May 26, 2022

SUPPORTING DOCUMENTATION

Application for State Permit to Operate

Prepared for:

SAINT-GOBAIN PERFORMANCE PLASTICS CORPORATION
701 Daniel Webster Highway
Merrimack, New Hampshire 03054

Prepared by:

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SUPPORTING DOCUMENTATION
APPLICATION FOR NHDES STATE PERMIT TO OPERATE
SAINT-GOBAIN PERFORMANCE PLASTICS CORPORATION

TABLE OF CONTENTS

CONFIDENTIAL SUPPORTING DOCUMENTATION
APPLICATION FOR NHDES STATE PERMIT TO OPERATE
SAINT-GOBAIN PERFORMANCE PLASTICS CORPORATION

TABLE OF CONTENTS (continued)

1.0 INTRODUCTION

C.T. Male Associates Engineering, Surveying, Architecture, Landscape Architecture & Geology, D.P.C. (C.T. Male) has prepared the attached application for a New Hampshire Department of Environmental Services (NHDES) State Permit to Operate and supporting documents for the Saint-Gobain Performance Plastics Corporation (Saint-Gobain) facility located at 701 Daniel Webster Highway in Merrimack, Hillsborough County, New Hampshire (see Figure 1). The NHDES Facility Identification Number is 3301100165, and the facility currently operates under Temporary Permit TP-0256, which was issued on February 11, 2020, and was extended on June 29, 2021. The current Temporary Permit expires on August 31, 2022. Copies of application forms are included in Attachment A.

The Saint-Gobain facility primarily manufactures polytetrafluoroethylene (PTFE) coated fiberglass and Kevlar® fabrics and PTFE films. The fabrics are manufactured for a variety of chemical and weather resistant applications. The facility also includes an antenna covering process. The antenna cover operations include manual application of adhesives to the fabric for bonding to other pieces of fabric or to metal frames.

In response to a determination by NHDES pursuant to NH Statute Chapter 125-C:10-e, *Requirements for Air Emissions of Perfluorinated Compounds Impacting Soil and Water*, Saint-Gobain installed a Regenerative Thermal Oxidizer (RTO) in 2021 to control PFC[1] and precursor emissions associated with the facility's coating operations.

Subsequent to the Temporary Permit issued in February 2020, Saint-Gobain submitted an Application for Significant Amendment of Temporary Permit TP-0256 on December 18, 2021, in part in response to the NHDES November 18, 2021 Letter of Deficiency regarding the operation of the RTO, which is incorporated herein[2].

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[1] - "Perfluorinated compounds" or "PFCs" as defined in RSA 125-C:10-e(I)(d) means the list of compounds identified in paragraph 1.1 of Environmental Protection Agency Document #: EPA/600/R-08/092 Method 537. "Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)", Version 1.1 (September 2009).

[2] - Saint-Gobain also submitted additional information to respond to NHDES' requests for additional information on January 27, 2022 and February 25, 2022, which are incorporated herein.

Due to the completion of RTO and related systems construction including the RTO Bypass stack, and the upcoming expiration date for Temporary Permit TP-0256 of August 31, 2022, Saint-Gobain is submitting this application for a State Permit to Operate. It is noted that the application presents the most up-to-date equipment information, and no significant changes have been made to the facility operations beyond what is currently listed in TP-0256 and the information included in the submissions through February 25, 2022.

2.0 PROCESS DESCRIPTION

During production of the coated fiberglass fabrics, the fiberglass cloth is coated with a PTFE dispersion, which includes an organic surfactant. The fiberglass cloth is passed through a coater dip pan filled with the aqueous PTFE resin emulsion and surfactant. The fabric is then passed through a heating tower where the coating is sintered onto the fabric. Each coating tower has dedicated multiple curing zones. Each tower is divided into three temperature zones that: remove water, volatilize the surfactant, and sinter the resin. The production of film products includes the same sequence of steps, however rather than a fiberglass cloth, the PTFE coating is temporarily applied to a reusable polyamide or stainless steel carrier belt. The film coating is then removed and the carrier belts are reused.

Under normal operations, the exhaust from all coating towers as well as smaller equipment (Chemsil, MTM, Step Press/Laminator and Heat Clean) is routed to the RTO control device. The ductwork associated with the RTO routes the exhaust for all of the existing process equipment, with the exception of the antenna fabrication process to provide control of PFC and precursor emissions associated with the facility's coating operations. The original emission points and associated exhaust equipment have been retired as part of the RTO installation project in 2021. A summary of the emission units which exhaust to the RTO is as follows:

Emission Unit ID	Device Name
EU01	Tower MA
EU02	Tower MB
EU03	Tower MC
EU04	Tower MR
EU05	Tower MD
EU06	Tower QX
EU07	20" SBC
EU08	20" Coater
EU12	Tower MG
EU13	Tower MP
EU15	Tower MQ

Emission Unit ID	Device Name
EU16	Tower MS
EU22	R&D Coater
EU23	Chemsil Coater
EU24	MTM
EU25	Step Press/Laminator
EU26	Heat Clean

In addition to the primary coating towers, the RTO receives exhaust from a variety of smaller production activities. The Chemsil coats and dries silicone onto fiberglass through thermally treating a solid paste without the addition of solvent. There are several pieces of post-processing equipment utilized at the facility after material has concluded running on the coating towers. The MTM and Step Press/Laminator are pieces of equipment which utilize heat to perform operations which laminate or otherwise affix coated fabric and films. In each case, the equipment's operation does not include the addition of solvents or other chemicals. The Heat Clean source is an oven used for cleaning by heating, and similarly does not involve the addition of solvents or other chemicals. None of these operations utilize solvents or other chemicals, and as such the release of volatiles/RTAP/HAP is not expected. However, each of these sources is exhausted to the RTO control device in order to maximize the collection and control of PFC by minimizing the potential for fugitive releases from facility operations.

The antenna fabrication process (EU17) includes manual application of adhesives to the fabric for bonding to other pieces of fabric or to metal frames. Detailed calculations relating to the antenna fabrication process are included in Attachment B.2. Saint-Gobain currently tracks the usage of materials in the antenna fabrication area. This operation includes up to 8 products, inclusive of 6 adhesive products, as well as two solvents which may be used as needed to clean/prepare surfaces for adhesive application. This area typically operates on a 1 shift schedule, 5 days per week. This operation, as well as the existing combustion activities listed in Attachment B.3 (backup power generation unit, fire pump, and natural gas fired heating systems) do not exhaust via the RTO or RTO bypass stack, as there is not PFC emissions expected from these operations.

3.0 AIR EMISSIONS

The coating operations currently utilize a wide variety of coating products and formulations. Although the RTO was installed specifically to control PFC, the unit will also control VOCs present in the exhaust streams from the towers. An understanding of the actual and potential process related emissions has been obtained using a variety of data sources. These methods are further described below. Emission calculations for the materials which are exhausted from the RTO are included in Attachment B.1.

Regulated Toxic Air Pollutants (RTAP)

Saint-Gobain and C.T. Male reviewed Safety Data Sheets for all products currently in the inventory tracking system for products used in Coating Tower operations at the facility (±166 materials). Of these materials, 22 contain RTAP and/or HAP, and 13 of those products were used in 2021. Within the calculations in Attachment B.1, the data utilizes the maximum concentration listed on each SDS whenever a range is given that has defined upper and lower limits.

As was done in previous submissions, this approach yields the annual RTAP available for release on an annual basis. In order to estimate potential annual emissions, a scaling factor was developed to extrapolate full production across all product lines. Details of the scaling factor development are included in Attachment B.7 and are used in VOC/HAP/RTAP potential emission estimates.

PFC and Fluorides

For the PFC and Fluorides emission estimates, the calculated values are based on stack test results from the "Results of the September 7-10, 2021 Regenerative Thermal Oxidizer Compliance Tests at the Saint-Gobain Performance Plastics in Merrimack, New Hampshire" report prepared by Barr Engineering. Form ARD-3 Section IV.A Supplement includes specific information relative to the PFC and Fluoride emissions.

3.1 RTO Operation

A Best Available Control Technology (BACT) Analysis previously determined that the use of RTO technology to control the target pollutant emissions for the sources

identified in this application was BACT given that certain nominal operating conditions are met. After the approval and installation of the RTO, operational testing was performed to derive values for these operating conditions, which are listed as permit requirements in the current Temporary Permit:

- The active combustion chamber of the RTO shall be maintained at a minimum temperature of 1,832°F (1,000°C), based on an hourly block average; and
- The inlet flowrate to the RTO shall not exceed 70,000 SCFM.

Saint-Gobain also completed stack testing to assess post-control emissions for PFOA and PFOS. The stack test report ("Results of the September 7-10, 2021 Regenerative Thermal Oxidizer Compliance Tests at Saint-Gobain Performance Plastics in Merrimack, New Hampshire" prepared by Barr Engineering Co.) describes the facility's operating conditions at the time of the testing. The operating conditions at the facility during the stack test were in excess of normal operating conditions with respect to the amount of material processed and the PFC content of the material and met the required operating conditions of Env-A 802.10. Emission rates for PFOA and PFOS were measured at the inlet and outlet of the RTO.

Stack testing of the RTO also determined that emissions of HF from the RTO are in compliance with the RTAP requirements and no additional add-on control device for the RTO exhaust is needed for HF control. In generating HF emission estimates for the RTO Bypass stack, the analysis herein assumes that the HF emissions measured at the RTO outlet during the performance testing would instead be emitted through the bypass stack. This assumption is a conservative over-representation of HF emissions from the bypass stack, because the bypass does not thermally destroy any PFCs within the combustion chambers of the RTO. The stack test results are utilized within these emission calculations, which are presented in Attachment B.8.

3.2 Facility Capture System Improvements

Extensive evaluation of the towers was undertaken in 2018 to determine how to maximize the collection of fugitive emissions inside the facility building and modifications subsequently occurred in several areas for this purpose. At the time of the 2021 stack testing, negative pressure was confirmed relative to operation of the

sources exhausting to the RTO to maximize the capture of potential fugitive emissions as referenced within the summary of the September 2021 RTO testing.

3.3 Air Pollution Control Equipment Monitoring Plan

Saint-Gobain has prepared an Air Pollution Control Equipment Monitoring Plan, which was submitted to NHDES in February 2022. Operation of the RTO will continue under this Monitoring Plan as part of operations under the State Permit to Operate.

4.0 DEPOSITION MODELING

Barr Engineering has previously submitted Air Deposition Modeling on behalf of Saint-Gobain regarding operation of the RTO and bypass stack in the December 18, 2021 Application for a Significant Modification to TP-0256. The modeling was completed to derive the maximum allowable number of hours during which the RTO could be operated in bypass mode for any 12-month period. The modeling indicated that the facility would be able to comply with NH Statute Chapter 125-C:10-e relative to HF, APFO, PFOA and PFOS if the bypass stack was used up to 4,145 hours in a 12-month period. A copy of the Air Dispersion and Deposition Modeling Summary prepared by Barr Engineering and previously submitted in December 2021 is included as Attachment C.

4.1 Compliance with RSA 125-C:10-e (PFOA & PFOS)

PFOA and PFOS emission rates for the bypass stack air deposition modeling were taken from the September 2021 stack testing emissions at the RTO inlet because these would be the emission rates directly from the bypass stack outlet in the event of brief unavoidable periods of RTO malfunction. A deposition modeling scenario was performed at both the maximum flowrate (57,500 SCFM as measured during the September 2021 stack testing) and expected average operating flowrate (50,000 SCFM)using the contaminant emission rate (on a mass per unit time basis) from the September 2021 stack test. Under actual operations with reduced flow, the mass per unit time emission rate would be expected to be lower than the level from the September 2021 stack test and as such the emissions of PFOA and PFOS are conservatively overestimated in these calculations.

The deposition modeling provides a unit impact rate (UIR) for each modeled receptor, which describes the amount of deposition at that location. The maximum UIR from the entire modeled area is then used to calculate the maximum allowable annual emissions based on the maximum allowable concentration infiltrating to groundwater for each contaminant. The maximum annual hours at which the bypass stack can operate while not exceeding the maximum allowable annual emissions can then be calculated based on the ratio of the maximum allowable annual emissions to the annual emission rate from the 2021 stack testing. The table below details the key values in calculating the

annual operating hours. For a full explanation of the calculations and additional intermediate steps, see Table 3 in Appendix C.

Contaminant	Maximum Concentration Infiltrating to Groundwater ($\mu g/m^3$)	Maximum Unit Impact Rate ($g/m^2/yr$ per g/s)	Maximum Annual Emission Rate (lb/yr)	Annual Emission Rate from 2021 Stack Tests (lb/yr)	Allowable Annual Operating Hours (hr)
Modeling Scenario at 70,000 CFM Bypass Stack Flowrate					
PFOA	<3.4	1.47	<0.085	0.18	4,145
PFOS	<4.4	1.47	<0.110	0.0024	8,760
Modeling Scenario at 50,000 CFM Bypass Stack Flowrate					
PFOA	<3.4	1.35	<0.093	0.18	4,509
PFOS	<4.4	1.35	<0.120	0.0024	8,760

As demonstrated by the air deposition modeling, the bypass could operate for a maximum of 4,145 hours per year without causing or contributing to an exceedance of groundwater or surface water quality standards.

4.2 Compliance with Env-A 1400 (RTAP)

Air dispersion modeling was also performed in 2021 to address the RTAP compounds HF and APFO from the bypass stack. APFO emissions were estimated from the PFOA 2021 stack emissions using a ratio of the compounds' molecular weights.

The HF emission rates for purposes of air dispersion modeling were taken from the 2021 stack testing rates measured at the RTO outlet. This estimate is a conservative approach, as HF emissions at the RTO outlet (i.e., those presented in the model as being discharged from the RTO bypass stack) are presumed to be higher than emissions from the RTO bypass stack due to the expected thermal conversion of PFCs to HF within the RTO.

The results from the air dispersion modeling found that the concentrations were well below the RTAP AAL for both HF and APFO, as shown in the table below. Therefore, the RTO bypass annual operating hours discussed in Section 3.1 would comply with the Env-A 1400 24-hour and Annual AAL. For a full explanation of the calculations, see Table 4 in Appendix C.

Contaminant	Maximum 24-hr Concentration (µg/m³)	24-hr AAL (µg/m³)	% of 24-hr AAL	Maximum Annual Concentration (µg/m³)	Annual AAL (µg/m³)	% of Annual AAL
Modeling Scenario at 70,000 CFM Bypass Stack Flowrate						
HF	0.061	1.5	4.1%	0.0092	0.98	0.94%
APFO	1.4E-05	0.05	0.0%	2.1E-06	0.024	0.0%
Modeling Scenario at 50,000 CFM Bypass Stack Flowrate						
HF	0.061	1.5	4.1%	0.0091	0.98	0.93%
APFO	1.4E-05	0.05	0.0%	2.1E-06	0.024	0.0%

5.0 CONFIDENTIALITY JUSTIFICATION

Saint-Gobain is submitting this confidentiality justification with regards to specific proprietary process data which is included within this supporting documentation. This confidentiality justification identifies what information is protected proprietary and confidential business information. The Confidential Business Information that we seek to be protected is found in Attachments A.2, B.1, B.2 and B.4, each of which contains information on specific raw materials used at the facility.

This supporting documentation contains proprietary process data and information, the release of which may jeopardize the competitive position of Saint-Gobain. Specifically, all documentation regarding raw materials utilized, products produced, manufacturing techniques, line speeds, application rates, and production capacity are being claimed as confidential business information and each of those pages in Attachments B and C are marked as such in accordance with Env-C 208.

Factors Pertaining to Whether or Not a Trade Secret Exists

Saint-Gobain offers the following information to demonstrate that a trade secret exists:

(a) The request for confidentiality contains information which is not known outside of the business of Saint-Gobain, its affiliated companies, its customers or companies with which Saint-Gobain has executed a confidentiality agreement.

(b) The information being considered a trade secret is known only by Saint-Gobain employees, the employees of affiliated companies, and the employees of companies with which Saint-Gobain has executed a confidentiality agreement, and only to the extent that they have the technical training and knowledge to understand how the operations work.

(c) Saint-Gobain restricts access and guards the secrecy of the information considered as trade secrets to its management level staff and personnel requiring access. Files and other documents containing information pertaining to trade secrets are maintained in secure locations at the company's management offices. Saint-Gobain protects the confidentiality of this information by requiring confidentiality agreements with consultants retained to provide services associated with the work.

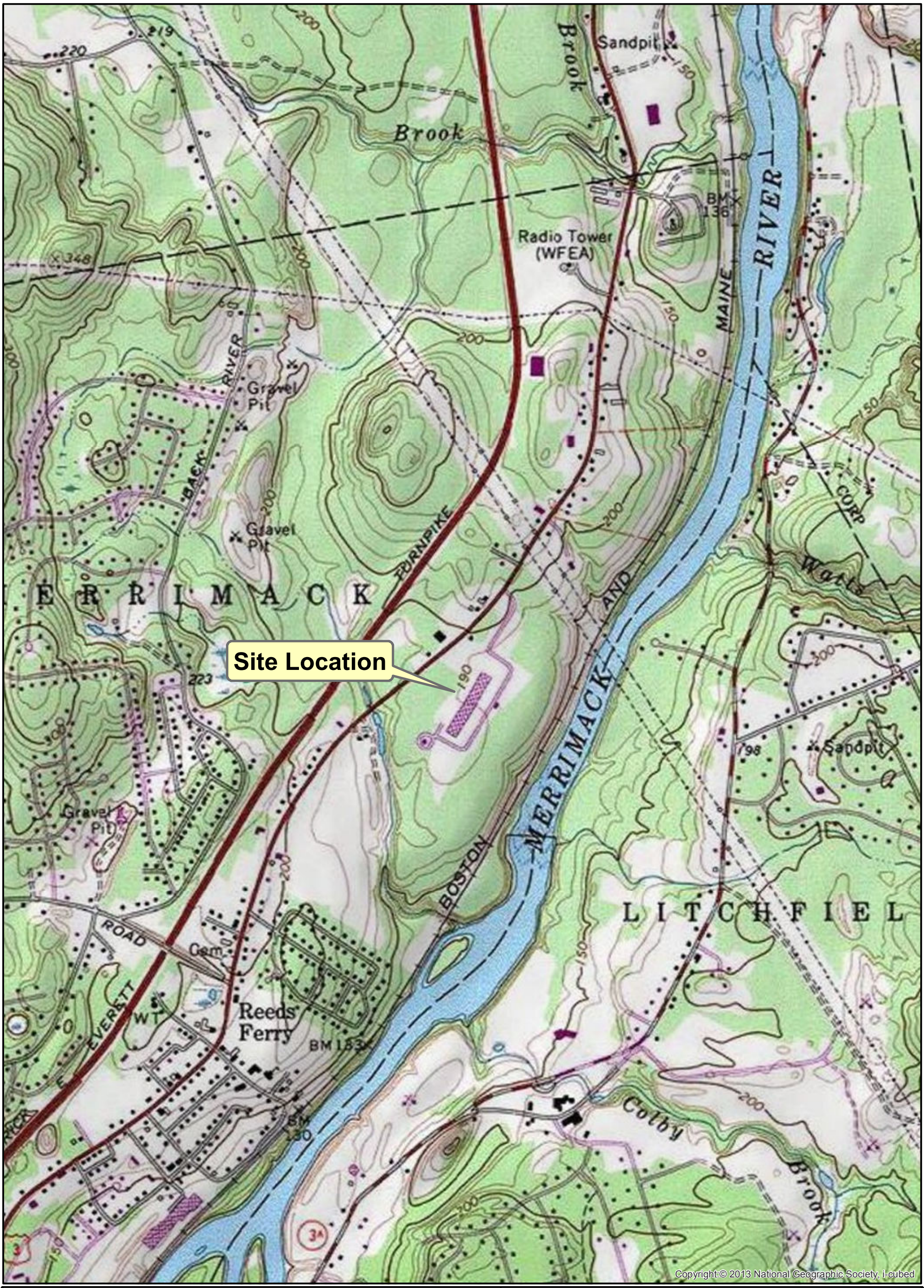
(d) Saint-Gobain has invested significant time and money in the research and development of its processes. These designs represent the product they sell to their customers. If this information were in the public domain Saint-Gobain would lose its competitive advantage.

(e) Saint-Gobain has expended significant resources in market research, contract negotiation and site development which are contingent on being able to produce the products.

(f) Saint-Gobain does not allow the use of documents or designs without written permission. If Saint-Gobain did not authorize the release of this information it could not be properly acquired and therefore would be difficult or illegal to obtain.

Figure 1

Site Location Map (Topographic Map)



N
W E
S

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Site Location Map
701 Daniel Webster Highway

Town of Merrimack **Hillsborough County, New Hampshire**

Project Number: 16.6126
Data Source: USGS
Projection: NH State Plane NAD 83 (ft.)
Date: March 3, 2016
File: MerrimackSiteUSGS11x17.mxd
GIS: CHay

Map Note: The locations and features depicted on this map are approximate and do not represent a field survey.

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FOUNDED IN 1910

Attachment A

Air Permit Application Forms

Attachment A.1

NHDES Form ARD-1

ARD-1 FORM
GENERAL FACILITY INFORMATION

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

This ARD-1 General Facility Information form shall be submitted with every application for an air permit, except for a Permit by Notification (PBN).

1. TYPE OF FACILITY[1]

☐ Title V ☒ Non-Title V ☐ Unknown

2. TYPE OF PERMIT[2]

☐ Temporary Permit (Construction) ☒ State Permit to Operate ☐ Title V Operating Permit

☐ General State Permit ☐ Limitation on Potential to Emit (Env-A 625)

3. TYPE OF APPLICATION[3]

☐ New ☒ Renewal ☐ Modification ☐ Administrative Amendment

4. FACILITY INFORMATION

FACILITY NAME[4]: Saint-Gobain Performance Plastics Corp.	AFS NUMBER[5]: 3301100165	
PHYSICAL ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
GOVERNMENT FACILITY CODE[6]: 0		

5. BUSINESS INFORMATION AS REGISTERED WITH SECRETARY OF STATE (If applicable)

REGISTERED NAME: Saint-Gobain Performance Plastics Corp.		
REGISTERED ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054

6. PARENT CORPORATION INFORMATION (If applicable)

PARENT CORPORATION NAME: Saint-Gobain Corporation		
MAILING ADDRESS: 20 Moores Road		
TOWN/CITY: Malvern	STATE: PA	ZIP: 19355

7. MAJOR ACTIVITY OR PRODUCT DESCRIPTION

List all activities performed at this facility and provide SIC and/or NAICS Code(s).

