 Post-Mod Controlled Emissions (lb/yr)**
A.	TFE	256.47	343.54
B.	CO2	50,926.30	144,752.56
C.	SO2	0.00	0.00
D.	HF	22.95	65.42
TOTAL VOC(1)		256.47	343.54

Emission Estimates for TFE/CO2 Post-Modification

Process Emissions

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / kg produced) was developed using CY2021 TFE/CO2 emissions, CY2021 total TFE/CO2 processed, and the production capacity after the proposed expansion. Note that the production capacity was assumed to increase by increased RSU production volume.

CY2021 TFE/CO2 Processed = 306,688 kg/yr
Post Modification Production Capacity = 874,061 kg/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/kg)	TFE/CO2 Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	TFE/CO2 Post-Mod Controlled Emissions (lb/yr)
A.	TFE	57,395.99	0.1871	163,578.57	99.99%	16.36
B.	CO_2	169.03	0.0006	481.74	--	144,425.38
C.	SO_2	--	--	--	--	0.00
D.	HF	--	--	--	--	65.42
TOTAL VOC[(1)]		57,395.99	--	163,578.57	--	16.36

Equipment Emissions

To estimate equipment emissions, the hourly equipment/fugitive emission rate was multiplied by the potential hours per year (8,760). It is assumed that no additional equipment will be required for the TFE/CO2 area.

CY2021 TFE/CO2 Hours of Operation = 6,713 hr/yr
Post Modification Maximum Hours of Operation = 8,760 hr/yr

	Component	Total Equipment Emissions	
		CY2021 Emissions (lb/yr)	Post Modification Emissions
A.	TFE	250.73	327.19
B.	CO_2	250.73	327.19
	VOC Total	**250.73**	**327.19**

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x NF_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

Compound Name		# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)
A.	TFE	4	100.012	130,834.07	99.95%	65.42
B.	CO2	0	44.008	0.00	99.95%	0.00
Total HF Emissions			**--**	**--**	**--**	**65.42**

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

Compound Name		# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)
A.	TFE	0	100.012	0.00	99.95%	0.00
B.	CO2	0	44.008	0.00	99.95%	0.00
Total SO2 Emissions			**--**	**--**	**--**	**0.00**

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

Compound Name		# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)
A.	TFE	2	100.01	143,943.64	0.00%	143,943.64
B.	CO2	1	44.01	481.74	0.00%	481.74
Total CO2 Emissions			**--**	**--**	**--**	**144,425.38**

Product Container Decontamination (NS-N, NS-O, NS-P)							
	Compound Name	**CY2021 Actual HFPO Decon Emissions (lb/yr)**	**HFPO Decon Post-Mod Controlled Emissions (lb/yr)**	**CY2021 Actual VE-N Decon Emissions (lb/yr)**	**VE-N Decon Post-Mod Controlled Emissions (lb/yr)**	**CY2021 Actual VE-S Decon Emissions (lb/yr)**	**VE-S Decon Post-Mod Controlled Emissions (lb/yr)**
A.	HFPO	2.29	3.43	0.00	0.00	0.00	0.00
B.	HFP	3.07	4.61	0.00	0.00	0.00	0.00
C.	PPVE	0.00	0.00	0.04	0.09	0.00	0.00
D.	PSEPVE	0.00	0.00	0.00	0.00	0.00	0.00
E.	EVE	0.00	0.00	0.01	0.02	0.00	0.00
F.	PMVE	0.00	0.00	0.00	0.00	0.19	0.38
G.	PEVE	0.00	0.00	0.00	0.00	0.03	0.07
H.	SO2	0.00	0.00	0.00	0.00	0.00	0.00
I.	CO2	45,232.97	67,852.54	437.00	873.61	1,778.40	3,556.96
J.	HF	20.56	30.84	0.19	0.38	0.81	1.62
TOTAL VOC[(1)]		**5.36**	**8.04**	**0.05**	**0.10**	**0.22**	**0.45**

Emission Estimates for Product Container Decontamination (NS-N, NS-O, NS-P)

HFPO Product Container Decontamination (NS-N)

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / containers decontaminated) was developed using CY2021 HFPO Container Decontamination process emissions, CY2021 total HFPO containers decontaminated, and the number of containers decontaminated post modification. Note that the production capacity was obtained from process engineers and assumes the following: Most of HFPO increases will be associated with VE-N/VE-S increases which are transferred via hard piping and do not require containers. Worst-case assumption is 50% increase in container cleaning.