SIC Code	Activity Description	NAICS Code	Activity Description
2221	Woven Fiber Glass		
2296	Industrial Fabrics		
2851	Fluoropolymer Films		

At a minimum, please provide contact information below for Responsible Official, Prepared Application, Technical, and Invoicing contacts. Make as many copies of this page as necessary in order to include all contacts that you wish to associate with the application. Multiple people can be assigned one role; multiple roles can be assigned to one person.

8. RESPONSIBLE OFFICIAL INFORMATION		
RESPONSIBLE OFFICIAL NAME[7]: David Calentine		
TITLE: Plant Manager		
COMPANY NAME: Saint-Gobain Performance Plastics Corp.		
MAILING ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
EMAIL ADDRESS: David.Calentine@saint-gobain.com		
TELEPHONE NUMBER: 603-420-1267	EXTENSION:	
FAX NUMBER:		
ROLES: ☒ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

9. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME: William Kempskie		
TITLE: EHS Manager		
COMPANY NAME: Saint-Gobain Performance Plastics Corporation		
MAILING ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
EMAIL ADDRESS: William.kempskie@saint-gobain.com		
TELEPHONE NUMBER: 603-420-1387	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☒ Technical ☒ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

10. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME: Daniel Reilly		
TITLE: Division Manager, Environmental Services		
COMPANY NAME: C.T. Male Associates		
MAILING ADDRESS: 50 Century Hill Drive		
TOWN/CITY: Latham	STATE: NY	ZIP: 12110
EMAIL ADDRESS: d.reilly@ctmale.com		
TELEPHONE NUMBER: 518-786-7400	EXTENSION:	
FAX NUMBER: 518-786-7299		
ROLES: ☐ Responsible Official ☒ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☒ Consultant		

11. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

12. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

13. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

For ALL APPLICATIONS except Administrative Amendments, General State Permits, and Limitations on Potential to Emit:

14. FACILITY-WIDE EMISSIONS		
POLLUTANT[8]	POTENTIAL TPY	ACTUAL TPY
VOC	<50	TOTAL = 2.1 TONS PER YEAR
Total HAP	<25	TOTAL = 0.13 TONS PER YEAR
Individual HAP	<10	LARGEST = 0.08 TONS PER YEAR
PFOA	<0.45 lb/yr; 0.000225 ton/yr	0.018 lb/yr; 0.000009 ton/yr
PFOS	<0.57 lb/yr; 0.000285 ton/yr	0.0006 lb/yr; 0.0000003 ton/yr

Please include calculations used in determining emissions and include any non-permitted emission devices.

15. FOR NEW APPLICATIONS OR IF CHANGES ARE MADE – PLEASE INCLUDE:	
☐	A copy of the USGS map, property identified, which shows the facility's location.
☐	A site plan to scale of the facility showing: 1. The locations of all emission points; 2. The dimensions of all buildings and tiers, including roof heights; and 3. The facility's property boundary and any security features (fences, walls, etc.).

16. FOR TITLE V PERMIT APPLICATIONS – PLEASE INCLUDE:[9]		
Included in Application	**Previously Submitted and Unchanged**	
☐	☐	A. Identification and details of limitations on source operation, or any work practice standards affecting emissions for all regulated pollutants.
☐	☐	B. Information required by any other applicable requirement of the Act, including, but not limited to, information related to stack height limitations developed pursuant to section 123 of the federal Clean Air Act (42 U.S.C. §7401).
☐	☐	C. A citation and description of state and federal air pollution control regulations and requirements applicable to each emission unit.
☐	☐	D. A narrative description or reference to test methods used or required for initial compliance demonstration with each applicable regulation.
☐	☐	E. Any additional information required to be provided pursuant to the Act or to determine applicability of any other requirements of the Act.
☐	☐	F. A written explanation of proposed exemptions.
☐	☐	G. Any information required to be provided to the director pursuant to the Act in order to evaluate alternative operating scenarios, or to define permit terms and conditions.
☐	☐	H. A list of all equipment and devices located at the source classified as insignificant activities pursuant to Env-A 600, including appropriate sizing data for equipment and devices which are exempt from permitting requirements based on their process ratings, fuel consumption rate, or both.

16. CONTINUED - FOR TITLE V PERMIT APPLICATIONS – PLEASE INCLUDE:[10]	
Included in Application	
☐	I. Compliance plan information containing: 1. A narrative description of the compliance status of the source with respect to all applicable requirements; 2. A narrative statement of methods used to determine continued compliance, including a description of monitoring, recordkeeping and reporting requirements and test methods; 3. A statement indicating the source's compliance status with an applicable enhanced monitoring and compliance certification requirements specified in Env-A 800; 4. A statement that the source shall continue to comply with all applicable requirements; 5. A statement that the source shall meet all applicable requirements that will become effective during the permit term on a timely basis; 6. A compliance schedule stating all applicable requirements with which the source is not in compliance, consistent with the following: a. The compliance schedule shall incorporate the requirements of and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject; b. Such compliance schedule shall be supplemental to, and not sanction non-compliance with, the applicable requirements on which it is based; and c. The compliance schedule shall include the following statements and schedules: i. A narrative description of how the source shall achieve compliance with such requirements; ii. A schedule of remedial measures, including an enforceable sequence of actions with milestones leading to compliance with any applicable requirements for which the source shall be in non-compliance with at the time of permit issuance; and iii. A schedule for submission of certified progress reports no less frequently than every 6 months. 7. For sources deemed in compliance with all applicable requirements, a certified statement signed by a responsible official stating: "The undersigned certifies that, based on information and belief formed after reasonable inquiry, the source is in compliance with all applicable regulations"; and 8. A schedule for submission of compliance certifications during the permit term, to be submitted annually or more frequently as specified by the underlying applicable requirement.
☐	J. For sources subject to Title IV of the Act, the compliance plan requirements, specified in (I.) above, shall apply to and be included in the acid rain portion of a compliance plan for an affected source, except as specifically superseded by regulations promulgated under Title IV of the Act with regard to the schedule and method(s) the source will use to achieve compliance with the acid rain emission limitations.
☐	K. In addition to the forms required pursuant to Env-A 1700, sources subject to Title IV of the Act shall use the nationally standardized forms for the acid rain portions of the Title V operating permit application, pursuant to 40 CFR 72.30.

This section of the form must be completed and signed by the Responsible Official only.

17. CERTIFICATIONS	
	I certify that the applicant, or the owner or operator the applicant represents, has right, title, or interest in all of the property that is proposed for development or use because the owner or operator owns, leases, or has binding options to purchase all of the property proposed for development or use.
☒	I am authorized to make this submission on behalf of the affected source or affected units for which this submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the information submitted in this document and all of its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

18. RESPONSIBLE OFFICIAL INFORMATION AND SIGNATURE	
RESPONSIBLE OFFICIAL NAME: David Calentine	
TITLE: Plant Manager	
David C Calentine RESPONSIBLE OFFICIAL'S SIGNATURE	5/26/22 DATE:

ARD-1 GENERAL FACILITY INFORMATION INSTRUCTIONS

1 A list of Title V facilities in NH can be found to the NHDES website. Most facilities are Non-Title V. Check Unknown if you are unsure.

2 Temporary Permit = New Construction at Existing or New Facility
State Permit to Operate = Existing Non-Title V Facilities
Title V Operating Permit = Existing Title V Facilities
GSP = General State Permit
Limitation on Potential to Emit = Small Facilities requesting coverage under Env-A 625

3 New = New devices at facility, change in operation at Existing facility or New facility never permitted before
Renewal = Renewal of any permit type
Modification = Currently permitted by non-expired permit and wants to make amendment/modification to information contained in permit. This includes adding/removing devices covered by GSP.
Administrative Amendment = changes in ownership or responsible official.

4 Facility Name = Trade Name or Doing Business As

5 AFS number is assigned by NHDES and is a 10-digit number starting with 33 (example 3300100001).

6 0 = Facility is not government owned
1 = Source owned by the Federal Government
2 = Source owned by the State
3 = Source owned by the County
4 = Source owned by the Municipality
5 = Source owned by the District

7 Responsible Official:
For a corporation = President, Secretary, treasurer, or vice-president in charge of a principal business function
For a partnership = General partner or proprietor
For a municipality = Principal executive officer or ranking elected official

8 For Title V sources, include facility wide emissions of filterable PM, filterable PM_{10}, filterable $PM_{2.5}$, condensable PM, SO_2, NO_x, CO, NMVOCs, Pb (if appropriate), HAPs, and CO_2e.

9 If any of the information requested in Section 16 A-H was submitted in a previous Title V Operating Permit application and has **not** changed, it can be incorporated by reference in the renewal application package. This previous information must be clearly referenced in the renewal application package and must accurately reflect current operations at the facility. If any changes have occurred at the facility or if changes are proposed in the renewal application package, new information must be provided. The information requested in Section 16 I-K must be completed based on current operations at the facility. Due to the time sensitive nature of this required information, incorporation by reference in the application package is **not** allowed.

Attachment A.2

NHDES Form ARD-3: PCE01 (Stacks 1A & 1B) and Attachments

ARD-3 FORM
INFORMATION REQUIRED FOR PERMITS FOR A UNIT OF PROCESSING OR MANUFACTURING EQUIPMENT

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

I. EQUIPMENT INFORMATION – *Complete a separate form for each Emission Unit.*

Emission Unit Description: PCE01 (Stacks 1A & 1B)

Process/ Device	Manufacturer Model # Serial #	Maximum Raw Material Process Rate	Maximum Finished Material Process Rate	Manufacture Date[1]	Installation Date[1]	Stack #	Hours of Operation per day and days/yr
Paint Booth #3 (Example)	*N/A (Example)*	*8 gal/hr (Example)*	*N/A (Example)*	*1997 (Example)*	*1999 (Example)*	*#1 (Ex)*	*3 hr/day; 250 days/yr (Example)*
Metal Furnace #2 (Example)	*Consumat Model C12 S/N: 2569 (Example)*	*N/A (Example)*	*500 lbs/hr (Example)*	*2002 (Example)*	*2002 (Example)*	*#5 (Ex)*	*9 hr/day; 300 days/yr (Example)*
See Attached							

Process Description - Please provide a brief description of each process performed (attach additional pages as needed):

EU01-EU08, EU12, EU13 EU15, & EU16 - Coating operations for paper, fabric, film, or foil; EU22, research and development coating operations for paper, fabric, film, or foil; EU23 - Chemsil Coater coats and dries silicone onto fiberglass through thermally treating a solid paste without the addition of solvent; EU24 & EU25 - MTM and Step Press/Laminator utilize heat to laminate or otherwise affix coated fabrics and films; EU26 - Heat Clean oven used for cleaning by heating.

A. Parts Washers/Solvent Degreasers

☒ **Not Applicable**

Process/Device	Manufacturer & Model #	Capacity (gal)	Solvent Used	# Solvent Changes per Year
Degreaser #2 (Example)	*Safety-Kleen Model 16 (Example)*	*16 gal (Example)*	*Recycled 150 Solvent (Example)*	*2 (Example)*

B. Coatings, Solvents, and Inks Entering Process – *Use additional sheets if necessary*

☐ **Not Applicable**

Process/ Device	Raw Material or Chemical Compound	Potential Usage (gal or lb per hour and per year)		Density (lb/gal)	Percent VOC[2] (wt %)	Percent HAP[3] (wt %)	Potential VOC emissions (lb/yr)	Potential HAP emissions (lb/yr)
Paint Booth (Example)	*Black Enamel #5693 (Example)*	*13 gal/hr (Example)*	*1360 gal/yr (Example)*	*7.5 lb/gal (Example)*	*67.96% (Example)*	*13.17% (Example)*	*6,932 lb/yr (Example)*	*1,343 lb/yr (Example)*
See Attached								

Provide an example of the calculations used to determine total potential VOC and HAP emitted. Indicate if the results are based on test results; if control equipment was taken into account; if conditions exist where solvents remain in the substrate rather than complete volatilization, transfer efficiency, etc.:

Stack test results are utilized for calculating bypass emissions and allowable hours of operation in lieu of a material balance approach.

Coating Application Method:

☐ High Volume-Low Pressure (HVLP) Spray ☐ Electrostatic Spray ☐ Zinc-Arc Spray
☐ Air-Assisted Airless Spray ☐ Airless Spray ☒ Dip Coat
☐ A Flow Coating Technique ☐ Other (specify): _____

C. Amount of Liquid Waste Discarded:

_____ ☐ gal/yr ☐ tons/yr

D. Stack Information

Is device equipped with multiple stacks? ☒ Yes ☐ No *(If yes, provide data for each stack)*
Are multiple units connected to this stack? ☐ Yes ☒ No
*(If **yes**, identify other devices on this stack:)*

Stack #	Discharge Height Above Ground Level (ft)	Inside Diameter (ft) or Area (ft^2) at Stack Exit[4]	Exhaust Temperature (°F)	Exhaust Flow (acfm)	Stack Capped or Otherwise Restricted[5] (Yes - Type/No)	Exhaust Orientation[6]	Stack Monitor (Yes/No) and Description
#5 (Ex)	*65 ft (Example)*	*4 ft (Example)*	*70 °F (Example)*	*1500 acfm (Example)*	*Yes - Rain Cap (Example)*	*Vertical (Example)*	*No (Example)*
1A (Main RTO Stack)	60 ft.	6 ft.	350◦F	100,000 ACFM	No	Vertical	No
1B (RTO Bypass Stack)	63.52 ft.	5 ft.	236◦F	76,900 ACFM	No	Horizontal	Yes - Open/Closed Monitor

E. Hours of Operation

Hours per day: up to 24 Days per year: up to 365

II. NEW HAMPSHIRE REGULATED TOXIC AIR POLLUTANTS (RTAPs) – Env-A 1400

Do any of the devices or processes emit any of the RTAPs listed in Env-A 1400?

☒ Yes ☐ No

If **Yes**, attach your facility's most recent compliance demonstration.

III. SUPPLEMENTAL FUEL USAGE INFORMATION

☐ Not Applicable

A. Fuel Information (List each fuel utilized by the devices)

Device	Fuel Type	Heat Value[7]	Units	Sulfur Content (%)	Maximum Fuel Flow Rate	Units	Maximum Gross Heat Input Rate	Units
Thermal Oxidizer (Example)	*#2 Fuel Oil (Example)*	*140,000 (Example)*	*Btu/gal (Example)*	*0.0015 (Example)*	*20 (Example)*	*gal/hr (Example)*	*1.2 (Example)*	*MMBtu/hr (Example)*
See Attached								

B. Air Pollutant Emissions from Combustion

Pollutant	Emission Factor	Units	Emission Factor Source[8]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP	See Attached						
PM_{10}							
NO_x							
VOC							
CO							
SO_2							
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

Calculations detailed in attachment.

Note: If process utilizes more than one Supplemental Fuel Burning Device, provide all six pollutant emissions information for each device. Use additional pages if necessary.

IV. POLLUTION CONTROL EQUIPMENT

☐ **Not Applicable**

Note: If the devices utilize more than one type of pollution control equipment, provide data for each type of equipment.

Device	Type of Control Device	Manufacturer of Control Device	Model and Serial Number of Control Device (if known)	Pollutant(s) Controlled by Device
Metal Furnace #2 (Example)	*Baghouse #2 (Example)*	*Ultra-Flow Inc. (Example)*	*2400 CFM Small Dust Collector Serial #: N/A (Example)*	*TSP (Example)*
Paint Spray Booth (Example)	*Filter (Example)*	*Paint Arrestors (Example)*	*3100 Series (Example)*	*Zinc Chromate (Example)*
PCE01	Regenerative Thermal Oxidizer	Air Clear	Thermgen 3 Canister RTO Serial No. 64504J5	PFOA and PFOS

For each control device, include an Air Pollution Control Equipment Monitoring Plan pursuant to Env-A 810.

A. Controlled Air Pollution Emissions (list emissions that result <u>after all</u> add on controls – *use additional sheets if necessary*)

Pollutant	Controlled Emission Factor	Units	Emission Factor Source[9]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
See Attached							

Provide an example of the calculations used to determine controlled air pollutant emissions, if applicable:

Calculations detailed in attachment

ARD-3 FORM INFORMATION INSTRUCTIONS

1 If exact date is unknown for Manufacture Date or Installation Date, you may use 01/01/year. Manufacture Date refers to the date the emission unit was originally produced. Installation Date refers to the date the emission unit is installed at the facility.

2 Volatile Organic Compound, as defined in Env-A 100.

3 Hazardous Air Pollutant, as defined in section 112 of the 1990 Clean Air Act Amendments.

4 Examples of Inside Diameter or Area at Stack Exit: Diameter at discharge point of convergence cone, if applicable

5 Flapper valves and other devices which do not restrict the vertical exhaust flow while the device is operating are not considered obstructions or restrictions.

6 Examples of Exhaust Orientation: Vertical, Horizontal, Downward
Note: for a stack to be considered vertical and unobstructed, there shall be no impediment to vertical flow, and the exhaust stack extends 2 feet higher than any roofline within 10 horizontal feet of the exhaust stack

7

Liquid Fuels	Heat Value
Ultra-Low Sulfur Diesel (ULSD)	137,000 Btu/gal
#2 Fuel Oil	140,000 Btu/gal
Kerosene	135,000 Btu/gal
Other – Liquid	Obtain from Fuel Supplier

Gaseous Fuels	Heat Value
Natural Gas	1,020 Btu/cubic foot
Propane (LPG)	94,000 Btu/gal
Gasoline	130,000 Btu/gal
Other (Gaseous)	Obtain from Fuel Supplier

8 Emission factor sources may include:
- Continuous Emissions Monitor (CEM)
- Stack Test (Provide Date)
- Vendor Guaranteed Rates (Provide Documentation)
- AP-42 Emission Factors
- Material Balance (Provide Sample Calculation)
- Engineering Estimate

Section I. Equipment Information

Process/ Device	Manufacturer Model # Serial #	Maximum Raw Material Process Rate [sq. ft/hr]	Maximum Finished Material Process Rate	Manufacture Date	Installation Date	Stack #	Hours of Operation[1] [hr/yr]
MA Tower (EU01)	N/A	6,000	N/A	N/A	1994	1A/1B	3,595
MB Tower (EU02)	N/A	17,500	N/A	N/A	1998	1A/1B	1,491
MC Tower (EU03)	N/A	9,200	N/A	N/A	1998	1A/1B	3,483
MR Tower (EU04)	N/A	9,200	N/A	N/A	2002	1A/1B	3,147
MD Tower (EU05)	N/A	9,200	N/A	N/A	1999	1A/1B	3,108
QX Tower (EU06)	N/A	6,000	N/A	N/A	1989	1A/1B	3,795
20" SBC (EU07)	N/A	500	N/A	N/A	1986	1A/1B	600
20" Coater (EU08)	N/A	500	N/A	N/A	1986	1A/1B	552
MG Tower (EU12)	N/A	4,375	N/A	N/A	2002	1A/1B	832
MP Tower (EU13)	N/A	4,375	N/A	N/A	2002	1A/1B	1,420
MQ Tower (EU15)	N/A	1,100	N/A	N/A	2002	1A/1B	2,859
MS Tower (EU16)	N/A	2,300	N/A	N/A	2002	1A/1B	3,792
R&D Coater (EU22)	N/A	2,600	N/A	N/A	N/A	1A/1B	458
Chemsil Coater (EU23)	N/A	3,800	N/A	N/A	N/A	1A/1B	N/A
MTM (EU24)	N/A	5,000	N/A	N/A	N/A	1A/1B	N/A
Step Press/ Laminator (EU25)	N/A	4,800	N/A	N/A	N/A	1A/1B	N/A
Heat Clean (EU26)	N/A	N/A	N/A	N/A	N/A	1A/1B	N/A

[1] 3-year average based on 2019-2021 annual operating hours per process/device.

Section I.B. Coatings, Solvents, and Inks Entering Process

(All product tracking is done based on total usage and is not tracked per Emission Unit/Tower)

Raw Material	2021 Usage [lb.]	Potential Usage [lb.][1]	Percent VOC	Percent HAP	Potential VOC emissions [lb/yr][2]	Potential HAP emissions [lb/yr][2]
Product #1	0	0	100.0%	24.00%	0	0
Product #2	0	0	100.0%	0%	0	0
Product #3	0	0	100.0%	0%	0	0
Product #4	0	0	100.0%	0%	0	0
Product #5	41	171	0%	0%	0	0
Product #6	74	310	100.0%	0%	310.1	0
Product #7	104	437	0%	0%	0	0
Product #8	10	42	100.0%	0%	42.11	0
Product #9	0	0	100.0%	0%	0	0
Product #10	906	3,817	0%	0%	0	0
Product #11	0	0	100.0%	0%	0	0
Product #12	0	0	100.0%	0%	0	0
Product #13	0	0	100.0%	0%	0	0
Product #14	0	0	100.0%	0%	0	0
Product #15	0	0	100.0%	0%	0	0
Product #16	2,750	11,579	0%	0%	0	0
Product #17	0	0	100.0%	25.10%	0	0
Product #18	293	1,234	0%	3.10%	0	38.25
Product #19	0	0	0%	0%	0	0
Product #20	171	718	0%	0%	0	0
Product #21	82	346	0%	0%	0	0
Product #22	0	0	100.0%	0%	0	0
Product #23	0	0	100.0%	0%	0	0
Product #24	103	434	0%	0%	0	0
Product #25	0	0	100.0%	100.0%	0	0
Product #26	14	58	100.0%	1.00%	57.86	0.58
Product #27	0	0	100.0%	0%	0	0
Product #28	0	0	100.0%	0%	0	0
Product #29	15	64	100.0%	0%	63.58	0
Product #30	0	0	100.0%	0%	0	0
Product #31	0	0	100.0%	0%	0	0
Product #32	5	19	100.0%	0.10%	19.50	0
Product #33	0	0	100.0%	47.30%	0	0
Product #34	0	0	100.0%	0%	0	0
Product #35	0	0	100.0%	0%	0	0
Product #36	756	3,182	0%	0%	0	0
Product #37	0	0	100.0%	0%	0	0
Product #38	0	0	100.0%	30.10%	0	0
Product #39	0	0	100.0%	12.30%	0	0
Product #40	0	0	100.0%	0%	0	0
Product #41	0	0	100.0%	0%	0	0
Product #42	0	0	100.0%	0%	0	0
Product #43	0	0	100.0%	0%	0	0

Raw Material	2021 Usage [lb.]	Potential Usage [lb.][1]	Percent VOC	Percent HAP	Potential VOC emissions [lb/yr][2]	Potential HAP emissions [lb/yr][2]
Product #44	0	0	0%	0%	0	0
Product #45	0	0	100.0%	0%	0	0
Product #46	0	0	100.0%	0%	0	0
Product #47	0	0	100.0%	0%	0	0
Product #48	0	0	100.0%	0%	0	0
Product #49	0	0	100.0%	0%	0	0
Product #50	0	0	100.0%	0%	0	0
Product #51	0	0	100.0%	0%	0	0
Product #52	0	0	100.0%	0%	0	0
Product #53	0	0	100.0%	0%	0	0
Product #54	0	0	100.0%	0%	0	0
Product #55	0	0	100.0%	0%	0	0
Product #56	0	0	100.0%	0%	0	0
Product #57	0	0	100.0%	0%	0	0
Product #58	0	0	100.0%	0%	0	0
Product #59	0	0	100.0%	0%	0	0
Product #60	0	0	100.0%	0%	0	0
Product #61	0	0	100.0%	0%	0	0
Product #62	0	0	100.0%	0%	0	0
Product #63	0	0	100.0%	0%	0	0
Product #64	0	0	100.0%	0%	0	0
Product #65	0	0	100.0%	0%	0	0
Product #66	0	0	100.0%	0%	0	0
Product #67	0	0	100.0%	0%	0	0
Product #68	0	0	100.0%	0%	0	0
Product #69	0	0	100.0%	0%	0	0
Product #70	0	0	100.0%	0%	0	0
Product #71	0	0	100.0%	0%	0	0
Product #72	1,615	6,800	0%	3.00%	0	204.0
Product #73	631	2,656	0%	3.00%	0	79.68
Product #74	3,877	16,325	0%	0%	0	0
Product #75	0	0	100.0%	0%	0	0
Product #76	0	0	100.0%	0%	0	0
Product #77	0	0	100.0%	0%	0	0
Product #78	3,227	13,588	0%	0%	0	0
Product #79	0	0	100.0%	0%	0	0
Product #80	0	0	100.0%	0%	0	0
Product #81	52	220	100.0%	0%	220.2	0
Product #82	0	0	100.0%	0%	0	0
Product #83	200	842	100.0%	0%	842.1	0
Product #84	304	1,280	0%	0%	0	0
Product #85	0	0	100.0%	0%	0	0
Product #86	0	0	100.0%	0%	0	0
Product #87	0	0	100.0%	0%	0	0
Product #88	778	3,274	100.0%	0%	3274	0

Raw Material	2021 Usage [lb.]	Potential Usage [lb.][1]	Percent VOC	Percent HAP	Potential VOC emissions [lb/yr][2]	Potential HAP emissions [lb/yr][2]
Product #89	0	0	100.0%	0%	0	0
Product #90	269	1,132	0%	0%	0	0
Product #91	429	1,807	0%	0%	0	0
Product #92	75,221	316,734	0%	0%	0	0
Product #93	1,201	5,055	0%	0%	0	0
Product #94	0	0	100.0%	0.30%	0	0
Product #95	25	106	100.0%	0.10%	106.0	0
Product #96	18	77	100.0%	0%	76.63	0
Product #97	676	2,848	0%	0%	0	0
Product #98	570,966	2,404,176	0%	0.010%	0	240.4
Product #99	14,242	59,968	0%	0%	0	0
Product #100	12,582	52,981	0%	0.010%	0	5.30
Product #101	0	0	100.0%	0.010%	0	0
Product #102	0	0	100.0%	0%	0	0
Product #103	22	95	100.0%	0%	94.59	0
Product #104	0	0	100.0%	0%	0	0
Product #105	0	0	100.0%	0%	0	0
Product #106	92	387	100.0%	0%	387.0	0
Product #107	0	0	100.0%	0%	0	0
Product #108	5,537	23,316	0%	0%	0	0
Product #109	0	0	100.0%	0%	0	0
Product #110	315	1,326	0%	0%	0	0
Product #111	0	0	100.0%	25.00%	0	0
Product #112	2,094	8,815	10.00%	0.10%	881.5	8.82
Product #113	77,593	326,720	0%	0%	0	0
Product #114	0	0	100.0%	0%	0	0
Product #115	371	1,563	0%	0.10%	0	2
Product #116	0	0	100.0%	0%	0	0
Product #117	440	1,853	0%	0%	0	0
Product #118	0	0	100.0%	0%	0	0
Product #119	0	0	100.0%	0%	0	0
Product #120	0	0	100.0%	0%	0	0
Product #121	110	464	0%	0%	0	0
Product #122	441	1,856	0%	0%	0	0
Product #123	110	464	100.0%	0%	464.1	0
Product #124	55	232	100.0%	0%	232.1	0
Product #125	26	108	100.0%	30.00%	107.8	32.34
Product #126	0	0	100.0%	0%	0	0
Product #127	88	372	100.0%	0%	371.9	0
Product #128	0	0	100.0%	0%	0	0
Product #129	9	38	100.0%	0%	38	0
Product #130	0	0	100.0%	0%	0	0
Product #131	0	0	100.0%	0%	0	0
Product #132	0	0	100.0%	0%	0	0
Product #133	717	3,017	0%	0%	0	0

Raw Material	2021 Usage [lb.]	Potential Usage [lb.][1]	Percent VOC	Percent HAP	Potential VOC emissions [lb/yr][2]	Potential HAP emissions [lb/yr][2]
Product #134	165	696	100.0%	0%	696.3	0
Product #135	1,112	4,682	0%	0%	0	0
Product #136	0	0	100.0%	0%	0	0
Product #137	0	0	100.0%	0%	0	0
Product #138	0	0	100.0%	0%	0	0
Product #139	0	0	0%	0%	0	0
Product #140	0	0	0%	0%	0	0
Product #141	13,393	56,396	0%	0%	0	0
Product #142	13	57	100.0%	0%	56.76	0
Product #143	0	0	0%	0%	0	0
Product #144	362	1,524	100.0%	0%	1524	0
Product #145	1,903	8,015	0%	0%	0	0
Product #146	0	0	100.0%	0%	0	0
Product #147	451	1,898	0%	0%	0	0
Product #148	0	0	100.0%	0%	0	0
Product #149	16	66	100.0%	0%	65.69	0
Product #150	0	0	100.0%	0%	0	0
Product #151	0	0	100.0%	0%	0	0
Product #152	26	111	100.0%	0%	111.2	0
Product #153	613	2,581	0%	0%	0	0
Product #154	127	535	0%	0%	0	0
Product #155	298	1,255	100.0%	0%	1255	0
Product #156	0	0	100.0%	0.010%	0	0
Product #157	47	199	0%	0%	0	0
Product #158	0	0	100.0%	0%	0	0
Product #159	857	3,609	100.0%	0%	3609	0
Product #160	1,029	4,335	0%	0%	0	0
Product #161	3,330	14,022	3.00%	3.00%	420.6	420.6
Product #162	165,958	698,803	0%	0%	0	0
Product #163	19	82	100.0%	0.0016%	81.73	0
Product #164	794	3,343	0%	0.0016%	0	0
Product #165	11,520	48,507	0%	0.0016%	0	0.78
Product #166	11,520	48,507	0%	0.0016%	0	0.78

[1] - Potential Usage (lb/yr) = 2021 Annual Usage (lb/yr) * (1 / 23.5% Utilization in 2021)
2021 Utilization (%) = 2021 Total Combined Coating Tower Operating Hours / (Combined Possible Tower Hours {8,760 hr/yr per Tower})

[2] - Potential Annual VOC/HAP Emissions (lb/yr) = Potential Usage (lb/yr) x % Total VOC or HAP

All VOC/HAP emissions are pre-control values, 2021 stack testing indicated a 77% VOC DRE.

Section III.A. Fuel Information

Device	Fuel Type	Heat Value [Btu/ft^3]	Sulfur Content (%)	Maximum Fuel Flow Rate [ft3/hr]	Maximum Output [MMBtu/hr]
MA Tower (EU01)	Natural Gas	1,020	N/A	3,824	3.9
MB Tower (EU02)	Natural Gas	1,020	N/A	7,353	7.5
MC Tower (EU03)	Natural Gas	1,020	N/A	4,412	4.5
MR Tower (EU04)	Natural Gas	1,020	N/A	4,412	4.5
MD Tower (EU05)	Natural Gas	1,020	N/A	8,824	9
QX Tower (EU06)	Natural Gas	1,020	N/A	7,353	7.5
20” SBC (EU07)	Electric	N/A	N/A	N/A	N/A
20” Coater (EU08)	Electric	N/A	N/A	N/A	N/A
MG Tower (EU12)	Natural Gas	1,020	N/A	5,882	6
MP Tower (EU13)	Natural Gas	1,020	N/A	7,353	7.5
MQ Tower (EU15)	Natural Gas	1,020	N/A	4,412	4.5
MS Tower (EU16)	Natural Gas	1,020	N/A	4,412	4.5
R&D Coater (EU22)	Natural Gas	1,020	N/A	1,961	2
Chemsil Coater (EU23)	Electric	N/A	N/A	N/A	N/A
MTM (EU24)	Natural Gas	1,020	N/A	2,941	3
Step Press/ Laminator (EU25)	Electric	N/A	N/A	N/A	N/A
Heat Clean (EU26)	Natural Gas	1,020	N/A	1,471	1.5
RTO Burner "A"	Natural Gas	1,020	N/A	8,627	8.8
RTO Burner "B"	Natural Gas	1,020	N/A	8,627	8.8

Section III.B. Air Pollutant Emissions from Combustion

Pollutant	Emission Factor[1] [lb/MMSCF]	Emission Factor[2] [lb/MMBTU]	Actual/Potential[3] [lb/hr]	Actual[4] [tpy]	Potential[5] [tpy]
PM (total)	7.6	0.0075	0.62	0.33	2.73
SO_2	0.6	0.00059	0.049	0.026	0.22
NO_x	100	0.098	8.19	4.28	35.86
CO	84	0.082	6.88	3.59	30.12
VOC	5.5	0.0054	0.45	0.24	1.97

Based on Combined heat input rating for Towers and RTO burner = 83.5 MMBtu/hr

[1] Natural gas emission factors for small boilers as found in Tables 1.4-1 and 1.4-2 of AP-42, Chapter 1.4, July 1998

[2] Per AP-42, "To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020."

[3] Actual & Potential [lb/hr] = Sum of Max Output (from III.A.) [MMBTU/hr] x Emission Factor [lb/MMBTU]

[4] Actual 2021 emissions for combustion operations calculated using measured natural gas usage.

[5] Potential [tpy] = Potential [lb/hr] x 8760 [hr/yr] x 1/2000 [ton/lb]

Section IV.A. Controlled Air Pollution Emissions

Pollutant	Controlled Emission Factor[1] [%]	Actual[2] [lb/hr]	Potential[3] [lb/hr]	Actual[4] [tpy]	Potential[5] [tpy]
PFOA	92	1.64E-06	2.06E-05	8.84E-06	4.65E-05
PFOS	75	6.80E-08	2.77E-07	3.16E-07	7.31E-07
Hydrogen Fluoride as F*	N/A	1.21E-02	1.21E-02	5.19E-02	5.30E-02

[1] RTO Destruction/Removal Efficiency (DRE) from September 2021 stack test results.

[2] Controlled emissions measured at the RTO outlet from the September 2021 stack test results.

[3] Uncontrolled emissions measured at the RTO inlet from the September 2021 stack test results. Potential emissions are equal to the actual emissions when the RTO bypass stack is operating.

[4] Max. Actual for PFOA/PFOS (tpy) = (175 hr/yr x potential (lb/hr)) + (8,585 hr/yr x actual (lb/hr))/2,000 lb/ton
Actual for HF (tpy) = (actual (lb/hr) x 8,585 hr/yr)/2,000 lb/ton

Monitoring plan indicates facility will track bypass minutes and flow.
Actual for PFOA/PFOS (tpy) = Bypass Minutes x Flow to RTO at time of bypass (cfm) x PFOA or PFOS Emission Rate (lb/dscf)

[5] Potential for PFOA/PFOS (tpy) = (4,145 hr/yr x potential (lb/hr)) + (4,615 hr/yr x actual (lb/hr))/2,000 lb/ton
Potential for HF (tpy) = (actual (lb/hr) x 8,760 hr/yr)/2,000 lb/ton

* Hydrogen fluoride is not controlled by the RTO but is a byproduct of operation of the RTO in treating

Attachment A.3

NHDES Form ARD-3: Antenna Covering Process Area

ARD-3 FORM
INFORMATION REQUIRED FOR PERMITS FOR A UNIT OF PROCESSING OR MANUFACTURING EQUIPMENT

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

I. EQUIPMENT INFORMATION – *Complete a separate form for each Emission Unit.*

Emission Unit Description: EU17 (Antenna Cover Fabrication Area)

Process/ Device	Manufacturer Model # Serial #	Maximum Raw Material Process Rate	Maximum Finished Material Process Rate	Manufacture Date[1]	Installation Date[1]	Stack #	Hours of Operation per day and days/yr
Paint Booth #3 (Example)	*N/A (Example)*	*8 gal/hr (Example)*	*N/A (Example)*	*1997 (Example)*	*1999 (Example)*	*#1 (Ex)*	*3 hr/day; 250 days/yr (Example)*
Metal Furnace #2 (Example)	*Consumat Model C12 S/N: 2569 (Example)*	*N/A (Example)*	*500 lbs/hr (Example)*	*2002 (Example)*	*2002 (Example)*	*#5 (Ex)*	*9 hr/day; 300 days/yr (Example)*
EU17	N/A	N/A	N/A	N/A	1993	2 (three identical stacks)	8hr/day; 260day/yr

Process Description - Please provide a brief description of each process performed (attach additional pages as needed):

EU17 is an Antenna Cover Fabrication Area which exhausts to the atmosphere through three (3) identical stacks togther identified as Stack #2.

A. Parts Washers/Solvent Degreasers

☒ **Not Applicable**

Process/Device	Manufacturer & Model #	Capacity (gal)	Solvent Used	# Solvent Changes per Year
Degreaser #2 (Example)	*Safety-Kleen Model 16 (Example)*	*16 gal (Example)*	*Recycled 150 Solvent (Example)*	*2 (Example)*

B. Coatings, Solvents, and Inks Entering Process – *Use additional sheets if necessary*

☐ **Not Applicable**

Process/ Device	Raw Material or Chemical Compound	Potential Usage (gal or lb per hour and per year)		Density (lb/gal)	Percent VOC[2] (wt %)	Percent HAP[3] (wt %)	Potential VOC emissions (lb/yr)	Potential HAP emissions (lb/yr)
Paint Booth (Example)	*Black Enamel #5693 (Example)*	*13 gal/hr (Example)*	*1360 gal/yr (Example)*	*7.5 lb/gal (Example)*	*67.96% (Example)*	*13.17% (Example)*	*6,932 lb/yr (Example)*	*1,343 lb/yr (Example)*
See Attached								

Provide an example of the calculations used to determine total potential VOC and HAP emitted. Indicate if the results are based on test results; if control equipment was taken into account; if conditions exist where solvents remain in the substrate rather than complete volatilization, transfer efficiency, etc.:

See Attached

Coating Application Method:

☐ High Volume-Low Pressure (HVLP) Spray ☐ Electrostatic Spray ☐ Zinc-Arc Spray
☐ Air-Assisted Airless Spray ☐ Airless Spray ☐ Dip Coat
☐ A Flow Coating Technique ☒ Other (specify): Manual Application

C. Amount of Liquid Waste Discarded:

_____ ☐ gal/yr ☐ tons/yr

D. Stack Information

Is device equipped with multiple stacks? ☒ Yes ☐ No *(If yes, provide data for each stack)*
Are multiple units connected to this stack? ☐ Yes ☒ No
*(If **yes**, identify other devices on this stack:)*

Stack #	Discharge Height Above Ground Level (ft)	Inside Diameter (ft) or Area (ft^2) at Stack Exit[4]	Exhaust Temperature (°F)	Exhaust Flow (acfm)	Stack Capped or Otherwise Restricted[5] (Yes - Type/No)	Exhaust Orientation[6]	Stack Monitor (Yes/No) and Description
#5 (Ex)	*65 ft (Example)*	*4 ft (Example)*	*70 °F (Example)*	*1500 acfm (Example)*	*Yes - Rain Cap (Example)*	*Vertical (Example)*	*No (Example)*
#2 (3 identical stacks)	2 ft.	6.25 ft2 (30"x30")	70◦F	3,400 ACFM	No	Horizontal	No

E. Hours of Operation

Hours per day: up to 24 Days per year: up to 365

II. NEW HAMPSHIRE REGULATED TOXIC AIR POLLUTANTS (RTAPs) – Env-A 1400

Do any of the devices or processes emit any of the RTAPs listed in Env-A 1400?
☒ Yes ☐ No

If **Yes**, attach your facility's most recent compliance demonstration.

III. SUPPLEMENTAL FUEL USAGE INFORMATION

☒ Not Applicable

A. Fuel Information (List each fuel utilized by the devices)

Device	Fuel Type	Heat Value[7]	Units	Sulfur Content (%)	Maximum Fuel Flow Rate	Units	Maximum Gross Heat Input Rate	Units
Thermal Oxidizer (Example)	*#2 Fuel Oil (Example)*	*140,000 (Example)*	*Btu/gal (Example)*	*0.0015 (Example)*	*20 (Example)*	*gal/hr (Example)*	*1.2 (Example)*	*MMBtu/hr (Example)*

B. Air Pollutant Emissions from Combustion

Pollutant	Emission Factor	Units	Emission Factor Source[8]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP							
PM_{10}							
NO_x							
VOC							
CO							
SO_2							
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

Note: If process utilizes more than one Supplemental Fuel Burning Device, provide all six pollutant emissions information for each device. Use additional pages if necessary.

IV. POLLUTION CONTROL EQUIPMENT

☒ **Not Applicable**

Note: If the devices utilize more than one type of pollution control equipment, provide data for each type of equipment.

Device	Type of Control Device	Manufacturer of Control Device	Model and Serial Number of Control Device (if known)	Pollutant(s) Controlled by Device
Metal Furnace #2 (Example)	*Baghouse #2 (Example)*	*Ultra-Flow Inc. (Example)*	*2400 CFM Small Dust Collector Serial #: N/A (Example)*	*TSP (Example)*
Paint Spray Booth (Example)	*Filter (Example)*	*Paint Arrestors (Example)*	*3100 Series (Example)*	*Zinc Chromate (Example)*

For each control device, include an Air Pollution Control Equipment Monitoring Plan pursuant to Env-A 810.

A. Controlled Air Pollution Emissions (list emissions that result <u>after all</u> add on controls – *use additional sheets if necessary*)

Pollutant	Controlled Emission Factor	Units	Emission Factor Source[9]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)

Provide an example of the calculations used to determine controlled air pollutant emissions, if applicable:

ARD-3 FORM INFORMATION INSTRUCTIONS

1 If exact date is unknown for Manufacture Date or Installation Date, you may use 01/01/year. Manufacture Date refers to the date the emission unit was originally produced. Installation Date refers to the date the emission unit is installed at the facility.

2 Volatile Organic Compound, as defined in Env-A 100.

3 Hazardous Air Pollutant, as defined in section 112 of the 1990 Clean Air Act Amendments.

4 Examples of Inside Diameter or Area at Stack Exit: Diameter at discharge point of convergence cone, if applicable

5 Flapper valves and other devices which do not restrict the vertical exhaust flow while the device is operating are not considered obstructions or restrictions.

6 Examples of Exhaust Orientation: Vertical, Horizontal, Downward
Note: for a stack to be considered vertical and unobstructed, there shall be no impediment to vertical flow, and the exhaust stack extends 2 feet higher than any roofline within 10 horizontal feet of the exhaust stack

7

Liquid Fuels	Heat Value
Ultra-Low Sulfur Diesel (ULSD)	137,000 Btu/gal
#2 Fuel Oil	140,000 Btu/gal
Kerosene	135,000 Btu/gal
Other – Liquid	Obtain from Fuel Supplier

Gaseous Fuels	Heat Value
Natural Gas	1,020 Btu/cubic foot
Propane (LPG)	94,000 Btu/gal
Gasoline	130,000 Btu/gal
Other (Gaseous)	Obtain from Fuel Supplier

8 Emission factor sources may include:
- Continuous Emissions Monitor (CEM)
- Stack Test (Provide Date)
- Vendor Guaranteed Rates (Provide Documentation)
- AP-42 Emission Factors
- Material Balance (Provide Sample Calculation)
- Engineering Estimate

Attachment A.4

NHDES Form ARD-7: Fire Pump

ARD-7 FORM
INFORMATION REQUIRED FOR PERMITS FOR ENGINES AND TURBINES

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

I. FUEL BURNING EQUIPMENT INFORMATION – *Complete a separate form for each emission unit.*

A. Emission Unit Description:

Clarke Fire Pump Model JU4H-UFAD58

☒ Reciprocating Internal Combustion Engine ☐ Combustion Turbine

☐ Rich Burn
☐ Lean Burn
☐ 2-Stroke
☐ 4-Stroke
☐ Dual-fuel

Use:
☒ Emergency
☐ Non-Emergency
☐ Demand Response
☐ Other_____

2015
Date Construction Commenced[1]

2015 | N/A
Installation Date[1] | Manufacture Date[1]

John Deere
Manufacturer

4045
Model Number

PE4045L273937
Serial Number

1.2 MMBtu/hr
Maximum Gross Heat Input Rate

8.7 ☒ gal/hr ☐ mmcf/hr
Maximum Fuel Flow Rate

110 ☒ bhp ☐ bkW
Maximum Engine Output Rating

☒ EPA Certified Not to Exceed Limits? If yes, provide EPA Certification Sheet.