CY2021 HFPO Containers Decontaminated = 47 containers/yr
Post Modification Production Capacity = 71 containers/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/container)	HFPO Decon Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	HFPO Decon Post-Mod Controlled Emissions (lb/yr)
A.	HFPO	22,881.33	486.8369	34,322.00	99.99%	3.43
B.	HFP	30,726.80	653.7617	46,090.20	99.99%	4.61
C.	SO_2	--	--	--	--	0.00
D.	CO_2	--	--	--	--	67,852.54
E.	HF	--	--	--	--	30.84
TOTAL VOC[(1)]		**53,608.13**	**--**	**80,412.20**	**--**	**8.04**

VE-North Product Container Decontamination (NS-O)

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / containers decontaminated) was developed using CY2021 VE-N Container Decontamination process emissions, CY2021 total VE-N containers decontaminated, and the number of containers decontaminated post modification. Note that the production capacity was obtained from process engineers and assumes the following: 100% increase in fleet which would require additional inspections and decontamination of equipment

CY2021 HFPO Containers Decontaminated = 72 containers/yr
Post Modification Production Capacity = 144 containers/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/container)	HFPO Decon Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	HFPO Decon Post-Mod Controlled Emissions (lb/yr)
A.	PPVE	442.00	6.1389	884.00	99.99%	0.09
B.	PSEPVE	0.00	0.0000	0.00	99.99%	0.00
C.	EVE	76.10	1.0569	152.20	99.99%	0.02
D.	SO_2	--	--	--	--	0.00
E.	CO_2	--	--	--	--	873.61
F.	HF	--	--	--	--	0.38
TOTAL VOC[(1)]		**518.10**	**7.20**	**1,036.20**	**--**	**0.10**

VE-South Product Container Decontamination (NS-P)

To estimate uncontrolled process emissions, an emission factor (in units of lb emission / containers decontaminated) was developed using CY2021 VE-S Container Decontamination process emissions, CY2021 total VE-S containers decontaminated, and the number of containers decontaminated post modification. Note that the production capacity was obtained from process engineers and assumes the following: 100% increase in fleet which would require additional inspections and decontamination of equipment

CY2021 HFPO Containers Decontaminated = 45 containers/yr
Post Modification Production Capacity = 90 containers/yr

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/container)	HFPO Decon Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	HFPO Decon Post-Mod Controlled Emissions (lb/yr)
A.	PMVE	1,883.32	41.8516	3,766.64	99.99%	0.38
B.	PEVE	344.69	7.6597	689.37	99.99%	0.07
C.	PPVE	0.00	0.0000	0.00	99.99%	0.00
D.	SO_2	--	--	--	--	0.00
E.	CO_2	--	--	--	--	3,556.96
F.	HF	--	--	--	--	1.62
TOTAL VOC[(1)]		**2,228.01**	**49.51**	**4,456.01**	**--**	**0.45**

Emissions Generated in the TO

A. HF Point Source Emission Summary

The thermal oxidizer generates hydrogen fluoride (HF) from the combustion of organic fluoride containing hydrocarbons, which are controlled by the scrubber. HF generation and emissions are calculated as follows:

$$E_{HF} = E_x x \frac{C_x}{100} x N F_x \frac{MW_{HF}}{MW_x} x (1 - \frac{C_{HF}}{100})$$

Where,
E_x = uncontrolled emission rate of fluorinated compound x,
C_x = TO control efficiency of compound x
NF_x = number of fluoride atoms in compound x
MW_{HF} = molecular weight of HF (20)
MW_x = molecular weight of compound x
C_{HF} = scrubber control efficiency of HF

	Compound Name	# of F Atoms in Compound	Molecular Weight of Compound	HF Generated in TO (lb/yr)	Scrubber Control Efficiency	Controlled HF Emissions (lb/yr)	
A.	HFPO	6	166.02	24,806.06	99.95%	12.40	HFPO
B.	HFP	6	150.02	36,864.05	99.95%	18.43	
A.	PPVE	10	266	664.52	99.95%	0.33	
B.	PSEPVE	14	446	0.00	99.95%	0.00	VE-N
C.	EVE	13	423	93.52	99.95%	0.05	
A.	PMVE	6	166.017	2,722.32	99.95%	1.36	
B.	PEVE	8	216.023	510.54	99.95%	0.26	VE-S
C.	PPVE	10	266.029	0.00	99.95%	0.00	
Total HF Emissions			**316.04**	**61670.11**	**--**	**32.83**	