B. Stack Information

Is emission unit equipped with multiple stacks? ☐ Yes ☒ No *(If yes, provide data for each stack)*
Are multiple units connected to this stack? ☐ Yes ☒ No
(If yes, identify other emission units or devices on this stack:) _____

Stack #	Discharge Height Above Ground Level (ft)	Inside Diameter (ft) or Area (ft^2) at Stack Exit[2]	Exhaust Temperature (°F)	Exhaust Flow (acfm)	Stack Capped or Otherwise Restricted[3] (Yes - Type/No)	Exhaust Orientation[4]	Stack Monitor (Yes/No) and Description
#5 (Ex)	*65 ft (Example)*	*4 ft (Example)*	*70 °F (Example)*	*1500 acfm (Example)*	*Yes - Rain Cap (Example)*	*Vertical (Example)*	*Yes – CEM for PM (Example)*
EU20	12 ft	0.33 ft	1021◦F	379 acfm	No	Vertical	No

C. Hours of Operation

Hours per day: up to 24 Days per year: up to 500 hr/yr

II. FUEL USAGE INFORMATION (List each fuel utilized by the emission unit)

Fuel Type	Heat Value[5]	Units	Sulfur Content (%)	Maximum Fuel Flow Rate	Units	Maximum Gross Heat Input Rate	Units
ULSD (Example)	*137,000 (Example)*	*Btu/gal (Example)*	*0.0015 (Example)*	*20 (Example)*	*gal/hr (Example)*	*2.74 (Example)*	*MMBtu/hr (Example)*
ULSD	137,000	Btu/gal	0.0015	8.7	gal/hr	1.2	MMBtu/hr

III. UNCONTROLLED AIR POLLUTANT EMISSIONS (list emissions that result from the burning of each fuel utilized by the emission unit <u>prior</u> to add on controls – *use additional sheets if necessary*)

Pollutant	Emission Factor	Units	Emission Factor Source[6]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP							
PM_{10}	0.0704566	lb/MM BTU	EPA Tier 3 Limit	0.08	0.08	0.02	0.37
NO_x	0.9394212	lb/MM BTU	EPA Tier 3 Limit	1.13	1.13	0.3	4.94
VOC	0.9394212	lb/MM BTU	EPA Tier 3 Limit	1.13	1.13	0.3	4.94
CO	1.1742765	lb/MM BTU	EPA Tier 3 Limit	1.41	1.41	0.4	6.17
SO_2	0.0015	lb/MM BTU	15 ppm Sulfur Limit	1.8E-3	1.8E-3	4.5E-4	0.0079
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

Emission factors listed are in lb/MMBTU

Emission factors for VOC and NOx each assumed to be total of Tier 3 Limit for NMHC + NOx (Tier 3 limits in g/kw-hr = 4.0 for NOx+NMHC; 5.0 for CO; and 0.3 for PM. Conversion Factor from g/kw-hr to g/hp-hr = 0.7457

Hourly Emissions (lb/hr) = (Max. Firing Rate {MMBtu/hr}) * (Emission Factor {lb/MBTU})
Potential Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr)
Annual Emission (lbs/yr) = Unit Firing Rate (MMBtu/hr) * 500 (hr/year) * Emission Factor (lb/MMBTU)

500 hour per year Annual Limit established in Env-A 600

IV. NEW HAMPSHIRE REGULATED TOXIC AIR POLLUTANTS (RTAPs) – Env-A 1400

Does the emission unit burn a non-exempt fuel[7] and emit any of the RTAPs listed in Env-A 1400?
☐ Yes ☒ No
If **Yes**, attach your facility's most recent compliance demonstration.

V. POLLUTION CONTROL EQUIPMENT

☒ **Not Applicable**

Note: If the emission unit utilizes more than one type of pollution control equipment, provide data for each type of equipment.

A. Type of Equipment

Type of Control Device	Manufacturer of Control Device	Model and Serial Number of Control Device (if known)	Pollutant(s) Controlled by Device
Oxidation Catalyst (Example)	*DCL International, Inc. (Example)*	*DC 18012 CC Serial #: N/A (Example)*	*CO and HAPs (Example)*

For each control device, include an Air Pollution Control Equipment Monitoring Plan pursuant to Env-A 810.

B. Controlled Air Pollution Emissions (list emissions that result from the burning of each fuel utilized by the emission unit after all add on controls – *use additional sheets if necessary*)

Pollutant	Controlled Emission Factor	Units	Emission Factor Source[6]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP							
PM_{10}							

NO_x							
VOC							
CO							
SO_2							
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

ARD-7 FORM INFORMATION INSTRUCTIONS

1 If exact date is unknown for Date Construction Commenced, Manufacture Date or Installation Date, you may use 01/01/year. The exception is for calendar years 2006 and 2007, where a month and year are required to determine rule applicability. Date Construction Commenced refers to the date the owner or operator has entered into a contractual obligation to undertake and complete a continuous program of construction, reconstruction, or modification of the emission unit. Manufacture Date refers to the date the emission unit was originally produced. Installation Date refers to the date the emission unit is installed at the facility.

2 Examples of Inside Diameter or Area at Stack Exit: Diameter at discharge point of convergence cone, if applicable

3 Flapper valves and other devices which do not restrict the vertical exhaust flow while the emission unit is operating are not considered obstructions or restrictions.

4 Examples of Exhaust Orientation: Vertical, Horizontal, Downward
Note: for a stack to be considered vertical and unobstructed, there shall be no impediment to vertical flow, and the exhaust stack extends 2 feet higher than any roofline within 10 horizontal feet of the exhaust stack

5

Liquid Fuels	Heat Value
Ultra-Low Sulfur Diesel (ULSD)	137,000 Btu/gal
#2 Fuel Oil	140,000 Btu/gal
Kerosene	135,000 Btu/gal
Other – Liquid	Obtain from Fuel Supplier

Gaseous Fuels	Heat Value
Natural Gas	1,020 Btu/cubic foot
Propane (LPG)	94,000 Btu/gal
Gasoline	130,000 Btu/gal
Other (Gaseous)	Obtain from Fuel Supplier

6 Emission factor sources may include:
- Continuous Emissions Monitor (CEM)
- Stack Test (Provide Date)
- Vendor Guaranteed Rates (Provide Documentation)
- EPA Certified Not To Exceed Limits (i.e. Tier II engine – submit specifications sheet or certification for documentation)
- AP-42 Emission Factors
- Material Balance (Provide Sample Calculation)
- Engineering Estimate

7 Fuels exempt from Env-A 1400 include:
- Virgin Petroleum Products (#2, #4, or #6 fuel oil, gasoline, kerosene, jet fuel, etc.)
- Coal
- Natural Gas
- Propane
- Biofuels – as defined in Env-A 1401.03(b)
- Biomass – as defined in Env-A 1401.03(c)

CLARKE®

FIRE PUMP ENGINES

MODELS

JU4H-UFAD58 JU4H-UFADW8
JU4H-UFADP0 JU4H-UFADY8
JU4H-UFADR0 JU4H-UFAD98

FM-UL-cUL APPROVED RATINGS BHP/*KW*

JU4H MODEL ♦	RATED SPEED 1760		2100		2350		2400		US-EPA (NSPS) Available Until ●
UFAD58	110	*82*							*No Expiration*
UFADP0	121	*90*	125	*93*	130	*97*	130	*97*	*No Expiration*
UFADR0	113	*84*	136	*101*	140	*104*	140	*104*	*No Expiration*
UFADW8	144	*107*							*No Expiration*
UFADY8	157	*117*							*No Expiration*
UFAD98	175	*131*							*No Expiration*

●USA EPA (NSPS) Tier 3 Emissions Certified Off-Road (40 CFR Part 89) and NSPS Stationary (40 CFR Part 60 Sub Part IIII). Meet EU Stage IIIA emission levels.
♦ All Models available for Export

Picture shown represents JU4H-TRWA engine model

SPECIFICATIONS

ITEM	JU4H MODELS UFAD58	UFADP0	UFADR0	UFADW8	UFADY8	UFAD98
Number of Cylinders	4					
Aspiration	TRWA					
Rotation*	CW					
Overall Dimensions In. (mm)	59.9 (1523) H x 44.4 (1127) L x 37.3 (949) W					
Crankshaft Centerline Height – in. (mm)	14 (356)					
Weight – lb (kg)	1490 (676)					
Compression Ratio	19.0:1					
Displacement – cu. in. (l)	275 (4.5)					
Engine Type	4 Stroke Cycle – Inline Construction					
Bore & Stroke – in. (mm)	4.19 x 5.00 (106 x 127)					
Installation Drawing	D630					
Wiring Diagram AC	C07651					
Wiring Diagram DC	C071367, C072146, C071361					
Engine Series	John Deere 4045 Series Power Tech E					
Speed Interpolation	N/A					

Abbreviations: CW – Clockwise TRWA – Turbocharged with Raw Water Aftercooling N/A Not Available L – Length W – Width H - Height

*Rotation viewed from Heat Exchanger / Front of engine

CERTIFIED POWER RATING

- Each engine is factory tested to verify power and performance.
- FM-UL power ratings are shown at specific speeds, Clarke engines can be applied at these single rated RPM settings with a speed adjustment of ± 50 RPM.

ENGINE RATINGS BASELINES

- Engines are to be used for stationary emergency standby fire pump service only. Engines are to be tested in accordance with NFPA 25.
- Engines are rated at standard SAE conditions of 29.61 in. (752.1 mm) Hg barometer and 77°F (25°C) inlet air temperature [approximates 300 ft. (91.4 m) above sea level] by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m)
- A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10°F (5.6°C) above 77°F (25°C) ambient temperature.

c UL us

NFPA 20 Requirements

FM C US APPROVED

CLARKE®

FIRE PUMP ENGINES

MODELS

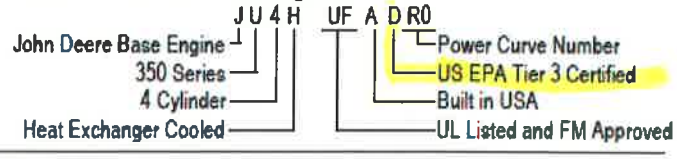
JU4H-UFAD58 JU4H-UFADW8
JU4H-UFADP0 JU4H-UFADY8
JU4H-UFADR0 JU4H-UFAD98

ENGINE EQUIPMENT

EQUIPMENT	STANDARD	OPTIONAL
Air Cleaner	Direct Mounted, Washable, Indoor Service with Drip Shield	Disposable, Drip Proof, Indoor Service Outdoor Type, Single or Two Stage (Cyclonic)
Alarms	Overspeed Alarm & Shutdown, Low Oil Pressure, Low & High Coolant Temperature, Low Raw Water Flow, High Raw Water Temperature	Low Coolant Level, Low Oil Level, Oil Filter Differential Pressure, Fuel Filter Differential Pressure, Air Filter Restriction
Alternator	12V-DC, 42 Amps with Poly-Vee Belt and Guard	24V-DC, 40 Amps with Poly-Vee Belt and Guard
Coupling	Bare Flywheel	UL Listed Driveshaft and Guard, JU4H-UFAD58, P0, R0, W8, Y8 – CDS30-S1; JU4H-UFAD98 – CDS-50
Electronic Control Module	12V-DC, Energized to Stop, Primary ECM always Powered on	24V-DC, Energized to Stop, Primary ECM always Powered on
Engine Heater	115V-AC, 1000 Watt	230V-AC, 1000 Watt
Exhaust Flex Connection	SS Flex, NPT(M) Connection, 4"	SS Flex, 150# ANSI Flanged Connection, 5"
Exhaust Protection	Metal Guards on Manifolds and Turbocharger	
Flywheel Housing	SAE #3	
Flywheel Power Take Off	11.5" SAE Industrial Flywheel Connection	
Fuel Connections	Fire Resistant, Flexible, USA Coast Guard Approved Supply and Return Lines	SS, Braided, cUL Listed, Supply and Return Lines
Fuel Filter	Primary Filter with Priming Pump	
Fuel Injection System	High Pressure Common Rail	
Governor, Speed	Dual Electronic Control Modules	
Heat Exchanger	Tube and Shell Type, 60 PSI (4 BAR), NPT(F) Connections – Sea Water Compatible	
Instrument Panel	Multimeter to Display English and Metric, Tachometer, Hourmeter, Water Temperature, Oil Pressure and One (1) Voltmeter with Toggle Switch, Front Opening	
Junction Box	Integral with Instrument Panel; For DC Wiring Interconnection to Engine Controller	
Lube Oil Cooler	Engine Water Cooled, Plate Type	
Lube Oil Filter	Full Flow with By-Pass Valve	
Lube Oil Pump	Gear Driven, Gear Type	
Manual Start Control	On Instrument Panel with Control Position Warning Light	
Overspeed Control	Electronic, Factory Set, Not Field Adjustable	
Raw Water Cooling Loop w/Alarms	Galvanized	Seawater, All 316SS, High Pressure
Raw Water Cooling Loop Solenoid Operation	Automatic from Fire Pump Controller and from Engine Instrument Panel (for Horizontal Fire Pump Applications)	Not Supplied (for Vertical Turbine Fire Pump Applications)
Run – Stop Control	On Instrument Panel with Control Position Warning Light	
Starters	Two (2) 12V-DC	Two (2) 24V-DC
Throttle Control	Adjustable Speed Control by Increase/Decrease Button, Tamper Proof in Instrument Panel	
Water Pump	Centrifugal Type, Poly-Vee Belt Drive with Guard	

Abbreviations : DC – Direct Current, AC – Alternating Current, SAE – Society of Automotive Engineers, NPT(F) – National Pipe Tapered Thread (Female), NPT(M) – National Pipe Tapered Thread (Male), ANSI – American National Standards Institute, SS – Stainless Steel

MODEL NOMENCLATURE (10 Digit Models)



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CLARKE

FIRE PUMP ENGINES

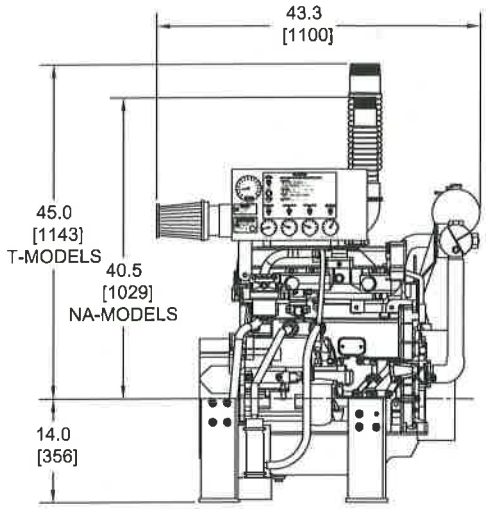
MODELS

JU4H-UF10, JU4H-UF12, JU4H-UF20, JU4H-UF22, JU4H-UF30, JU4H-UF32, JU4H-UFH8, JU4H-UFH0, JU4H-UFH2, JU4H-UF40, JU4H-UF42, JU4H-UF58, JU4H-UF50, JU4H-UF52

FM-UL-CUL APPROVED RATINGS BHP/*KW*

JU4H MODEL	RATED SPEED 1470		1760		2100		2350		2600	
UF10			41	*31*	51	*38*	55	*41*		
UF12							55	*41*	59	*44*
UF20			60	*45*	67	*50*	72	*54*		
UF22							72	*54*	75	*56*
UF30			64	*48*	79	*59*	85	*63*		
UF32							85	*63*	85	*63*
UFH8	63	*47*	73	*54*						
UFH0			73	*54*	88	*66*	98	*73*		
UFH2							98	*73*	99	*74*
UF40			94	*70*	105	*78*	106	*79*		
UF42							106	*79*	106	*79*
UF58	79	*59*	110	*82*						
UF50			110	*82*	130	*97*	127	*95*		
UF52							127	*95*	127	*95*

All engine models and ratings are USA EPA emissions compliant per NSPS (40 CFR Part 60 Sub Part IIII)



JU4H-UF50
OVERALL WIDTH
29.0
[735]

SPECIFICATIONS

ITEM	JU4H MODELS UF10/12	UF20/22	UF30/32	UFH8/H0/H2	UF40/42	UF58/50/52
Number of Cylinders	4					
Aspiration	NA		T			
Rotation*	Clockwise (CW)					
Weight - lb (kg)	910 (413)		935 (424)			
Compression Ratio	17.6:1		17.0:1			
Displacement - cu. in. (l)	275 (4.5)					
Engine Type	4 Stroke Cycle - Inline Construction					
Bore & Stroke - in. (mm)	4.19 x 5.00 (106 x 127)					
Installation Drawing	D - 534 - US		D - 545 - UK			
Wiring Diagram	C07575 (DC Engine Wiring)		C07651 (AC Heater Wiring)			
Engine Series	John Deere 4045 Series					

Abbreviations: CW – Clockwise NA – Naturally Aspirated T – Turbocharged

*Rotation viewed from Heat Exchanger / Front of engine • Engine intended for Indoor use or inside weatherproof enclosure only

† ENGINE RATINGS BASELINES

- Engines are rated at standard SAE conditions of 29.61 in. (7521 mm) Hg barometer and 77°F (25°C) inlet air temperature [approximates 300 ft. (91.4 m) above sea level] by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m).
- A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10°F (5.6°C) above 77°F (25°C) ambient temperature.
- Note: Engines are not to be used for continuous duty. Engines are to be used only for stationary emergency standby fire pump service. According to NFPA 25 engines are to be tested 30 minutes per week at no pump flow and full pump flow once per year.

CERTIFIED POWER AT ANY SPEED

- Although FM-UL Certified BHP ratings are shown at specific speeds, Clarke engines can be applied at any intermediate speed. To determine the intermediate certified power, make a linear interpolation from the Clarke FM-UL certified power curve. Contact Clarke or your Pump OEM representative to obtain details.

c UL us

Meets NFPA 20 Requirements

FM C US APPROVED

CLARKE

FIRE PUMP ENGINES

MODELS

JU4H-UF10, JU4H-UF12, JU4H-UF20, JU4H-UF22, JU4H-UF30, JU4H-UF32, JU4H-UFH8, JU4H-UFH0, JU4H-UFH2, JU4H-UF40, JU4H-UF42, JU4H-UF58, JU4H-UF50, JU4H-UF52

ENGINE EQUIPMENT

EQUIPMENT	STANDARD	OPTIONAL
Air Cleaner	Direct Mounted, Washable, Indoor Service	Disposable, Drip proof, Indoor Service, Outdoor Type
Alternator	12V-DC, 42 Amps; w/Belt Guard	24V-DC, 40 Amps; w/Belt Guard
Exhaust Protection	Blankets on UF10/12, UF20/22, Metal Guards on Manifolds & Turbo on UF30/32, UFH8/H0/H2, UF40/42, UF50/52/58	
Coupling	Bare Flywheel	UL-Drive Shaft & Guard, UF10/12, UF20/22 - CDS10-SC; UF30/32, UFH8/H0/H2, UF40/42 - CDS20-SC; UF58/50/52 - CDS30-S1
Exhaust Flex Connection	SS Flex, NPT, 3" NA, SS Flex, NPT, 4" T	SS Flex, 150# Flange, 4" & 5"
Flywheel Housing	S.A.E. #3	
Flywheel Power Take Off	11.5" S.A.E. Industrial Flywheel Connection	
Fuel Connections	Fire Resistant Flexible Supply & Return Lines	
Fuel Filter	Primary Filter w/priming pump	
Fuel Injection System	Stanadyne Direct Injection	
Engine Heater	120V-AC, 1500 Watt	240V-AC, 1500 Watt
Governor, Speed	Constant Speed, Mechanical	
Heat Exchanger	Tube & Shell Type, 60 PSI w/NPTF Connections	
Instrument Panel	English & Metric, Tachometer, Hourmeter, Water Temperature, Oil Pressure & Two (2) Voltmeters	
Junction Box	Integral with Instrument Panel; For DC Wiring Interconnection to Engine Controller	
Lube Oil Cooler	Engine Water Cooled, Plate Type	
Lube Oil Filter	Full Flow w/By-Pass Valve	
Lube Oil Pump	Gear Driven, Gear Type	
Manual Start Controls	On Instrument Panel	
Overspeed Control	Electronic w/Reset & Test on Instrument Panel	
Raw Water Solenoid Operation	Automatic from Engine Controller & from Instrument Panel	
Run-Stop Control	On Instrument Panel With Control Position Warning Light	
Run Solenoid	12V-DC Energized to Run	24V-DC Energized to Run 12V-DC Energized to Stop 24V-DC Energized to Stop
Starters	Two (2) 12V-DC	Two (2) 24V-DC
Throttle Control	Adjustable Speed Control, Tamper Proof	
Water Pump	Poly-Vee Belt Drive w/Guard	

MODEL NOMENCLATURE: (8 Digit Models)

JU4H-UF10

- JU — John Deere Base Engine
- 4 — 250 Series
- H — 4 Cylinders
- UF — Heat Exchanger Cooled
- 10 — Power Curve Number
- F — FM Approved
- U — UL Listed

CLARKE

CLARKE Fire Protection Products, Inc.
3133 E. Kemper Rd., Cincinnati, Ohio 45241
United States of America
Tel +1-513-771-2200 Fax +1-513-771-0726
www.clarkefire.com

CLARKE UK, Ltd.
Grange Works, Lomond Rd., Coatbridge, ML5-2NN
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Tel +44-1236-429946 Fax +44-1236-427274
www.clarkefire.com

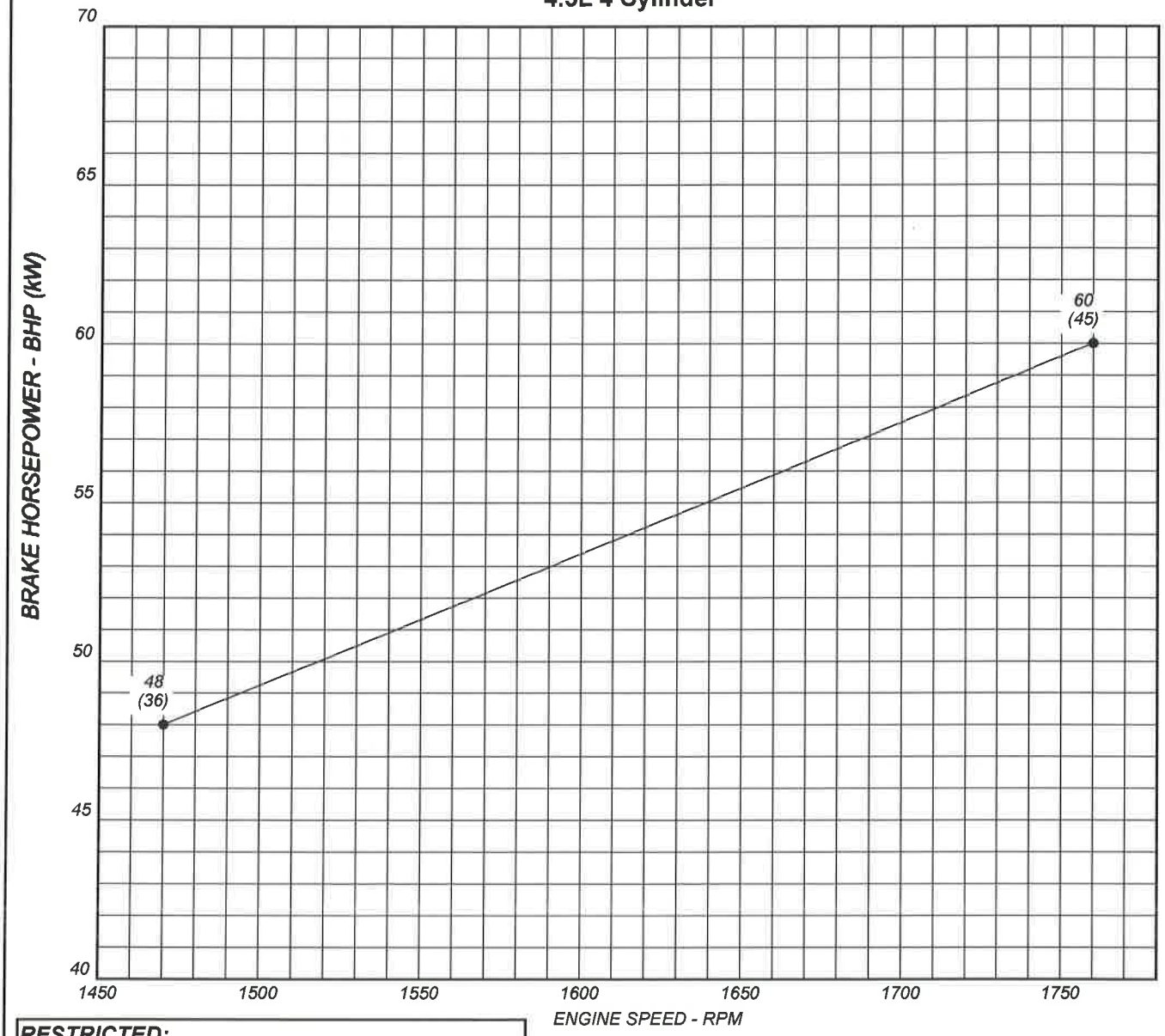
C13600 1.2 5/09

Printed in U.S.A.

CLARKE

Fire Protection Products, Inc.

FIRE PUMP MODEL: JU4H-UF28
Heat Exchanger
Turbocharged
4.5L 4 Cylinder



RESTRICTED:
USE ONLY FOR STAND-BY FIRE PUMP APPLICATIONS

ENGINE PERFORMANCE:
STANDARD CONDITIONS: (SAE J1349, ISO 3046)
77°F (25°C) AIR INLET TEMPERATURE
29.61 IN. (751.1MM) HG BAROMETRIC PRESSURE
#2 DIESEL FUEL (SEE C13940)

KEVIN KUNKLER 25AUG03

NAMEPLATE BHP (MAXIMUM PUMP LOAD)

CREATED	DATE CREATED
KTF	08/25/03

ENGINE MODEL JU4H-UF28

DRAWING NO.	REV
C13978	A

JU4H-UF28
INSTALLATION & OPERATION DATA
USA Production

Basic Engine Description

Engine Manufacturer	John Deere Co.
Ignition Type	Compression (Diesel)
Number of Cylinders	4
Bore and Stroke - in.(mm)	4.19(106) x 5.00(127)
Displacement - $in.^3$ (L)	275 (4.5)
Compression Ratio	17.0:1
Valves per cylinder - Intake	1
Exhaust	1
Combustion System	Direct Injection
Engine Type	Rotary, 4 Stroke Cycle
Aspiration	Naturally Aspirated
Firing Order (CW Rotation)	1-3-4-2
Charge Air Cooling Type	None
Rotation (Viewed from Front) - Clockwise	Standard
Counter-Clockwise	Not Available
Engine Crankcase Vent System	Open
Installation Drawing	D-538

Cooling System	**1470**	**1760**
Engine H_2O Heat -Btu/sec.(kW)	11 (12)	19 (20)
Engine Radiated Heat - Btu/sec.(kW)	10 (11)	13 (14)
Heat Exchanger Minimium Flow		
60°F (15°C) Raw H_2O - gal/min. (L/min.)	6 (23)	6 (23)
95°F (35°C) Raw H_2O - gal/min. (L/min.)	7 (27)	8 (30)
Heat Exchanger Maximum Cooling H_2O		
Inlet Pressure - bar ($lb./in.^2$) (kPa)	4 (60) (400)	
Flow - gal./min (L/min.)	40 (151)	
Thermostat, Start to Open - °F (°C)	187 (86)	
Fully Opened - °F (°C)	196 (91)	
Engine Coolant Capacity - qt. (L)	15 (14)	
Coolant Pressure Cap - $lb./in.^2$(kPa)	10 (69)	
Maximum Engine H_20 Temperature - °F (°C)	200 (93)	
Minimum Engine H_20 Temperature - °F (°C)	160 (71)	

Electric System - DC		
System Voltage (Nominal)	12	24
Battery Capacity for Ambients Above 32°F (0°C)		
Voltage (Nominal)	12	24
Qty. per Battery Bank	1	2
SAE size per J537	4D-640	4D-640
CCA @ 0°F (-18°C)	640	640
Reserve Capacity - Minutes	285	285
Battery Cable Circuit*, Max Resistance - ohm	0.0012	0.0012
Battery Cable Minimum Size		
0 -120 in. Circuit* Length	00	00
121 - 160 in. Circuit* Length	000	000
161 - 200 in. Circuit* Length	0000	0000
Charging Alternator Output - Amp	40	40
Starter Cranking Amps - @ 60°F (15°C)	380	250

**Positive and Negative Cables Combined Length*

NOTE: This engine is Intendend For Indoor Installation Or In A Weatherproof Enclosure. *(Continued)*

JU4H-UF28
INSTALLATION & OPERATION DATA (Continued)
USA Production

	1470	1760
Exhaust System		
Exhaust Flow - ft.^{3}/min. (m^3/min.)	348 (9.9)	379 (10.7)
Exhaust Temperature - °F (°C)	1025 (609)	1021 (549)
Maximum Allowable Back Pressure - in. H_20 (kPa)	30 (7.4)	
Minimum Exhaust Pipe Dia. - in. (mm)**	3 (76)	
Fuel System		
Fuel Consumption - gal./hr. (L/hr.)	2.5 (9.5)	3.8 (14.4)
Fuel Return - gal./hr. (L/hr)	7.4 (28.0)	7.9 (30.0)
Total Supply Fuel Flow - gal./hr (L/hr.)	9.9 (37.5)	11.7 (44.4)
Fuel Pressure - lb./in.^{2} (kPa)	3-6 (21-41)	
Minimum Line Size - Supply - in. (mm)	.50 (12.7) Sch. 40 - Black Iron	
Minimum Line Size - Return - in. (mm)	.375 (9.5) Sch. 40 - Black Iron	
Maximum Allowable Fuel Pump Suction		
With Clean Filter - in. H_20 (mH_20)	31 (0.8)	
Maximum Allowable Fuel Head above Fuel pump, Supply or Retrun - m(ft)	1.4 (4.5)	
Fuel Filter Micron Size	8	
Heater System		
Jacket Water Heater		
Wattage (Nominal)	1500	
Voltage - AC, 1P	115 (+5%, -10%)	
Optional Voltage - AC, 1P	230 (+5%, -10%)	
Induction Air System		
Air Cleaner Type	Indoors Service Only - Washable	
Air Intake Restriction Maximum Limit		
Dirty Air Cleaner - in. H_20 (kPa)	5 (1.2)	
Clean Air Cleaner - in. H_20 (kPa)	1 (0.2)	
Engine Air Flow - ft.^{3}/min. (m^3/min.)	127 (3.6)	140 (4.0)
Maximum Allowable Temperature (Air To Engine Inlet) - °F (°C)***	130 (54)	
Lubrication System		
Oil Pressure - normal - lb./in.^{2} (kPa)	35-50 (241-345)	
In Pan Oil Temperature - °F (°C)	220-245 (104-118)	
Oil Pan Capacity - High - qt. (L)	8 (7.5)	
Low - qt. (L)	7 (6.5)	
Total Oil Capacity with Filter - qt. (L)	9 (8.5)	
Performance		
BMEP - lb./in.^{2} (kPa)	103 (711)	98 (677)
Piston Speed - ft./min. (m/min.)	1226 (374)	1467 (447)
Mechanical Noise - dB(A) @ 1m	C131603	
Power Curve	C131082	

*** Based On Nominal System. Flow Analysis Must Be Done To Assure Adherance To System Limitations. (Minimum Exhaust pipe Diameter is based on 15 feet of pipe, one elbow, and a silencer pressure drop no greter than one half the max. allowable back pressure.)*

**** Review For Power Deration If Air Entering Engine Exceeds °77F (25°C)*

C131600 rev D
ACH 06DEC06

JU4H & JU6H ENGINE MODELS
ENGINE MATERIALS AND CONSTRUCTION

Air Cleaner
Type..... Indoor Usage Only
Oiled Fabric Pleats
Material..... Surgical Cotton
Aluminum Mesh

Air Cleaner - Optional
Type..... Canister
Material..... Pleated Paper
Housing..... Enclosed

Camshaft
Material..... Cast Iron
Chill Hardened
Location..... In Block
Drive..... Gear, Spur
Type of Cam..... Ground

Charge Air Cooler (JU6H-60,62,68,74,84, ADK0, AD58, ADNG, ADN0, ADQ0, ADR0, AAQ8, AARG, ADP8, ADP0, ADT0, AD88, ADR8, AD98, ADS0, ADW8, ADX8, AD98 only)
Type..... Raw Water Cooled

Materials (in contact with raw water)
Tubes..... 90/10 CU/NI
Headers ..... 36500 Muntz
Covers ..... 83600 Red Brass
Plumbing ..... 316 Stainless Steel/ Brass
90/10 Silicone

Coolant Pump
Type..... Centrifugal
Drive..... Poly Vee Belt

Coolant Thermostat
Type..... Non Blocking
Qty..... 1

Connecting Rod
Type..... I-Beam Taper
Material..... Forged Steel Alloy

Crank Pin Bearings
Type..... Precision Half Shell
Number..... 1 Pair Per Cylinder
Material..... Wear-Guard

Crankshaft
Material..... Forged Steel
Type of Balance..... Dynamic

Cylinder Block
Type..... One Piece with
Non-Siamese Cylinders
Material..... Annealed Gray Iron

Cylinder Head
Type..... Slab 2 Valve
Material..... Annealed Gray Iron

Cylinder Liners
Type..... Centrifugal Cast, Wet Liner
Material..... Alloy Iron Plateau, Honed

Valves
Type..... Poppet
Arrangement..... Overhead Valve
Number/Cylinder..... 1 intake
1 exhaust
Operating Mechanism..... Mechanical Rocker Arm
Type of Lifter..... Large Head
Valve Seat Insert..... Replaceable

Fuel Pump
Type..... Diaphragm
Drive..... Cam Lobe

Heat Exchanger (USA)
Type..... Tube & Shell
Materials
Tube& Headers..... Copper
Shell..... Copper
Electrode..... Zinc

Heat Exchanger (UK)
Type..... Tube & Bundle
Materials
Tube& Headers..... Copper
Shell..... Aluminum

Injection Pump
Type..... Rotary
Drive..... Gear

Lubrication Cooler
Type..... Plate

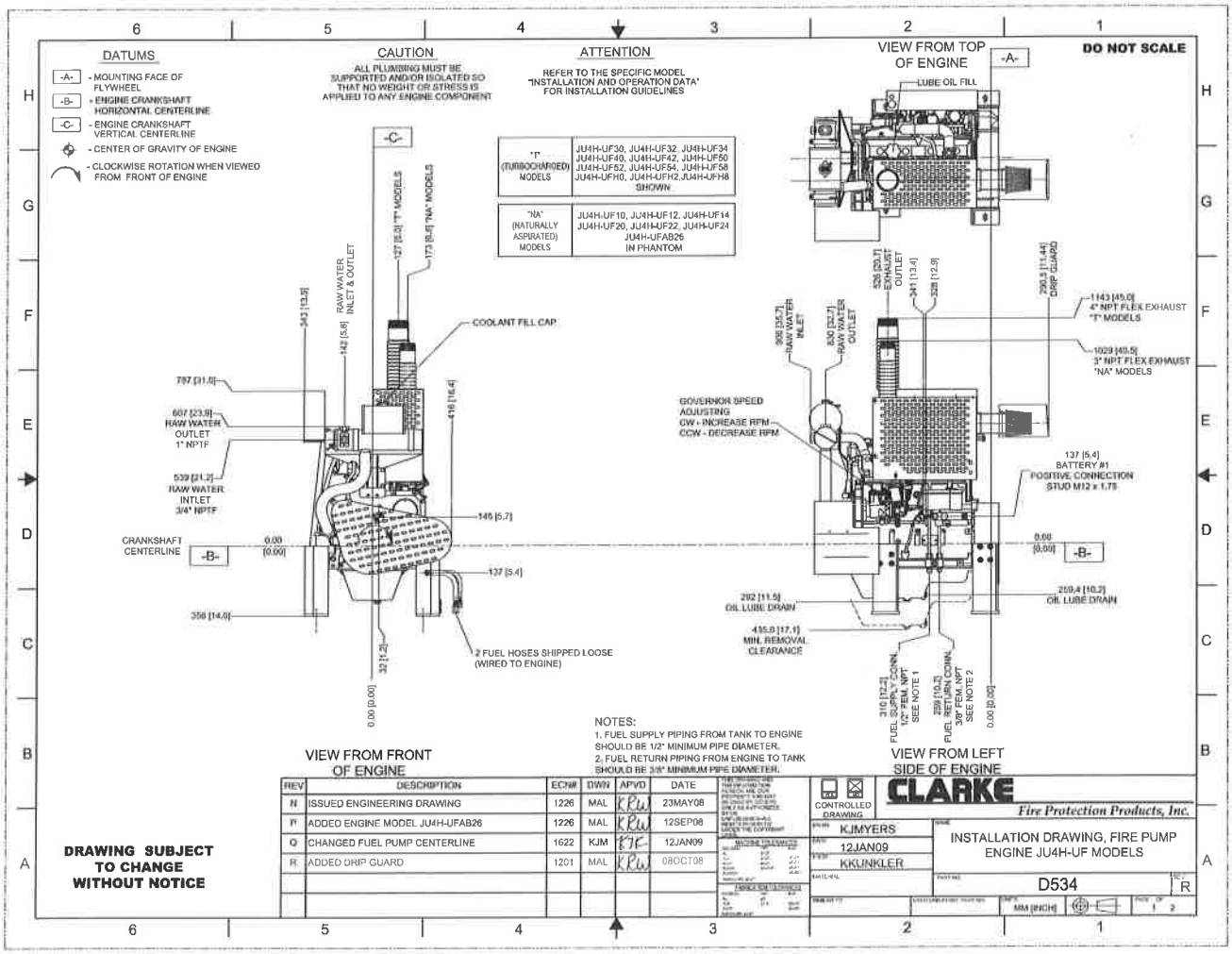
Lubrication Pump
Type..... Gear
Drive..... Gear

Main Bearings
Type..... Precision Half Shells
Material..... Steel Backed-Aluminum Lined

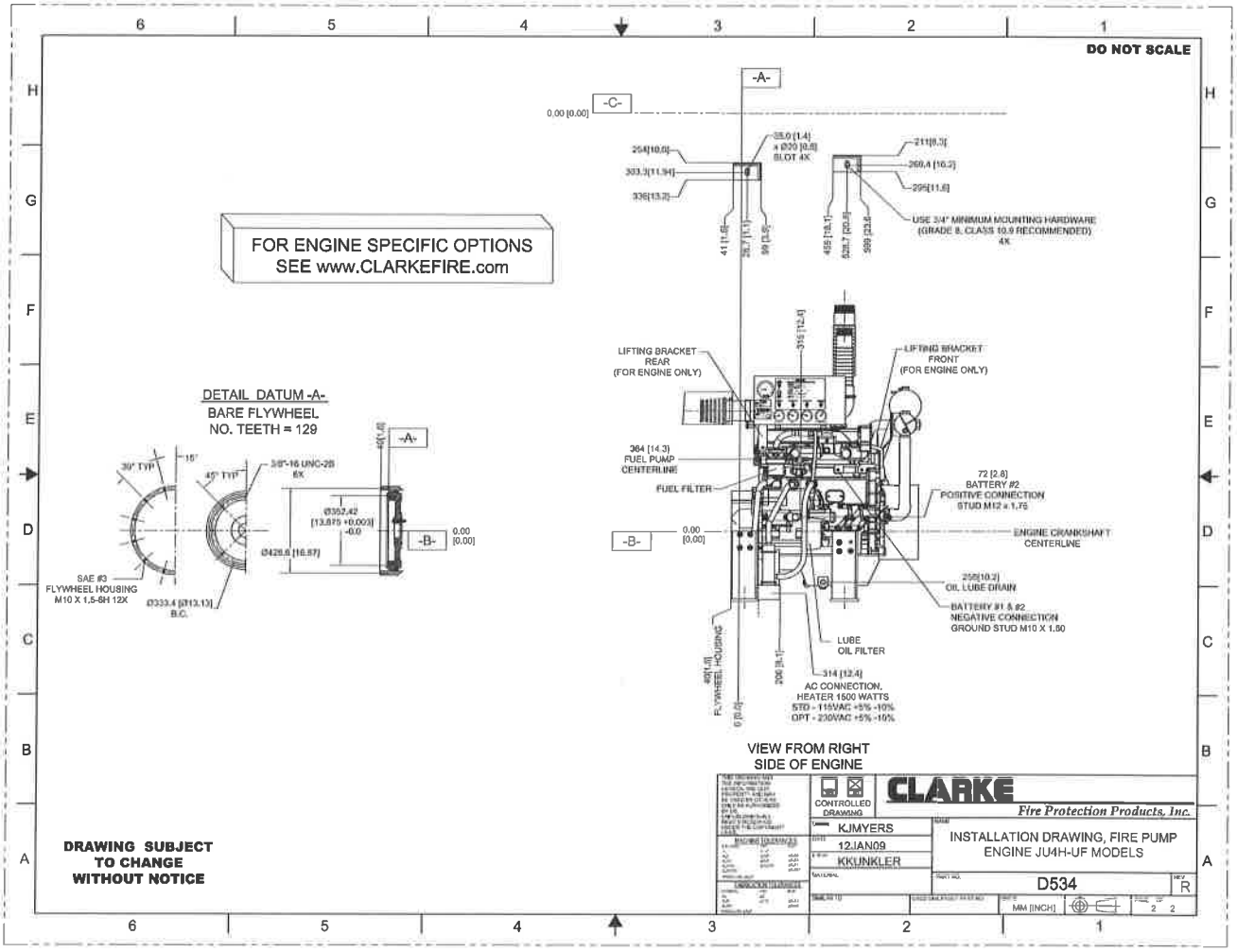
Piston
Type and Material..... Aluminum Alloy with Reinforced
Top Ring Groove
Cooling..... Oil Jet Spray

Piston Pin
Type..... Full Floating - Offset

Piston Rings
Number/Piston..... 3
Top..... Keystone Barrel Faced -
Plasma Coated
Second..... Tapered Cast Iron
Third..... Double Rail Type
w/Expander Spring



REV	DESCRIPTION	ECN#	DWN	APVD	DATE
N	ISSUED ENGINEERING DRAWING	1226	MAL	KRW	23MAY08
P	ADDED ENGINE MODEL JU4H-UFAB26	1226	MAL	KRW	12SEP08
Q	CHANGED FUEL PUMP CENTERLINE	1622	KJM	KJE	12JAN09
R	ADDED DRIP GUARD	1201	MAL	KRW	08OCT08


DO NOT SCALE
FOR ENGINE SPECIFIC OPTIONS
SEE www.CLARKEFIRE.com
DETAIL DATUM -A-
BARE FLYWHEEL
NO. TEETH = 129
30° TYP
15°
45° TYP
3/8"-16 UNC-2B
6X
SAE #3
FLYWHEEL HOUSING
M10 X 1.5-6H 12X
Ø333.4 [Ø13.13]
B.C.
Ø352.42
[13.875 +0.003
-0.0
Ø426.6 [16.87]
-A-
-B-
-C-
0.00 [0.00]
LIFTING BRACKET
REAR
(FOR ENGINE ONLY)
LIFTING BRACKET
FRONT
(FOR ENGINE ONLY)
364 [14.3]
FUEL PUMP
CENTERLINE
FUEL FILTER
72 [2.8]
BATTERY #2
POSITIVE CONNECTION
STUD M12 x 1.75
ENGINE CRANKSHAFT
CENTERLINE
255[10.2]
OIL LUBE DRAIN
BATTERY #1 & #2
NEGATIVE CONNECTION
GROUND STUD M10 X 1.50
LUBE
OIL FILTER
314 [12.4]
AC CONNECTION.
HEATER 1500 WATTS
STD - 115VAC +5% -10%
OPT - 230VAC +5% -10%
FLYWHEEL HOUSING
VIEW FROM RIGHT
SIDE OF ENGINE
DRAWING SUBJECT
TO CHANGE
WITHOUT NOTICE
CONTROLLED
DRAWING
CLARKE
Fire Protection Products, Inc.
KJMYERS
12JAN09
KKLINKLER
INSTALLATION DRAWING, FIRE PUMP
ENGINE JU4H-UF MODELS
D534
R
MM [INCH]
2 2

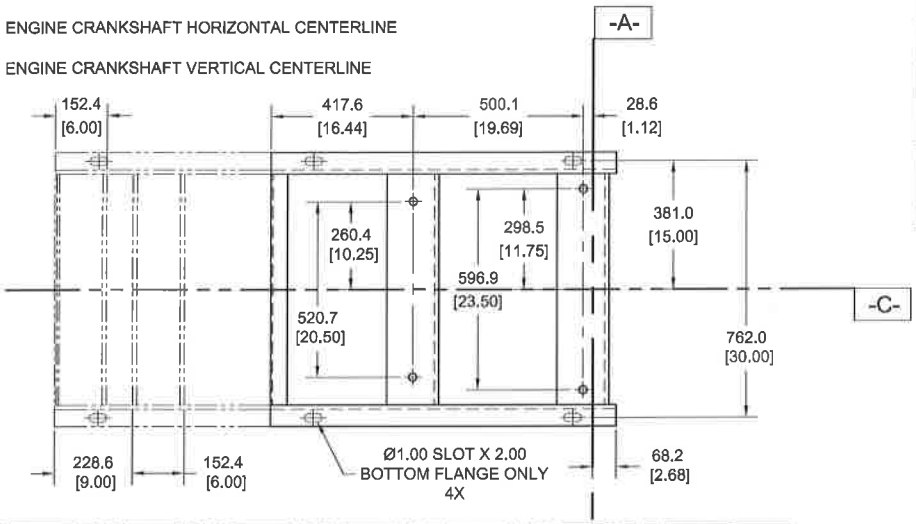
DATUMS

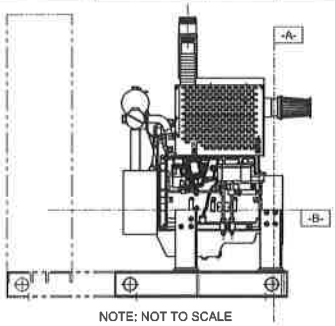
-A- - MOUNTING FACE OF FLYWHEEL

-B- - ENGINE CRANKSHAFT HORIZONTAL CENTERLINE

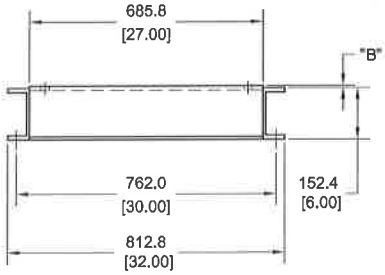
-C- - ENGINE CRANKSHAFT VERTICAL CENTERLINE