B. SO2 Point Souce Emission Summary

The thermal oxidizer generates sulfur dioxide (SO2) from the combustion of hydrocarbons, which are controlled by the scrubber. SO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of S Atoms in Compound	Molecular Weight of Compound	SO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled SO2 Emissions (lb/yr)	
A.	HFPO	0	166.02	0.00	99.95%	0.00	HFPO
B.	HFP	0	150.02	0.00	99.95%	0.00	
A.	PPVE	0	266	0.00	99.95%	0.00	
B.	PSEPVE	1	446	0.00	99.95%	0.00	VE-N
C.	EVE	0	423	0.00	99.95%	0.00	
A.	PMVE	0	166.017	0.00	99.95%	0.00	
B.	PEVE	0	216.023	0.00	99.95%	0.00	VE-S
C.	PPVE	0	266.029	0.00	99.95%	0.00	
Total SO2 Emissions			**--**	**--**	**--**	**0.00**	

C. CO2 Point Source Emission Summary

The thermal oxidizer generates carbon dioxide (CO2) from the combustion of hydrocarbons, which is not assumed to be controlled by the scrubber. CO2 generation and emissions are calculated using the same methodology as HF, above.

	Compound Name	# of C Atoms in Compound	Molecular Weight of Compound	CO2 Generated in TO or Process	Scrubber Control Efficiency	Controlled CO2 Emissions (lb/yr)	
A.	HFPO	3	166.02	27,292.87	0.00%	27,292.87	HFPO
B.	HFP	3	150.02	40,559.67	0.00%	40,559.67	
A.	PPVE	5	266	731.14	0.00%	731.14	
B.	PSEPVE	7	446	0.00	0.00%	0.00	VE-N
C.	EVE	9	423	142.47	0.00%	142.47	
A.	PMVE	3	166.017	2,995.23	0.00%	2,995.23	
B.	PEVE	4	216.023	561.72	0.00%	561.72	VE-S
C.	PPVE	5	266.029	0.00	0.00%	0.00	
Total CO2 Emissions			**--**	**--**	**--**	**72,283.11**	

Waste DMSO Tank (I-02)			
	Compound Name	**CY2021 Actual Waste DMSO Tank Emissions (lb/yr)**	**Waste DMSO Tank Post-Mod Controlled Emissions (lb/yr)**
A.	DMSO	896.36	901.26
TOTAL VOC		**896.36**	**901.26**

Emission Estimates for Waste DMSO Tank (I-02) Post-Modification

Process Emissions

It is assumed that the Waste DMSO Tank process emissions will increase proportional to the Membrane Treatment production increases. Process emissions would only account for 0.13% of the total emissions. Fugitives are not expected to increase because equipment is not being added. To estimate uncontrolled process emissions, an emission factor (in units of lb emission / unit produced) was developed using CY2021 Membrane Treatment emissions, CY2021 total Membrane Treatment Production, and the production capacity after the proposed hydrolysis modification. Note that the production capacity was obtained from process engineer as maximum production volume.

CY2021 Membrane Treatment Production = 41,849 units/yr
Post Modification Production Capacity = 217,669 units/yr

Compound Name		CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Process Emission Factor (lb/unit)	Waste DMSO Tank Post-Mod Process Emissions (lb/yr)	TO Control Efficiency (%)	Fugitive Emissions (lb/yr)	Waste DMSO Tank Post-Mod Controlled Emissions
A.	DMSO	896.36	2.78E-05	6.06	--	895.1993	901.26
TOTAL VOC[(1)]		896.36	--	6.06	--	--	901.26

Note: Process emissions from I-02 are not controlled by the Thermal Oxidizer.

Equipment Emissions

Losses from equipment emissions would be accounted for in the Process Emissions section.

Methylene Chloride / Brine System (I-03)			
	Compound Name	**CY2021 Actual MeCl Emissions (lb/yr)**	**MeCl Post-Mod Controlled Emissions (lb/yr)**
A.	MeCl	1,159.00	1,390.80
TOTAL VOC		**1,159.00**	**1,390.80**

Emission Estimates for Methylene Chloride (I-03) Post-Modification

Emissions

It is assumed that the Methylene Chloride emissions from the brine system would increase proportionally to the additional equipment / components that are added as a result of the modification. Based on process knowledge, it has been assumed that Methylene Chloride connections would increase by 20%.