ENGINE MODEL	DRIVESHAFT	"A"	"B"
JU4H-UF10, 12, 14, 20, 22, 24, AB26	CDS10	20.25	0.25
	SC41A	20.25	0.25
JU4H-UF30, 32, 34, H8, H0, H2, 40, 42, AD4G	CDS20	20.25	0.25
JU4H-UF30, 32, 34, H8, H0, H2, 40, 42, 58, 50, 52, 54, AD4G, AD5G, ADJG, ADP0, ADR0, ADW8, AD98	SC55A	20.25	0.25
JU4H-UF58, 50, 52, 54, AD5G, ADJG, ADP0, ADR0, ADW8	CDS30	20.35	0.35
JU4H-UFAD98	CDS50	20.45	0.45





NOTE: NOT TO SCALE



ATTENTION

REFER TO THE SPECIFIC MODEL "INSTALLATION AND OPERATION DATA" FOR INSTALLATION GUIDELINES

REV	DESCRIPTION	ECN#	DWN	APVD	DATE
M	REDRAWN AS OPTION PAGE	1226	RJT	KRW	23MAY08
N	DIMENSIONS FOR DIFFERENT DRIVESHATS ADDED	1695	KJM	KRW	09APR09
P	ADDED TIER 3 ENGINE MODELS	1845	KJM	KRW	01DEC09

CONTROLLED DRAWING

CLARKE *Fire Protection Products, Inc.*

DRWN: RJTOLLE

DATE: 14MAY08

CHECK: KWAULIGMAN

MATERIAL:

PART NO.: D535

REV: P

SIMILAR TO: USED ON LAYOUT PART NO. D534

UNITS: MM [INCH]

PAGE 1 OF 1

VERTICAL BASE OPTION FOR JU4H

JU4H-UF28

FIRE PUMP DRIVER

EMISSION DATA

FOR

EPA NSPS (4)

4 *Cylinders*
Four *Cycle*
Lean *Burn*
Turbocharged

500 PPM SULFUR #2 DIESEL FUEL								
RPM	BHP (1)	FUEL GAL/HR (L/HR)	GRAMS / HP- HR				EXHAUST	
			NMHC	NOx	CO	PM (2)	°F (°C)	CFM (m^3/min)
1760	60	3.8 (14.4)	0.39	5.41	0.87	0.24	1021 (549)	379 (10.7)

4045T Base Model Engine Manufactured by John Deere Co.

Notes:

1) *Engines are rated at standard conditions of 29.61in. (7521 mm) Hg barometer and 77°F (25° C) inlet air temperature. (SAE J1349)*

2) *PM is a measure of total particulate matter, including PM_{10}.*

3) *These emissions values have been determined using engine test data with 500 parts per million (PPM) Sulfur content fuel.*

4) *All engine models and ratings are USA EPA emissions compliant per NSPS (40 CFR Part 60 Sub Part IIII)*

Disclaimer

1. Stationary diesel-fueled compression ignition engines manufactured after July 1, 2006 for installations within U.S. are subject to the proposed EPA new source performance standards (the "NSPS"), Federal Code of Regulations Title 40 Chapter I, part 60.

2. The reverse side of this document shows the emissions from this model engine supplied by Clarke Fire Protection Products ("Clarke"). These emissions values are calculated based on an ISO 8178 part 4 D1 cycle weighted average of actual testing.

3. Actual test data in the field or other information established by the local air districts or the EPA that show actual emissions from an engine supplied by Clarke in excess of the NSPS limitations could indicate a violation of the NSPS and subject the owner and/or operator of the engine to penalties under federal law. Although Clarke believes that the engines supplied by Clarke comply with the NSPS based on the available data, for the foregoing reasons, Clarke cannot, and does not, guarantee that its engines will comply with the NSPS emission regulations.

4. CLARKE MAKES NO WARRANTIES OR GUARANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, THAT THE ENGINES SUPPLIED BY CLARKE WILL COMPLY WITH THE NSPS. CLARKE ALSO EXPRESSLY DISCLAIMS THAT THE ENGINES SUPPLIED BY CLARKE WILL, IN FACT, COMPLY WITH THE NSPS. IN NO EVENT SHALL CLARKE BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THESE TERMS AND CONDITIONS OR THE ENGINES SUPPLIED BY CLARKE OR FOR INDEMNIFICATION OF BUYER ON ACCOUNT OF ANY CLAIM ASSERTED AGAINST BUYER, OR FOR ANY OTHER DAMAGE OF ANY KIND, WHETHER DIRECT OR INDIRECT, IF THE ENGINES SUPPLIED BY CLARKE DO NOT COMPLY WITH THE NSPS.

8 June 2006

Attachment A.5

NHDES Form ARD-7: Generator

ARD-7 FORM
INFORMATION REQUIRED FOR PERMITS FOR ENGINES AND TURBINES

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

I. FUEL BURNING EQUIPMENT INFORMATION – *Complete a separate form for each emission unit.*

A. Emission Unit Description:

Kohler Generator Set Model 40REOZJC

☒ Reciprocating Internal Combustion Engine ☐ Combustion Turbine

☐ Rich Burn
☐ Lean Burn
☐ 2-Stroke
☐ 4-Stroke
☐ Dual-fuel

Use:
☒ Emergency
☐ Non-Emergency
☐ Demand Response
☐ Other_____

2015
Date Construction Commenced[1]

2015 — Installation Date[1]

N/A — Manufacture Date[1]

John Deere — Manufacturer

4024HF285B — Model Number

SGM32DG5J — Serial Number

0.47 MMBtu/hr — Maximum Gross Heat Input Rate

3.4 — Maximum Fuel Flow Rate
☒ gal/hr ☐ mmcf/hr

80 — Maximum Engine Output Rating
☒ bhp ☐ bkW

☒ EPA Certified Not to Exceed Limits? If yes, provide EPA Certification Sheet.

B. Stack Information

Is emission unit equipped with multiple stacks? ☐ Yes ☒ No *(If yes, provide data for each stack)*
Are multiple units connected to this stack? ☐ Yes ☒ No
(If yes, identify other emission units or devices on this stack:) _____

Stack #	Discharge Height Above Ground Level (ft)	Inside Diameter (ft) or Area (ft^2) at Stack Exit[2]	Exhaust Temperature (°F)	Exhaust Flow (acfm)	Stack Capped or Otherwise Restricted[3] (Yes - Type/No)	Exhaust Orientation[4]	Stack Monitor (Yes/No) and Description
#5 (Ex)	*65 ft (Example)*	*4 ft (Example)*	*70 °F (Example)*	*1500 acfm (Example)*	*Yes - Rain Cap (Example)*	*Vertical (Example)*	*Yes – CEM for PM (Example)*
EU21	6 ft	0.2 ft	1,000◦F	355 acfm	No	Vertical	No

C. Hours of Operation

Hours per day: up to 24 Days per year: up to 500 hr/yr

II. FUEL USAGE INFORMATION (List each fuel utilized by the emission unit)

Fuel Type	Heat Value[5]	Units	Sulfur Content (%)	Maximum Fuel Flow Rate	Units	Maximum Gross Heat Input Rate	Units
ULSD (Example)	*137,000 (Example)*	*Btu/gal (Example)*	*0.0015 (Example)*	*20 (Example)*	*gal/hr (Example)*	*2.74 (Example)*	*MMBtu/hr (Example)*
ULSD	137,000	Btu/gal	0.0015	3.4	gal/hr	0.47	MMBtu/hr

III. UNCONTROLLED AIR POLLUTANT EMISSIONS (list emissions that result from the burning of each fuel utilized by the emission unit <u>prior</u> to add on controls – *use additional sheets if necessary*)

Pollutant	Emission Factor	Units	Emission Factor Source[6]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP							
PM_{10}	0.093942	lb/MM BTU	EPA Tier 3 Limit	0.04	0.04	0.01	0.19
NO_x	1.1038199	lb/MM BTU	EPA Tier 3 Limit	0.51	0.51	0.1	2.25
VOC	1.1038199	lb/MM BTU	EPA Tier 3 Limit	0.51	0.51	0.1	2.25
CO	1.1742765	lb/MM BTU	EPA Tier 3 Limit	0.55	0.55	0.1	2.40
SO_2	0.0015	lb/MM BTU	15 ppm Sulfur Limit	0.0007	0.0007	1.7E-4	0.0031
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

Emission factors listed are in lb/MMBTU

Emission factors for VOC and NOx each assumed to be total of Tier 3 Limit for NMHC + NOx (Tier 3 limits in g/kw-hr = 4.7 for NOx+NMHC; 5.0 for CO; and 0.4 for PM. Conversion Factor from g/kw-hr to g/hp-hr = 0.7457

Hourly Emissions (lb/hr) = (Max. Firing Rate {MMBtu/hr}) * (Emission Factor {lb/MBTU})
Potential Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr)
Annual Emission (lbs/yr) = Unit Firing Rate (MMBtu/hr) * 500 (hr/year) * Emission Factor (lb/MMBTU)

500 hour per year Annual Limit established in Env-A 600

IV. NEW HAMPSHIRE REGULATED TOXIC AIR POLLUTANTS (RTAPs) – Env-A 1400

Does the emission unit burn a non-exempt fuel[7] and emit any of the RTAPs listed in Env-A 1400?
☐ Yes ☒ No
If **Yes**, attach your facility's most recent compliance demonstration.

V. POLLUTION CONTROL EQUIPMENT

☒ **Not Applicable**

Note: If the emission unit utilizes more than one type of pollution control equipment, provide data for each type of equipment.

A. Type of Equipment

Type of Control Device	Manufacturer of Control Device	Model and Serial Number of Control Device (if known)	Pollutant(s) Controlled by Device
Oxidation Catalyst (Example)	*DCL International, Inc. (Example)*	*DC 18012 CC Serial #: N/A (Example)*	*CO and HAPs (Example)*

For each control device, include an Air Pollution Control Equipment Monitoring Plan pursuant to Env-A 810.

B. Controlled Air Pollution Emissions (list emissions that result from the burning of each fuel utilized by the emission unit after all add on controls – *use additional sheets if necessary*)

Pollutant	Controlled Emission Factor	Units	Emission Factor Source[6]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP							
PM_{10}							
NO_x							

VOC							
CO							
SO_2							
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

ARD-7 FORM INFORMATION INSTRUCTIONS

1 If exact date is unknown for Date Construction Commenced, Manufacture Date or Installation Date, you may use 01/01/year. The exception is for calendar years 2006 and 2007, where a month and year are required to determine rule applicability. Date Construction Commenced refers to the date the owner or operator has entered into a contractual obligation to undertake and complete a continuous program of construction, reconstruction, or modification of the emission unit. Manufacture Date refers to the date the emission unit was originally produced. Installation Date refers to the date the emission unit is installed at the facility.

2 Examples of Inside Diameter or Area at Stack Exit: Diameter at discharge point of convergence cone, if applicable

3 Flapper valves and other devices which do not restrict the vertical exhaust flow while the emission unit is operating are not considered obstructions or restrictions.

4 Examples of Exhaust Orientation: Vertical, Horizontal, Downward
Note: for a stack to be considered vertical and unobstructed, there shall be no impediment to vertical flow, and the exhaust stack extends 2 feet higher than any roofline within 10 horizontal feet of the exhaust stack

5

Liquid Fuels	Heat Value
Ultra-Low Sulfur Diesel (ULSD)	137,000 Btu/gal
#2 Fuel Oil	140,000 Btu/gal
Kerosene	135,000 Btu/gal
Other – Liquid	Obtain from Fuel Supplier

Gaseous Fuels	Heat Value
Natural Gas	1,020 Btu/cubic foot
Propane (LPG)	94,000 Btu/gal
Gasoline	130,000 Btu/gal
Other (Gaseous)	Obtain from Fuel Supplier

6 Emission factor sources may include:
- Continuous Emissions Monitor (CEM)
- Stack Test (Provide Date)
- Vendor Guaranteed Rates (Provide Documentation)
- EPA Certified Not To Exceed Limits (i.e. Tier II engine – submit specifications sheet or certification for documentation)
- AP-42 Emission Factors
- Material Balance (Provide Sample Calculation)
- Engineering Estimate

7 Fuels exempt from Env-A 1400 include:
- Virgin Petroleum Products (#2, #4, or #6 fuel oil, gasoline, kerosene, jet fuel, etc.)
- Coal
- Natural Gas
- Propane
- Biofuels – as defined in Env-A 1401.03(b)
- Biomass – as defined in Env-A 1401.03(c)

Model: 40REOZJC

KOHLER POWER SYSTEMS

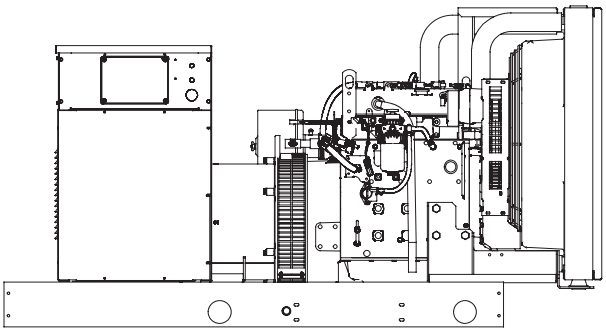
208–600 V **Diesel**

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Tier 3 EPA-Certified for Stationary Emergency Applications

Ratings Range

		60 Hz
Standby:	**kW**	33–40
	kVA	33–50
Prime:	**kW**	30–38
	kVA	30–48



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two- and five-year extended warranties are also available.
- Alternator features:
  - The unique Fast-Response™ II excitation system delivers excellent voltage response and short-circuit capability using a permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controllers for guaranteed system integration and remote communication. See Controllers on page 3.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.

Generator Set Ratings

				130°C Rise Standby Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
4P5	120/208	3	60	40/50	139	37/46	128
	127/220	3	60	40/50	131	38/48	125
	120/240	3	60	40/50	120	37/46	111
	120/240	1	60	33/33	138	30/30	125
	139/240	3	60	40/50	120	38/48	114
	220/380	3	60	35/44	66	32/40	61
	277/480	3	60	40/50	60	38/48	57
	347/600	3	60	40/50	48	38/48	46
4Q5	120/240	1	60	38/38	158	34/34	143
4Q7	120/240	1	60	40/40	167	36/36	150

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* Standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain the technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads: quantity, type	12, Reconnectable 4, 110–120/220–240
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current
Peak motor starting kVA:	(35% dip for voltages below)
480 V 4P5 (12 lead)	140
240 V 4Q5 (4 lead)	95
240 V 4Q7 (4 lead)	104

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Vacuum-impregnated windings with fungus-resistant epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
- Fast-Response™ II brushless alternator with brushless exciter for excellent load response.

Application Data

Engine

Engine Specifications	
Manufacturer	John Deere
Engine model	4024HF285B
Engine type	4-Cycle, Turbocharged
Cylinder arrangement	4 Inline
Displacement, L (cu. in.)	2.4 (149)
Bore and stroke, mm (in.)	86 x 105 (3.39 x 4.13)
Compression ratio	18.2:1
Piston speed, m/min. (ft./min.)	375 (1230)
Main bearings: quantity, type	5, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	60 (80)
Cylinder head material	Cast Iron
Crankshaft material	Ductile Iron
Valve material:	
Intake	Chromium-Silicon Steel
Exhaust	Stainless Steel
Governor: type, make/model	JDEC Electronic, Level 18, EUP
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust flow at rated kW, m^3/min. (cfm)	10.0 (355)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	538 (1000)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)
Exhaust outlet size at engine hookup, mm (in.)	63.5 (2.5)

Engine Electrical

Engine Electrical System	
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	12
Ampere rating	70
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA):	
Quantity, CCA rating	One, 640
Battery voltage (DC)	12

Fuel

Fuel System	
Fuel supply line, min. ID, mm (in.)	11.0 (0.44)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. lift, engine-driven fuel pump, m (ft.)	3.0 (10.0)
Max. fuel flow, Lph (gph)	82 (21.7)
Max. return line restriction, kPa (in. Hg)	35 (10.3)
Fuel prime pump	Manual
Fuel filter	
Secondary	5 Microns @ 98% Efficiency
Water Separator	Yes
Recommended fuel	#2 Diesel

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.)	7.3 (7.7)
Oil pan capacity with filter, L (qt.)	8.2 (8.7)
Oil filter: quantity, type	1, Cartridge
Oil cooler	Water-Cooled

Application Data

Cooling

Radiator System	
Ambient temperature, °C (°F)*	50 (122)
Engine jacket water capacity, L (gal.)	2.6 (0.7)
Radiator system capacity, including engine, L (gal.)	10.6 (2.8)
Engine jacket water flow, Lpm (gpm)	98 (26)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	28.4 (1613)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	7.0 (400)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	597 (23.5)
Fan, kWm (HP)	2.9 (3.9)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

* Enclosure reduces ambient temperature capability by 5°C (9°F).

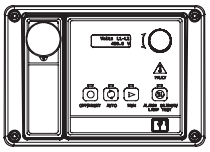
Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m^3/min. (scfm)‡	96 (3400)
Combustion air, m^3/min. (cfm)	3.7 (130)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	11.0 (626)
Alternator, kW (Btu/min.)	7.6 (435)

‡ Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

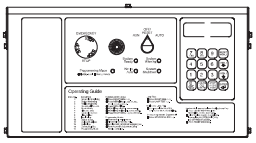
Fuel Consumption		
Diesel, Lph (gph) at % load	**Standby Rating**	
100%	12.9	(3.4)
75%	9.8	(2.6)
50%	6.8	(1.8)
25%	3.4	(0.9)
Diesel, Lph (gph) at % load	**Prime Rating**	
100%	11.7	(3.1)
75%	9.1	(2.4)
50%	6.1	(1.6)
25%	3.4	(0.9)

Controllers



Decision-Maker® 3000 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.
- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-100 for additional controller features and accessories.



Decision-Maker® 550 Controller
Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities.
- Digital display and keypad provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or modem configuration
- Controller supports Modbus® protocol
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-46 for additional controller features and accessories.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KohlerPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Additional Standard Features

- Alternator Protection
- Battery Rack and Cables
- Oil Drain and Coolant Drain w/Hose Barb
- Oil Drain Extension (with narrow skid and enclosure models only)
- Operation and Installation Literature
- Radiator Drain Extension (with enclosure only)

Available Options

Approvals and Listings

- ❑ California OSHPD Approval
- ❑ CSA Approval
- ❑ IBC Seismic Certification
- ❑ UL2200 Listing

Enclosed Unit

- ❑ Sound Enclosure (with enclosed critical silencer)
- ❑ Weather Enclosure (with enclosed critical silencer)

Open Unit

- ❑ Exhaust Silencer, Critical (kit: PA-324470)
- ❑ Flexible Exhaust Connector, Stainless Steel

Fuel System

- ❑ Flexible Fuel Lines
- ❑ Fuel Pressure Gauge
- ❑ Subbase Fuel Tanks

Controller

- ❑ Common Failure Relay
- ❑ Communication Products and PC Software (Decision-Maker® 550 controller only)
- ❑ Customer Connection (Decision-Maker® 550 controller only)
- ❑ Dry Contact (isolated alarm) (Decision-Maker® 550 controller only)
- ❑ Input/Output Module (Decision-Maker® 3000 controller only)
- ❑ Remote Annunciator Panel
- ❑ Remote Emergency Stop
- ❑ Run Relay

Cooling System

- ❑ Block Heater, 1000 W, 110–120 V [recommended for ambient temperatures below 0°C (32°F)]
- ❑ Radiator Duct Flange

Electrical System

- ❑ Alternator Strip Heater
- ❑ Battery
- ❑ Battery Charger, Equalize/Float Type
- ❑ Battery Heater
- ❑ Line Circuit Breaker (NEMA type 1 enclosure)
- ❑ Line Circuit Breaker with Shunt Trip (NEMA type 1 enclosure)

Paralleling System

- ❑ Reactive Droop Compensator
- ❑ Remote Speed Adjust Control/Electronic Governor
- ❑ Voltage Adjust Control
- ❑ Voltage Regulator Relocation (Decision-Maker® 550 controller only)

Miscellaneous

- ❑ Air Cleaner, Heavy Duty
- ❑ Air Cleaner Restriction Indicator
- ❑ Closed Crankcase Vent
- ❑ Engine Fluids Added
- ❑ Rated Power Factor Testing
- ❑ Rodent Guards

Literature

- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

Warranty

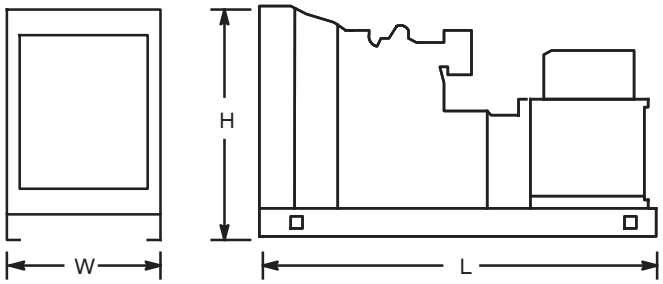
- ❑ 2-Year Basic
- ❑ 5-Year Basic
- ❑ 5-Year Comprehensive

Other Options

- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____

Dimensions and Weights

Overall Size, L x W x H, mm (in.):
Wide Skid: 2300 x 1041 x 1133 (90.55 x 40.98 x 44.61)
Narrow Skid: 1998 x 780 x 1067 (78.66 x 30.71 x 42.01)
Weight (radiator model), wet, kg (lb.): 694 (1530)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