Post Modification Increase = 20%

	Compound Name	CY2021 Uncontrolled Emissions (lb/yr)	Uncontrolled Emission Factor (lb/kg)	Waste DMSO Tank Post-Mod Uncontrolled Emissions (lb/yr)	TO Control Efficiency (%)	Waste DMSO Tank Post-Mod Controlled Emissions (lb/yr)
A.	MeCl	1,159.00	--	1,390.80	--	1,390.80
TOTAL VOC[(1)]		1,159.00	--	1,390.80	--	1,390.80

Note: Process emissions from I-03 are not controlled by the Thermal Oxidizer.

NATURAL GAS COMBUSTION EMISSIONS CALCULATOR REVISION N 01/05/2017 - OUTPUT SCREEN

Air Quality ENVIRONMENTAL QUALITY

Instructions: Enter emission source / facility data on the "INPUT" tab/screen. The air emission results and summary of input data are viewed / printed on the "OUTPUT" tab/screen. The different tabs are on the bottom of this screen.

This spreadsheet is for your use only and should be used with caution. NCDEQ does not guarantee the accuracy of the information contained. This spreadsheet is subject to continual revision and updating. It is your responsibility to be aware of the most current information available. NCDEQ is not responsible for errors or omissions that may be contained herein.

SOURCE / FACILITY / USER INPUT SUMMARY (FROM INPUT SCREEN)

COMPANY:	**Chemours Company - Fayetteville Works**			FACILITY ID NO.:	900009
				PERMIT NUMBER:	03735T48
EMISSION SOURCE DESCRIPTION:	139.4 MMBTU/HR NATURAL GAS-FIRED BOILER			FACILITY CITY:	Fayetteville
EMISSION SOURCE ID NO.:	PS-A			FACILITY COUNTY:	Bladen
CONTROL DEVICE:	NO CONTROL			POLLUTANT	CONTROL EFF.
SPREADSHEET PREPARED BY:	Christel Compton			NOX	CALC'D AS 0%
ACTUAL FUEL THROUGHPUT:	595.00	10^6 SCF/YR	FUEL HEAT VALUE: 1,020 BTU/SCF		
POTENTIAL FUEL THROUGHPUT:	1,197.20	10^6 SCF/YR	BOILER TYPE: LARGE WALL-FIRED BOILER (> 100 mmBTU/HR)	NO SNCR APPLIED	
REQUESTED MAX. FUEL THRPT:	1,197.20	10^6 SCF/YR	HOURS OF OPERATIONS: 24		

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION

	ACTUAL EMISSIONS (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMSSIONS (AFTER CONTROLS / LIMITS)		EMISSION FACTOR lb/mmBtu	
AIR POLLUTANT EMITTED	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	uncontrolled	controlled
PARTICULATE MATTER (Total)	0.07	0.15	0.07	0.31	0.07	0.31	0.001	0.001
PARTICULATE MATTER (Filterable)	0.03	0.06	0.03	0.12	0.03	0.12	0.000	0.000
PARTICULATE MATTER (Condensable)	0.04	0.10	0.04	0.19	0.04	0.19	0.000	0.000
PM 2.5 (Total)	0.06	0.13	0.06	0.26	0.06	0.26	0.000	0.000
PM 2.5 (Filterable)	0.02	0.03	0.02	0.07	0.02	0.07	0.000	0.000
SULFUR DIOXIDE (SO2)	0.08	0.18	0.08	0.36	0.08	0.36	0.001	0.001
NITROGEN OXIDES (NOx)	25.97	56.53	25.97	113.73	25.97	113.73	0.186	0.186
CARBON MONOXIDE (CO)	11.48	24.99	11.48	50.28	11.48	50.28	0.082	0.082
VOLATILE ORGANIC COMPOUNDS (VOC)	0.75	1.64	0.75	3.29	0.75	3.29	0.005	0.005