Attachment B

Emission Calculations

Attachment B.1

Tower Coater Calculations

Tower Coater Operations - Breakdown of Components of Raw Materials

Formula Description & Composition	ID #	Ethylene Glycol 107-21-1	Toluene 108-88-3	Isopropanol 67-63-0	Formaldehyde 50-00-0	Ethanol 64-17-5	1,4-Dioxane 123-91-1	Benzene 71-43-2	Polyethyene Glycol 25322-68-3	Chromic Acid 7738-94-5)	Tetrafluoroethylene 116-14-3	Methanol 67-56-1	Acetaldehyde 75-07-0	Ethylene Oxide 75-21-8	Propylene Oxide 75-56-9	graphite 7782-42-5	aluminum 7429-90-5	titanium dioxide 13463-67-7	Methyl ethyl ketone 78-93-3	2-Pyrrolidinone, 1-methyl-872-50-4	hexane 110-54-3	Iron Oxide 1309-37-1	Silica-Quartz 14808-60-7	Manganese Oxide 1313-13-9	Talc(hydrous magnesium silicate) 14807-96-6
		RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP	HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP	RTAP	RTAP	RTAP	RTAP/HAP	RTAP	RTAP	RTAP/HAP	RTAP
Product #1	01	13.00%	10.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #2	02	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #3	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #4	04	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #5	05	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #6	06	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #7	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #8	08	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #9	09	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #10	10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #11	11	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #12	12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #13	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #14	14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #15	15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #16	16	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #17	17	30.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	5.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #18	18	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #19	19	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #20	20	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #21	21	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #22	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #23	23	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #24	24	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #25	25	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #26	26	0.00%	0.00%	0.00%	0.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #27	27	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #28	28	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #29	29	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #30	30	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #31	31	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #32	32	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #33	33	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	27.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #34	34	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #35	35	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #36	36	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #37	37	0.00%	0.00%	0.00%	0.0004%	0.00%	0.0015%	0.00%	0.00%	0.00%	0.00%	0.00%	0.0006%	0.001%	0.0002%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #38	38	0.00%	0.00%	30.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #39	39	0.00%	0.00%	0.00%	0.00%	0.00%	0.30%	0.00%	12.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #40	40	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #41	41	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #42	42	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #43	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #44	44	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #45	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #46	46	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #47	47	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #48	48	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #49	49	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #50	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #51	51	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #52	52	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #53	53	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #54	54	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #55	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #56	56	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #57	57	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #58	58	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #59	59	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #60	60	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #61	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #62	62	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #63	63	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #64	64	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #65	65	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #66	66	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #67	67	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #68	68	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #69	69	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #70	70	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #71	71	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #72	72	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #73	73	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #74	74	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #75	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #76	76	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #77	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%	0.00%	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #78	78	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #79	79	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #80	80	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #81	81	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #82	82	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #83	83	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #84	84	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	45.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Tower Coater Operations - Breakdown of Components of Raw Materials

Formula Description & Composition	ID #	Ethylene Glycol 107-21-1	Toluene 108-88-3	Isopropanol 67-63-0	Formaldehyde 50-00-0	Ethanol 64-17-5	1,4-Dioxane 123-91-1	Benzene 71-43-2	Polyethyene Glycol 25322-68-3	Chromic Acid 7738-94-5)	Tetrafluoroethylene 116-14-3	Methanol 67-56-1	Acetaldehyde 75-07-0	Ethylene Oxide 75-21-8	Propylene Oxide 75-56-9	graphite 7782-42-5	aluminum 7429-90-5	titanium dioxide 13463-67-7	Methyl ethyl ketone 78-93-3	2-Pyrrolidinone, 1-methyl-872-50-4	hexane 110-54-3	Iron Oxide 1309-37-1	Silica-Quartz 14808-60-7	Manganese Oxide 1313-13-9	Talc(hydrous magnesium silicate) 14807-96-6
Product #85	85	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #86	86	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #87	87	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #88	88	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #89	89	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #90	90	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #91	91	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #92	92	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #93	93	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #94	94	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #95	95	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #96	96	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #97	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #98	98	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #99	99	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #100	100	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #101	101	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #102	102	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #103	103	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #104	104	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #105	105	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #106	106	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #107	107	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #108	108	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	65.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #109	109	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #110	110	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #111	111	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #112	112	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #113	113	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #114	114	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #115	115	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #116	116	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #117	117	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #118	118	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #119	119	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.00%	0.00%	0.00%	0.00%
Product #120	120	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #121	121	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	98.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #122	122	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #123	123	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #124	124	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #125	125	0.00%	30.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	30.00%	0.00%	5.00%	0.00%	0.00%	0.00%	0.00%
Product #126	126	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	6.00%	0.00%
Product #127	127	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #128	128	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #129	129	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #130	130	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #131	131	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #132	132	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.00%	0.00%	0.00%	0.00%
Product #133	133	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	55.00%	0.00%	0.00%	0.00%
Product #134	134	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	33.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #135	135	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #136	136	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Product #137	137	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #138	138	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #139	139	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #140	140	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #141	141	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	90.00%
Product #142	142	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #143	143	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #144	144	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #145	145	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #146	146	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #147	147	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #148	148	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #149	149	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #150	150	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #151	151	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #152	152	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #153	153	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #154	154	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #155	155	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #156	156	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #157	157	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #158	158	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #159	159	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #160	160	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	30.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #161	161	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #162	162	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #163	163	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #164	164	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #165	165	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Product #166	166	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Graphite, Aluminum, Titanium Dioxide, Iron Oxide, Silica-Quartz and Talc were also listed on SDS and are listed RTAP (as respirable portion). As these components are within the liquid formulations, emission of respirable material is not expected and emissions are shown as 0.
Tetrafluoroethylene is shown as a component within four raw materials; however the concetration is not listed. The concentration has been estimated at 0.1% to be conservative (if present at 0.1%, the material concentration would need to be listed on the SDS).

Attachment B.2

Antenna Fabrication Calculations

Calculation of Annual VOC/HAP/RTAP Emissions from Antenna Fabrication Activity

Known:

1. Annual usage of each product within area
2. Concentration of components in raw materials per Safety Data Sheets (Maximum of range when listed)
3. Assume all VOC/HAP/RTAP emitted during processing except MDI
4. MDI is not volatile at room temperature and is not expected to be emitted

Annual Product Usage within Area

Product	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Annual Average
	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr	gal/yr
Antenna Area Material 01	0.61	0.75	4	0.25	0	2	0	0	1.5	5	1.41
Antenna Area Material 02	65.04	87.6	0	48	12	58	20	20	0	0	31.06
Antenna Area Material 03	0	0	0	0	0	0	0	0	0	0	0
Antenna Area Material 04	102	99.96	140.6	110	0	0	0	0	0	0	45.26
Antenna Area Material 05	0	0	28	0	0	0	0	0	0	0	2.80
Antenna Area Material 06	0	0	0	0	0	0	0	0	0	0	0
Antenna Area Material 07	3.25	8.06	3	3	1.5	16	1.25	2.25	1.63	0.63	4.06
Antenna Area Material 08							53	53	36	25.6	41.90
Total Gallons Per Year	170.9	196.37	175.6	161.25	13.5	76	74.25	75.25	39.13	31.23	101.35

Component Information from SDS (Maximum Concentration where Ranges are Listed on SDS)

Product	Density lb/gal	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	Methylene Diphenyl Isocyanate	VOC	Solids
		141-78-6	108-88-3	1330-20-7	78-93-3	110-54-3	110-82-7	100-41-4	71-43-2	1317-36-8	101-68-8	N/A	N/A
		RTAP	BOTH	BOTH	RTAP	BOTH	RTAP	BOTH	BOTH	BOTH	BOTH	N/A	N/A
Antenna Area Material 01	7.8	40.0%	30.0%	5.0%	13.0%			1.0%	0.1%			38.7%	25.0%
Antenna Area Material 02	7.2		30.0%		30.0%	5.0%						76.4%	23.4%
Antenna Area Material 03	8		60.0%				1.0%		0.1%	20.0%		76.5%	23.5%
Antenna Area Material 04	7.2		100.0%									100.0%	0.0%
Antenna Area Material 05	6.7				100.0%							100.0%	0.0%
Antenna Area Material 06	8		60.00%							20.0%		76.5%	24.5%
Antenna Area Material 07	7.1				100%						6.30%	86.0%	14.0%
Antenna Area Material 08	7.2		40.00%		40%	1.5%						76.4%	14.0%

2021 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	5	7.8	15.60	11.70	1.95	5.07	0.00	0.00	0.39	0.04	0.00	15.10	9.75	14.08
Antenna Area Material 02	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 03	0	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
Antenna Area Material 04	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	0.63	7.1	0.00	0.00	0.00	4.47	0.00	0.00	0.00	0.00	0.00	3.85	0.63	0.00
Antenna Area Material 08	25.6	7.1	0.00	72.70	0.00	72.70	2.73	0.00	0.00	0.00	0.00	138.84	25.45	75.43
Annual Emissions (lb/yr) =			15.60	84.40	1.95	82.25	2.73	0.00	0.39	0.04	0.00	157.79	35.82	89.51

2020 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	1.5	7.8	4.68	3.51	0.59	1.52	0.00	0.00	0.12	0.01	0.00	4.53	2.93	4.22
Antenna Area Material 02	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 03	0	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
Antenna Area Material 04	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	1.63	7.1	0.00	0.00	0.00	11.57	0.00	0.00	0.00	0.00	0.00	9.95	1.62	0.00
Antenna Area Material 08	36	7.1	0.00	102.24	0.00	102.24	3.83	0.00	0.00	0.00	0.00	195.25	35.78	106.07
Annual Emissions (lb/yr) =			4.68	105.75	0.59	115.33	3.83	0.00	0.12	0.01	0.00	209.73	40.33	110.30

2019 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	0	7.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 02	20	7.2	0.00	43.20	0.00	43.20	7.20	0.00	0.00	0.00	0.00	110.00	33.70	50.40
Antenna Area Material 03	0	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
Antenna Area Material 04	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	2.25	7.1	0.00	0.00	0.00	15.98	0.00	0.00	0.00	0.00	0.00	13.74	2.24	0.00
Antenna Area Material 08	53	7.1	0.00	150.52	0.00	150.52	5.64	0.00	0.00	0.00	0.00	287.45	52.68	156.16
Annual Emissions (lb/yr) =			0.00	193.72	0.00	209.70	12.84	0.00	0.00	0.00	0.00	411.19	88.61	206.56

2018 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	0	7.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 02	20	7.2	0.00	43.20	0.00	43.20	7.20	0.00	0.00	0.00	0.00	110.00	33.70	50.40
Antenna Area Material 03	0	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
Antenna Area Material 04	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	1.25	7.1	0.00	0.00	0.00	8.88	0.00	0.00	0.00	0.00	0.00	7.63	1.24	0.00
Antenna Area Material 08	53	7.1	0.00	150.52	0.00	150.52	5.64	0.00	0.00	0.00	0.00	287.45	52.68	156.16
Annual Emissions (lb/yr) =			0.00	193.72	0.00	202.60	12.84	0.00	0.00	0.00	0.00	405.08	87.62	206.56

2017 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	2	7.8	6.24	4.68	0.78	2.03	0.00	0.00	0.16	0.02	0.00	6.04	3.90	5.63
Antenna Area Material 02	58	7.2	0.00	125.28	0.00	125.28	20.88	0.00	0.00	0.00	0.00	319.00	97.72	146.16
Antenna Area Material 03	0	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
Antenna Area Material 04	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	16	7.1	0.00	0.00	0.00	113.60	0.00	0.00	0.00	0.00	0.00	97.70	15.90	0.00
Antenna Area Material 08		7.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Emissions (lb/yr) =			6.24	129.96	0.78	240.91	20.88	0.00	0.16	0.02	0.00	422.73	117.52	151.79

2016 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	0	7.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 02	12	7.2	0.00	25.92	0.00	25.92	4.32	0.00	0.00	0.00	0.00	66.00	20.22	30.24
Antenna Area Material 03	0	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
Antenna Area Material 04	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	1.5	7.1	0.00	0.00	0.00	10.65	0.00	0.00	0.00	0.00	0.00	9.16	1.49	0.00
Antenna Area Material 08		7.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Emissions (lb/yr) =			0.00	25.92	0.00	36.57	4.32	0.00	0.00	0.00	0.00	75.16	21.71	30.24

2015 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	0.25	7.8	0.78	0.59	0.10	0.25	0.00	0.00	0.02	0.00	0.00	0.75	0.49	0.70
Antenna Area Material 02	48	7.2	0.00	103.68	0.00	103.68	17.28	0.00	0.00	0.00	0.00	264.00	80.87	120.96
Antenna Area Material 03	0	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
Antenna Area Material 04	110	7.2	0.00	792.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	792.00	0.00	792.00
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	3	7.1	0.00	0.00	0.00	21.30	0.00	0.00	0.00	0.00	0.00	18.32	2.98	0.00
Antenna Area Material 08		7.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Emissions (lb/yr) =			0.78	896.27	0.10	125.23	17.28	0.00	0.02	0.00	0.00	1075.07	84.34	913.66

2014 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	4	7.8	12.48	9.36	1.56	4.06	0.00	0.00	0.31	0.03	0.00	12.08	7.80	11.26
Antenna Area Material 02	0	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 03	0	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
Antenna Area Material 04	140.6	7.2	0.00	1012.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1012.32	0.00	1012.32
Antenna Area Material 05	28	6.7	0.00	0.00	0.00	187.60	0.00	0.00	0.00	0.00	0.00	187.60	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	3	7.1	0.00	0.00	0.00	21.30	0.00	0.00	0.00	0.00	0.00	18.32	2.98	0.00
Antenna Area Material 08		7.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Emissions (lb/yr) =			12.48	1021.68	1.56	212.96	0.00	0.00	0.31	0.03	0.00	1230.32	10.78	1023.58

2013 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	0.75	7.8	2.34	1.76	0.29	0.76	0.00	0.00	0.06	0.01	0.00	2.26	1.46	2.11
Antenna Area Material 02	87.6	7.2	0.00	189.22	0.00	189.22	31.54	0.00	0.00	0.00	0.00	481.80	147.59	220.75
Antenna Area Material 03	0	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
Antenna Area Material 04	99.96	7.2	0.00	719.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	719.71	0.00	719.71
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	8.06	7.1	0.00	0.00	0.00	57.23	0.00	0.00	0.00	0.00	0.00	49.21	8.01	0.00
Antenna Area Material 08		7.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Emissions (lb/yr) =			2.34	910.68	0.29	247.20	31.54	0.00	0.06	0.01	0.00	1252.99	157.06	942.58

2012 Speciated Compound Emissions - Antenna Fabrication

Product	Annual Usage	Density	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide	VOC	Solids	Total HAP
	(gal/yr)	(lb/gal)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)
Antenna Area Material 01	0.61	7.8	1.90	1.43	0.24	0.62	0.00	0.00	0.05	0.00	0.00	1.84	1.19	1.72
Antenna Area Material 02	65.04	7.2	0.00	140.49	0.00	140.49	23.41	0.00	0.00	0.00	0.00	357.72	109.58	163.90
Antenna Area Material 03	0	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
Antenna Area Material 04	102	7.2	0.00	734.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	734.40	0.00	734.40
Antenna Area Material 05	0	6.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antenna Area Material 06	0	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
Antenna Area Material 07	3.25	7.1	0.00	0.00	0.00	23.08	0.00	0.00	0.00	0.00	0.00	19.84	3.23	0.00
Antenna Area Material 08		7.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual Emissions (lb/yr) =			1.90	876.31	0.24	164.18	23.41	0.00	0.05	0.00	0.00	1113.81	114.00	900.02

Results of Air Dispersion Modeling for RTAP/HAP (Adjusted 2019 Model Results Based on Increased Hourly Pounds of Ethyl Acetate, Xylene and Benzene)

	Ethyl Acetate	Toluene	Xylene	MEK	Hexane	Cyclo-hexane	Ethyl Benzene	Benzene	Lead Monoxide
Maximum Annual Emissions (2012-2021) in lb.	15.60	1021.68	1.95	247.20	31.54	0.00	0.39	0.04	0
Hourly Pounds Based on Max. Annual/2,080 hr/yr	0.00750	0.491	0.000938	0.119	0.0152	0	0.000188	0.0000188	0
Maximum 24-Hour Concentration (ug/m^3)	2.33E-01	1.52E+01	2.90E-02	3.69E+00	4.71E-01	N/A	4.65E-03	5.81E-04	N/A
Annual Concentration (ug/m^3)	0.07875	5.115	0.010	1.24	0.158	N/A	0.002	0.00025	N/A
24-hour AAL (ug/m^3)	10141	5000	1550	5000	885	N/A	1000	5.7	N/A
Annual AAL (ug/m^3)	4829	5000	100	5000	700	N/A	1000	3.8	N/A
% of 24 Hour AAL	0.0023%	0.30%	0.0019%	0.074%	0.053%	N/A	0.00047%	0.0102%	N/A
% Annual AAL	0.0016%	0.10%	0.0100%	0.025%	0.023%	N/A	0.00020%	0.0066%	N/A
% Increase From Hourly Value in 2018 in Application	25%	0%	25%	0%	0%	N/A	0%	25%	N/A

Attachment B.3

Combustion Calculations

EMISSIONS OF AIR CONTAMINANTS FROM COMBUSTION IN EMERGENCY GENERATOR

Known Data:

a. Existing Diesel Fuel Fired Emergency Generator Unit installed in 2015
b. Unit is a Kohler generator 40REOZJC (80 hp/0.466 MMBtu/hr engine)

Assumptions:

a. Unit has the unrestricted potential to operate 8,760 hours per year
   Hours of operation capped at 500 hours per year per Env-A 600

Emission Factors:

From EPA Tier 3 Limits or Sulfur Content Limit in Diesel Fuel

Contaminant Name	Emission Factor (g/hp-hr)	Emission Factor (lb/hp-hr)	Emission Factor (lb/MMBtu)	
Particulate Matter (PM)	0.29828	0.000657595	0.09394212	Tier 3 Limit
Sulfur Dioxide (SO_2)*			0.0015	15 ppm S Limit
Oxides of Nitrogen (NO_X)**	3.50479	0.007726739	1.10381990	Tier 3 Limit
Carbon Monoxide (CO)	3.7285	0.008219935	1.17427649	Tier 3 Limit
Total Organic Compounds (TOC)**	3.50479	0.007726739	1.10381990	Tier 3 Limit

* - Emission factor based on 15 PPM sulfur

** - Emission factors for VOC and NOx each assumed to be total of Tier 3 Limit for NMHC + NO_X

Tier 3 limits (in g/kw-hr) = 4.7 for NOx+NMHC; 5.0 for CO; and 0.4 for PM. Conversion factor from g/kw-hr to g/hp-hr = 0.7457

Details of Emergency Generator Unit at Facility

Identifier	Manufacturer	Fuel Type	Rating (hp)	Rating (BTU/hr)
40REOZJC	Kohler/John Deere	Diesel Fuel	80	466,000

Emission Calculations

Hourly Emissions (lb/hr) = (Max. Firing Rate {MMBtu/hr}) * (Emission Factor {lb/MBTU})
Potential Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr)
Annual Emission (lbs/yr) = Unit Firing Rate (MMBtu/hr) * 500 (hr/year)[1] * Emission Factor (lb/MMBTU)

Contaminant Name	Hourly Emissions (lb/hr)	Potential to Emit (lb/yr)	Annual Emissions [500 Hrs/Yr] (ton/yr)
Particulate Matter (PM)	0.04	383.5	0.01
Sulfur Dioxide (SO_2)	0.0007	6.1	1.7E-04
Oxides of Nitrogen (NO_X)	0.51	4,506	0.1
Carbon Monoxide (CO)	0.55	4,794	0.1
Total Organic Compounds (TOC)	0.51	4,506.0	0.1

[1] - Maximum allowed rate based on 500 hours per year limit established in Env-A 600.

EMISSIONS OF AIR CONTAMINANTS FROM COMBUSTION IN FIRE PUMP

Known Data:

a. Existing Fire Pump Unit installed in 2015
b. 110 HP emergency Clarke Model JU4H-UF AD 5G emergency fire pump combusting Diesel Fuel

Assumptions:

a. Unit has the unrestricted potential to operate 8,760 hours per year
   Hours of operation capped at 500 hours per year per Env-A 600

Emission Factors:

From EPA Tier 3 Limits or Sulfur Content Limit in Diesel Fuel

Contaminant Name	Emission Factor (g/hp-hr)	Emission Factor (lb/hp-hr)	Emission Factor (lb/MMBtu)	
Particulate Matter (PM)	0.22371	0.000493196	0.07045659	Tier 3 Limit
Sulfur Dioxide (SO_2)*			0.0015	15 ppm S Limit
Oxides of Nitrogen (NO_X)**	2.9828	0.006575948	0.93942119	Tier 3 Limit
Carbon Monoxide (CO)	3.7285	0.008219935	1.17427649	Tier 3 Limit
Total Organic Compounds (TOC)**	2.9828	0.006575948	0.93942119	Tier 3 Limit

* - Emission factor based on 15 PPM sulfur

** - Emission factors for VOC and NOx each assumed to be total of Tier 3 Limit for NMHC + NO_X

Tier 3 limits (in g/kw-hr) = 4.0 for NOx+NMHC; 5.0 for CO; and 0.3 for PM. Conversion factor from g/kw-hr to g/hp-hr = 0.7457

Details of Emergency Generator Unit at Facility

Identifier	Manufacturer	Fuel Type	Rating (hp)	Rating (BTU/hr)
JU4H-UF AD 5G	Clarke	Diesel Fuel	110	1,200,000

Emission Calculations

Hourly Emissions (lb/hr) = (Max. Firing Rate {MMBtu/hr}) * (Emission Factor {lb/MBTU})
Potential Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr)
Annual Emission (lbs/yr) = Unit Firing Rate (MMBtu/hr) * 500 (hr/year)[1] * Emission Factor (lb/MMBTU)

Contaminant Name	Hourly Emissions (lb/hr)	Potential to Emit (lb/yr)	Annual Emissions [500 Hrs/Yr] (ton/yr)
Particulate Matter (PM)	0.08	740.6	0.02
Sulfur Dioxide (SO_2)	1.80E-03	15.8	4.50E-04
Oxides of Nitrogen (NO_X)	1.13	9,875	0.3
Carbon Monoxide (CO)	1.41	12,344	0.4
Total Organic Compounds (TOC)	1.13	9,875.2	0.3

[1] - Maximum allowed rate based on 500 hours per year limit established in Env-A 600.