TOXIC / HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION

		ACTUAL EMISSIONS (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		POTENTIAL EMSSIONS (AFTER CONTROLS / LIMITS)		EMISSION FACTOR lb/mmBtu	
TOXIC / HAZARDOUS AIR POLLUTANT	CAS NUMBER	lb/hr	lbs/yr	lb/hr	lbs/yr	lb/hr	lbs/yr	uncontrolled	controlled
Acetaldehyde (TH)	75070	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrolein (TH)	107028	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ammonia (T)	7664417	4.37E-01	1.90E+03	4.37E-01	3.83E+03	4.37E-01	3.83E+03	3.14E-03	3.14E-03
Arsenic unlisted compounds (TH)	ASC-other	2.73E-05	1.19E-01	2.73E-05	2.39E-01	2.73E-05	2.39E-01	1.96E-07	1.96E-07
Benzene (TH)	71432	2.87E-04	1.25E+00	2.87E-04	2.51E+00	2.87E-04	2.51E+00	2.06E-06	2.06E-06
Benzo(a)pyrene (TH)	50328	1.64E-07	7.14E-04	1.64E-07	1.44E-03	1.64E-07	1.44E-03	1.18E-09	1.18E-09
Beryllium metal (unreacted) (TH)	7440417	1.64E-06	7.14E-03	1.64E-06	1.44E-02	1.64E-06	1.44E-02	1.18E-08	1.18E-08
Cadmium metal (elemental unreacted) (TH)	7440439	1.50E-04	6.55E-01	1.50E-04	1.32E+00	1.50E-04	1.32E+00	1.08E-06	1.08E-06
Chromic acid (VI) (TH)	7738945	1.91E-04	8.33E-01	1.91E-04	1.68E+00	1.91E-04	1.68E+00	1.37E-06	1.37E-06
Cobalt unlisted compounds (H)	COC-other	1.15E-05	5.00E-02	1.15E-05	1.01E-01	1.15E-05	1.01E-01	8.24E-08	8.24E-08
Formaldehyde (TH)	50000	1.03E-02	4.46E+01	1.03E-02	8.98E+01	1.03E-02	8.98E+01	7.35E-05	7.35E-05
Hexane, n- (TH)	110543	2.46E-01	1.07E+03	2.46E-01	2.15E+03	2.46E-01	2.15E+03	1.76E-03	1.76E-03
Lead unlisted compounds (H)	PBC-other	6.83E-05	2.98E-01	6.83E-05	5.99E-01	6.83E-05	5.99E-01	4.90E-07	4.90E-07
Manganese unlisted compounds (TH)	MNC-other	5.19E-05	2.26E-01	5.19E-05	4.55E-01	5.19E-05	4.55E-01	3.73E-07	3.73E-07
Mercury vapor (TH)	7439976	3.55E-05	1.55E-01	3.55E-05	3.11E-01	3.55E-05	3.11E-01	2.55E-07	2.55E-07
Napthalene (H)	91203	8.34E-05	3.63E-01	8.34E-05	7.30E-01	8.34E-05	7.30E-01	5.98E-07	5.98E-07
Nickel metal (TH)	7440020	2.87E-04	1.25E+00	2.87E-04	2.51E+00	2.87E-04	2.51E+00	2.06E-06	2.06E-06
Selenium compounds (H)	SEC	3.28E-06	1.43E-02	3.28E-06	2.87E-02	3.28E-06	2.87E-02	2.35E-08	2.35E-08
Toluene (TH)	108883	4.65E-04	2.02E+00	4.65E-04	4.07E+00	4.65E-04	4.07E+00	3.33E-06	3.33E-06
Total HAPs		2.58E-01	1.12E+03	2.58E-01	2.26E+03	2.58E-01	2.26E+03	1.85E-03	1.85E-03
Highest HAP	Hexane	2.46E-01	1.07E+03	2.46E-01	2.15E+03	2.46E-01	2.15E+03	1.76E-03	1.76E-03

TOXIC AIR POLLUTANT EMISSIONS INFORMATION (FOR PERMITTING PURPOSES)

		EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS			EMISSION FACTOR lb/mmBtu	
TOXIC AIR POLLUTANT	CAS Num.	lb/hr	lb/day	lb/yr	uncontrolled	controlled
Acetaldehyde (TH)	75070	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrolein (TH)	107028	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ammonia (T)	7664417	4.37E-01	1.05E+01	1.90E+03	3.14E-03	3.14E-03
Arsenic unlisted compounds (TH)	ASC-other	2.73E-05	6.56E-04	1.19E-01	1.96E-07	1.96E-07
Benzene (TH)	71432	2.87E-04	6.89E-03	1.25E+00	2.06E-06	2.06E-06
Benzo(a)pyrene (TH)	50328	1.64E-07	3.94E-06	7.14E-04	1.18E-09	1.18E-09
Beryllium metal (unreacted) (TH)	7440417	1.64E-06	3.94E-05	7.14E-03	1.18E-08	1.18E-08
Cadmium metal (elemental unreacted) (TH)	7440439	1.50E-04	3.61E-03	6.55E-01	1.08E-06	1.08E-06
Soluble chromate compounds, as chromium (VI) equivalent	SolCR6	1.91E-04	4.59E-03	8.33E-01	1.37E-06	1.37E-06
Formaldehyde (TH)	50000	1.03E-02	2.46E-01	4.46E+01	7.35E-05	7.35E-05
Hexane, n- (TH)	110543	2.46E-01	5.90E+00	1.07E+03	1.76E-03	1.76E-03
Manganese unlisted compounds (TH)	MNC-other	5.19E-05	1.25E-03	2.26E-01	3.73E-07	3.73E-07
Mercury vapor (TH)	7439976	3.55E-05	8.53E-04	1.55E-01	2.55E-07	2.55E-07
Nickel metal (TH)	7440020	2.87E-04	6.89E-03	1.25E+00	2.06E-06	2.06E-06
Toluene (TH)	108883	4.65E-04	1.12E-02	2.02E+00	3.33E-06	3.33E-06

GREENHOUSE GAS EMISSIONS INFORMATION (FOR EMISSIONS INVENTORY PURPOSES) - CONSISTENT WITH EPA MANDATORY REPORTING RULE (MRR) METHOD				*GHG - POTENTIAL TO EMIT NOT BASED ON EPA MRR METHOD*	
GREENHOUSE GAS POLLUTANT	ACTUAL EMISSIONS EPA MRR CALCULATION METHOD: TIER 1			**POTENTIAL EMISSIONS**	
	metric tons/yr	metric tons/yr, **CO2e**	short tons/yr	short tons/yr	short tons/yr, **CO2e**
CARBON DIOXIDE (CO_2)	32430.21	32,430.21	35,748.15	71,369.12	71369.12
METHANE (CH_4)	6.12E-01	1.53E+01	6.74E-01	1.35E+00	3.37E+01
NITROUS OXIDE (N_2O)	6.12E-02	1.82E+01	6.74E-02	1.35E-01	4.01E+01
		TOTAL CO2e (metric tons) **32,463.73**			TOTAL CO2e (short tons) **71,442.89**

NOTE: CO2e means CO2 equivalent
NOTE: The DAQ Air Emissions Reporting Online (AERO) system requires short tons be reported. The EPA MRR requires metric tons be reported.
NOTE: Do not use greenhouse gas emission estimates from this spreadsheet for PSD (Prevention of Significant Deterioration) purposes.

Boiler PS-A

Hydrogen Chloride (HCl) **CAS No. 7647-01-0**

The ERF Memorandum to EPA emission factor for uncontrolled residual and distillate oil firing is given as 1.60E-02 lbs/MMBtu in "Revised November 2011 Development of Baseline Emission Factors for Boilers and Process Heaters at Commercial, Industrial, and Institutional Facilities" memo, November 2011; so that figure is used as the latest information from EPA.

EPA emission factor = **1.6E-02** pounds of HCl per million BTUs generated in the boiler.

The ERF Memorandum to EPA emission factor for uncontrolled natural gas firing is given as 1.06E-03 lbs/MMBtu in "Revised November 2011 Development of Baseline Emission Factors for Boilers and Process Heaters at Commercial, Industrial, and Institutional Facilities" memo, November 2011; so that figure is used as the latest information from EPA.

Emission factor = **1.06E-03** pounds of HCl per million BTUs generated in the boiler.

PS-A emissions of HCl:

0 gallons of No. 2 fuel oil were burned in 2021

$$0 \text{ gal. No. 2 F.O} \times \frac{0.140 \text{ MM-BTU}}{\text{gal. No. 2 F.O.}} = 0.00\text{E+00 MM-BTU}$$

$$0.00\text{E+00 MM-BTU} \times \frac{1.6\text{E-02 lbs HCl}}{\text{MM-BTU}} = \mathbf{0.00\ lbs\ HCl}$$

595 MM-scf of Natural Gas were burned in 2021

$$595.000 \text{ MM-scf Natural Gas} \times \frac{1{,}020 \text{ BTU}}{\text{scf Natural Gas}} = 606{,}900 \text{ MM-BTU}$$

$$606{,}900 \text{ MM-BTU} \times \frac{1.1\text{E-03 lbs HCl}}{\text{MM-BTU}} = \mathbf{643.31\ lbs\ HCl}$$

Total HCl emissions:

0.00 lbs HCl from No. 2 F.O.
\+ 643.31 lbs HCl from Natural Gas
643.31 lbs HCl emissions