Attachment B.4

2021 Tower Coater Summary

	All quantities in Pounds		Ethylene Glycol 107-21-1	Toluene 108-88-3	Isopropanol 67-63-0	Formaldehyde 50-00-0	Ethanol 64-17-5	1,4-Dioxane 123-91-1	Benzene 71 43-2	Polyethyene Glycol 25322-68-3	Chromic Acid 7738-94-5	Tetrafluoroethylene 116-14-3	Methanol 67-56-1	Acetaldehyde 75-07-0	Ethylene Oxide 75-21-8	Propylene Oxide 75-56-9	Methyl ethyl ketone 78-93-3	2-Pyrrolidinone, 1-methyl-872-50-4	hexane 110 54-3
	Formula Description	2021 Total	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP	RTAP/HAP
1	Product 01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Product 02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Product 03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Product 04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Product 05	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Product 06	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Product 07	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Product 08	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Product 09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Product 10	906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Product 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Product 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Product 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Product 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Product 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Product 16	2,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Product 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Product 18	293	0	0	0	0	0	0	0	8.79	0	0	0	0	0	0	0	0	0
19	Product 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Product 20	171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Product 21	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Product 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	Product 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Product 24	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Product 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	Product 26	14	0	0	0	0	0.1374	0	0	0	0	0	0	0	0	0	0	0	0
27	Product 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Product 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Product 29	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Product 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	Product 31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	Product 32	5	0	0	0	0	0	0	0.00463	0	0	0	0	0	0	0	0	0	0
33	Product 33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	Product 34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	Product 35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Product 36	756	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Product 37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	Product 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	Product 39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	Product 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	Product 41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	Product 42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	Product 43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	Product 44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	Product 45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	Product 46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	Product 47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Product 48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	Product 49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	Product 50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	Product 51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	Product 52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	Product 53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	Product 54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	Product 55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	Product 56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	Product 57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	Product 58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	All quantities in Pounds		Ethylene Glycol 107-21-1	Toluene 108-88-3	Isopropanol 67-63-0	Formaldehyde 50-00-0	Ethanol 64-17-5	1,4-Dioxane 123-91-1	Benzene 71 43-2	Polyethyene Glycol 25322-68-3	Chromic Acid 7738-94-5	Tetrafluoroethylene 116-14-3	Methanol 67-56-1	Acetaldehyde 75-07-0	Ethylene Oxide 75-21-8	Propylene Oxide 75-56-9	Methyl ethyl ketone 78-93-3	2-Pyrrolidinone, 1-methyl-872-50-4	hexane 110-54-3
	Formula Description	2021 Total	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP	RTAP/HAP
59	Product 59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	Product 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	Product 61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	Product 62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	Product 63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	Product 64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	Product 65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	Product 66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	Product 67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	Product 68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	Product 69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	Product 70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	Product 71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	Product 72	1,615	0	0	0	0	0	0	0	48.4503	0	0	0	0	0	0	0	0	0
73	Product 73	631	0	0	0	0	0	0	0	18.9243	0	0	0	0	0	0	0	0	0
74	Product 74	3,877	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	Product 75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	Product 76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	Product 77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	Product 78	3,227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	Product 79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	Product 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	Product 81	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	Product 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	Product 83	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	Product 84	304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	Product 85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86	Product 86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	Product 87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88	Product 88	778	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	Product 89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	Product 90	269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	Product 91	429	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	Product 92	75,221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93	Product 93	1,201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	Product 94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	Product 95	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	Product 96	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	Product 97	676	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	Product 98	570,966	0	0	0	0	0	0	0	0	0	570.9664	0	0	0	0	0	0	0
99	Product 99	14,242	0	0	0	0	0	0	0	0	0	14.24178	0	0	0	0	0	0	0
100	Product 100	12,582	0	0	0	0	0	0	0	0	0	12.58246	0	0	0	0	0	0	0
101	Product 101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	Product 102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	Product 103	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	Product 104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	Product 105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	Product 106	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107	Product 107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	Product 108	5,537	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109	Product 109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	Product 110	315	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111	Product 111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112	Product 112	2,094	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	All quantities in Pounds		Ethylene Glycol 107-21-1	Toluene 108-88-3	Isopropanol 67-63-0	Formaldehyde 50-00-0	Ethanol 64-17-5	1,4-Dioxane 123-91-1	Benzene 71 43-2	Polyethyene Glycol 25322-68-3	Chromic Acid 7738-94-5	Tetrafluoroethylene 116-14-3	Methanol 67-56-1	Acetaldehyde 75-07-0	Ethylene Oxide 75-21-8	Propylene Oxide 75-56-9	Methyl ethyl ketone 78-93-3	2-Pyrrolidinone, 1-methyl-872-50-4	hexane 110 54-3
	Formula Description	2021 Total	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP	RTAP/HAP
113	Product 113	77,593	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114	Product 114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	Product 115	371	0	0	0	0	0	0.37129	0	0	0	0	0	0	0	0	0	0	0
116	Product 116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117	Product 117	440	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118	Product 118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
119	Product 119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	Product 120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
121	Product 121	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122	Product 122	441	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123	Product 123	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124	Product 124	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	Product 125	26	0	7.68	0	0	0	0	0	0	0	0	0	0	0	0	7.68	0	1.28
126	Product 126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127	Product 127	88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	Product 128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	Product 129	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	Product 130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131	Product 131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132	Product 132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133	Product 133	717	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134	Product 134	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	Product 135	1,112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
136	Product 136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
137	Product 137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138	Product 138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139	Product 139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	Product 140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141	Product 141	13,393	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
142	Product 142	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143	Product 143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144	Product 144	362	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	Product 145	1,903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	Product 146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
147	Product 147	451	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
148	Product 148	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
149	Product 149	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.6	0	0
150	Product 150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
151	Product 151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152	Product 152	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153	Product 153	613	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
154	Product 154	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	Product 155	298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.8	0
156	Product 156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157	Product 157	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
158	Product 158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	Product 159	857	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	Product 160	1,029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	Product 161	3,330	0	0	0	0	0	0	0	0	0	0	99.8991	0	0	0	0	0	0
162	Product 162	165,958	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
163	Product 163	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164	Product 164	794	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	Product 165	11,520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166	Product 166	11,520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2021 Total	993,212	0.00	7.68	0.00	0.00	0.14	0.37	0.00	76.16	0.00	597.79	99.90	0.00	0.00	0.00	23.28	29.80	1.28

Attachment B.5

RTAP/HAP Summary

Evaluation of RTAP/HAP associated with Coating Tower operation

1. Actual/PTE scaling factor as calculated for each year used in calculations
2. Actual amount of RTAP/HAP available for release per maximum concentrations listed on Safety Data Sheets
3. Convert actual annual emissions to PTE by dividing annual emissions by scaling factor
4. For worst-case evaluation, use max. PTE calculated for years 2012-2021 to account for product variation
5. Convert to hourly PTE by dividing PTE (lb/yr) by 8,760 hours
6. Demonstrate compliance with Adjusted In-Stack Concentration limits established under Env-A 1405.05

Year	Actual/PTE Scaling Factor	Ethylene Glycol		Toluene		Isopropanol		Formaldehyde		Ethanol		1,4-Dioxane		Benzene		Polyethylene Glycol		Chromic Acid (Chromium		Tetrafluoroethylene	
		107-21-1		108-88-3		67-63-0		50-00-0		64-17-5		123-91-1		71-43-2		25322-68-3		7738-94-5		116-14-3	
		RTAP/HAP		RTAP/HAP		RTAP		RTAP/HAP		RTAP		RTAP/HAP		RTAP/HAP		RTAP		RTAP/HAP		RTAP	
		Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE
		lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr
2021	0.305	0	0	7.68	25.19	0	0	0	0	0.14	0.45	0.37	1.22	0.0046	0.015	76.16	249.9	0	0	597.8	1,961
2020	0.330	0	0	13.02	39.40	0	0	0	0	2.12	6.42	1.05	3.18	0.0056	0.017	136.6	413.3	0	0	652.4	1,975
2019	0.350	0	0	4.20	11.99	0	0	0.0	0	0.30	0.85	1.33	3.79	0.018	0.051	137.0	391.2	0	0	717.0	2,047
2018	0.348	0	0	15.90	45.69	0	0	0	0	0.31	0.88	2.25	6.48	0.012	0.034	193.8	556.9	0	0	857.1	2,463
2017	0.335	98.60	294.5	0	0	0	0	0	0	0.25	0.74	1.70	5.08	0.032	0.096	179.0	534.6	0	0	331.2	989.0
2016	0.381	0	0	0	0	0	0	0	0	0.35	0.91	2.56	6.73	0.0085	0.022	236.4	621.2	0	0	959.52	2,522
2015	0.412	736.2	1,786	538.8	1,307	53.88	130.7	0	0	3.18	7.72	0	0	0	0	333.1	808.0	0	0	1,089	2,642
2014	0.471	1,105	2,344	697.8	1,481	69.78	148.1	0	0	0.68	1.44	0.59	1.26	0	0	315.4	669.1	0	0	1,153	2,447
2013	0.448	1,698	3,789	493.1	1,100	49.31	110.0	0	0	0.28	0.62	3.52	7.86	0.0020	0.0045	396.8	885.4	0	0	589.8	1,316
2012	0.455	3,733	8,208	1,329	2,922	132.9	292.2	0	0	0.49	1.08	6.68	14.69	0.021	0.046	724.6	1,593	0	0	0	0
Maximum =	0.471	3733	8208	1329	2922	132.9	292.2	0	0	3.18	7.72	6.68	14.69	0.032	0.096	724.6	1593	0	0	1153	2642
Average =	0.384	737	1642	310.0	693.3	30.59	68.10	0	0	0.81	2.11	2.01	5.03	0.010	0.029	272.9	672.3	0	0	694.7	1836
PTE (lb/hr) = (based on 8,760 hr/yr)		0.937 lb/hr		0.334 lb/hr		0.0334 lb/hr		0 lb/hr		0.000881 lb/hr		0.00168 lb/hr		0.0000110 lb/hr		0.182 lb/hr		0 lb/hr		0.302 lb/hr	
RTAP Evaluation																					
X (lb/hr) =		0.937 lb/hr		0.334 lb/hr		0.0334 lb/hr		0 lb/hr		0.000881 lb/hr		0.00168 lb/hr		0.00001101 lb/hr		0.182 lb/hr		0 lb/hr		0.302 lb/hr	
Y = X / 7.94 =		0.1180		0.0420		0.00420		0		0.0001109		0.000211		0.00000139		0.0229		0		0.0380	
Z = Y x 10^6 =		118,003 ug/sec		42,017 ug/sec		4,202 ug/sec		0 ug/sec		110.92 ug/sec		211.3 ug/sec		1.39 ug/sec		22,906 ug/sec		0 ug/sec		37,984 ug/sec	
A = Stack Volume (±70,000 CFM)																					
B = A / 2119 =		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec	
In-Stack Concentration = Z/B		3572 ug/m^3		1272 ug/m^3		127.2 ug/m^3		0 ug/m^3		3.36 ug/m^3		6.40 ug/m^3		0.042 ug/m^3		693.4 ug/m^3		0 ug/m^3		1149.8 ug/m^3	
Adj. In-Stack Conc. = (Z/B) / 700		5.10 ug/m^3		1.82 ug/m^3		0.18 ug/m^3		0 ug/m^3		0.0048 ug/m^3		0.0091 ug/m^3		0.000060 ug/m^3		0.99 ug/m^3		0 ug/m^3		1.64 ug/m^3	
RTAP Limits Comparison																					
24 Hour AAL		503 ug/m^3		5000 ug/m^3		1757 ug/m^3		1.3 ug/m^3		6714 ug/m^3		258 ug/m^3		5.7 ug/m^3		208 ug/m^3		0.036 ug/m^3		171 ug/m^3	
Annual AAL		335 ug/m^3		5000 ug/m^3		1171 ug/m^3		0.88 ug/m^3		4476 ug/m^3		30 ug/m^3		3.8 ug/m^3		99 ug/m^3		0.024 ug/m^3		81 ug/m^3	
Adj. In-Stack Conc./24 Hour AAL		1.01%		0.036%		0.0103%		0%		0.000071%		0.0035%		0.00105%		0.48%		0%		0.96%	
Adj. In-Stack Conc./Annual AAL		1.52%		0.036%		0.016%		0%		0.000107%		0.030%		0.0016%		1.00%		0%		2.03%	
In Compliance with AALs?		Yes		Yes		Yes		N/A		Yes		Yes		Yes		Yes		N/A		Yes	

Evaluation of RTAP/HAP associated with Coating Tower operation

1. Actual/PTE scaling factor as calculated for each year used in calculations
2. Actual amount of RTAP/HAP available for release per maximum concentrations listed on Safety Data Sheets
3. Convert actual annual emissions to PTE by dividing annual emissions by scaling factor
4. For worst-case evaluation, use max. PTE calculated for years 2012-2021 to account for product variation
5. Convert to hourly PTE by dividing PTE (lb/yr) by 8,760 hours
6. Demonstrate compliance with Adjusted In-Stack Concentration limits established under Env-A 1405.05

Year	Actual/PTE Scaling Factor	Methanol		Acetaldehyde		Ethylene Oxide		Propylene Oxide		Methyl Ethyl Ketone		2-Pyrrolidinone, 1-methyl-		Hexane	
		67-56-1		75-07-0		75-21-8		75-56-9		78-93-3		872-50-4		110-54-3	
		RTAP/HAP		RTAP/HAP		RTAP/HAP		RTAP/HAP		RTAP		RTAP		RTAP/HAP	
		Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE
		lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr
2021	0.305	99.90	327.7	0	0	0	0	0	0	23.28	76.37	29.80	97.76	1.28	4.20
2020	0.330	72.25	218.6	0	0	0	0	0	0	31.42	95.09	23.04	69.74	2.17	6.57
2019	0.350	67.04	191.4	0	0	0	0	0	0	11.20	31.98	12.37	35.33	0.70	2.00
2018	0.348	45.37	130.4	0	0	0	0	0	0	49.60	142.5	43.30	124.4	2.65	7.62
2017	0.335	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0.381	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0.412	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0.471	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0.448	0	0	0	0	0	0	0	0	0.0	0	0.0	0	0	0
2012	0.455	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum =	0.471	99.90	327.72	0	0	0	0	0	0	49.60	142.5	43.30	124.43	2.65	7.62
Average =	0.384	28.46	86.82	0	0	0	0	0	0	11.55	34.60	10.85	32.73	0.68	2.04
PTE (lb/hr) = (based on 8,760 hr/yr)		0.0374 lb/hr		0 lb/hr		0 lb/hr		0 lb/hr		0.0163 lb/hr		0.0142 lb/hr		0.000869 lb/hr	
RTAP Evaluation															
X (lb/hr) =		0.0374 lb/hr		0 lb/hr		0 lb/hr		0 lb/hr		0.0163 lb/hr		0.0142 lb/hr		0.000869 lb/hr	
Y = X / 7.94 =		0.00471		0		0		0		0.00205		0.00179		0.0001095	
Z = Y x 10^6 =		4,712 ug/sec		0 ug/sec		0 ug/sec		0 ug/sec		2,049 ug/sec		1,789 ug/sec		109.49 ug/sec	
A = Stack Volume (±70,000 CFM)															
B = A / 2119 =		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec	
In-Stack Concentration = Z/B		142.63 ug/m^3		0 ug/m^3		0 ug/m^3		0 ug/m^3		62.04 ug/m^3		54.16 ug/m^3		3.31 ug/m^3	
Adj. In-Stack Conc. = (Z/B) / 700		0.204 ug/m^3		0 ug/m^3		0 ug/m^3		0 ug/m^3		0.089 ug/m^3		0.077 ug/m^3		0.0047 ug/m^3	
RTAP Limits Comparison															
24 Hour AAL		20000 ug/m^3		161 ug/m^3		6.4 ug/m^3		17 ug/m^3		5000 ug/m^3		1429 ug/m^3		885 ug/m^3	
Annual AAL		20000 ug/m^3		9 ug/m^3		4.3 ug/m^3		11 ug/m^3		5000 ug/m^3		952 ug/m^3		700 ug/m^3	
Adj. In-Stack Conc./24 Hour AAL		0.00102%		0%		0%		0%		0.0018%		0.0054%		0.00054%	
Adj. In-Stack Conc./Annual AAL		0.00102%		0%		0%		0%		0.0018%		0.0081%		0.00068%	
In Compliance with AALs?		Yes		N/A		N/A		N/A		Yes		Yes		Yes	

Attachment B.6

PFOA/PFOS Calculations Summary

Calculation of Annual Combined PFOA/PFOS Emissions from RTO and Bypass Operations

Known:

[1] PFOA RTO Outlet Emission Rate = 1.64×10^{-6} lb/hr (from September 2021 Stack Test, Table 4-2)

[2] PFOS RTO Outlet Emission Rate = 6.80×10^{-8} lb/hr (from September 2021 Stack Test, Table 4-2)

[3] PFOA Bypass Emission Rate = 2.06×10^{-5} lb/hr (from September 2021 Stack Test, Table 4-2)

[4] PFOS Bypass Emission Rate = 2.77×10^{-7} lb/hr (from September 2021 Stack Test, Table 4-2)

[5] Air Deposition Modeling results limit operation of bypass at 4,145 hours per year

Assumptions:

[6] RTO hours of operation are anticipated to be 8,760 less the hours of Bypass operation (i.e., 8,760 - 4,145 = 4,615)

[7] Hourly bypass outlet (lb/hr) assumed to equal RTO inlet measured during September 2021 stack test

A. Calculation of Combined Annual Emission Rate at Maximum Allowable Bypass Hours (4,145 hr/yr):

1. PFOA Annual Emissions = Bypass Emissions (lb/hr) * 4,145 (hr/yr) + RTO Outlet (lb/hr) * 4,615 hr/yr)
[item 3] [item 5] [item 1] [item 6]

PFOA Annual Emissions (lb/yr) =	0.093	lb/yr
Maximum Allowable PFOA =	0.45	lb/yr
% of Maximum Emissions =	20.66%	of allowable PFOA on an annual basis

2. PFOS Annual Emissions = Bypass Emissions (lb/hr) * 4,145 (hr/yr) + RTO Outlet (lb/hr) * (8,760 hr/yr - 4,145 hr/yr)
[item 4] [item 5] [item 2] [item 6]

PFOS Annual Emissions (lb/yr) =	0.0015	lb/yr
Maximum Allowable PFOS =	0.57	lb/yr
% of Maximum Emissions =	0.26%	of allowable PFOS on an annual basis

B. Calculation of Combined Annual Emission Rate at Requested Annual Bypass Hours (175 hr/yr*):

1. PFOA Annual Emissions = Bypass Emissions (lb/hr) * 175 (hr/yr) + RTO Outlet (lb/hr) * 8,585 hr/yr)
[item 3] [item 5] [item 1]

PFOA Annual Emissions (lb/yr) =	0.018	lb/yr
Maximum Allowable PFOA =	0.45	lb/yr
% of Maximum Emissions =	3.93%	of allowable PFOA on an annual basis

2. PFOS Annual Emissions = Bypass Emissions (lb/hr) * 175 (hr/yr) + RTO Outlet (lb/hr) * (8,585 hr/yr)
[item 4] [item 5] [item 2]

PFOS Annual Emissions (lb/yr) =	0.0006	lb/yr
Maximum Allowable PFOS =	0.57	lb/yr
% of Maximum Emissions =	0.11%	of allowable PFOS on an annual basis

* - 175 hours per year is equal to 2% of 8,760

Results of the September 7-10, 2021, Regenerative Thermal Oxidizer Compliance Tests at Saint-Gobain Performance Plastics in Merrimack, New Hampshire

RTO PCE01

Temporary Permit No. TP-0256

Barr Project No. 29061003.07

Prepared for
Saint-Gobain Performance Plastics
Merrimack, New Hampshire

November 2021

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435-4803
Phone: 952.832.2600
www.barr.com

4 Results

4.1 PFAS Test Results

The PFAS results that satisfy the facility permit are illustrated below. The PFOA annualized emission rate average is 0.014 lb/yr, which is below the permit limit of 0.45 lb/yr. The PFOS annualized emission rate average is 0.00060 lb/yr which is below the permit limit of 0.57 lb/yr.

Table 4-1 PFAS Test Results

Test Methods 1-4, OTM-45	Average Test Results RTO Outlet (PCE01)	Permit Limit
Test Date	9/7-8/21	-
PFOA, lb/yr	0.014	0.45
PFOS, lb/yr	0.00060	0.57

The full results of the RTO inlet and outlet PFAS tests are summarized in Tables 1-2 for each compound in the OTM-45 Table 45-1. The samples were analyzed for the PFAS target analytes listed in Table 45-1 of Other Test Method 45 (OTM-45).

Table 1 provides the RTO outlet controlled PFAS emission rates in pounds per year (lb/yr) Table 2 provides the RTO inlet mass loading rates of PFAS in lb/yr. The calculated destruction/removal efficiency (DRE) for PFOA and PFOS are presented below. Intermediary calculations of PFAS pollutant concentrations, emissions rates and compound DRE are in Appendix A for the inlet and outlet tests.

Table 4-2 RTO PFAS Destruction/ Removal Efficiency

Average Test Results			
Test Methods 1-4, OTM-45	RTO Inlet, lb/hr (PCE01)	RTO Outlet, lb/hr (PCE01)	DRE, %
Test Date	9/7-8/21	9/7-8/21	
PFOA	2.06E-05	1.64E-06	92
PFOS	2.77E-07	6.80E-08	75

Test run one was performed on September 7. Test runs two and three were performed on September 8. Test run three was delayed 27 minutes from 1433-1500 due to an RTO trip out and subsequent reheating to its operating temperature.

Performance tests for HF, NMVOC and permanent total enclosure verification were completed during periods of the three PFAS test runs.

4.2 Hydrogen Fluoride Test Results

Table 3 summarizes the results of the HF test performed on September 7-8, 2021. Four test runs were completed during periods of the PFAS test runs. The first test run on September 7th was compromised due to an inability to lower the sample train exit temperature below 68 degrees Fahrenheit at the beginning of the run. Barr conferred with NHDES representatives onsite, and all agreed to conduct three additional runs that were successfully completed on September 8th and comprise the test. All four samples were analyzed, and results are presented in the table with the test average omitting run one, which had no effect on the results, data usability or reliability. Test run three was delayed from 1145-1410 waiting for the next PFAS test run to begin and also delayed 27 minutes from 1433-1500 due to an RTO trip out and subsequent reheating to its operating temperature.

HF does not have a specific a permit emission limit, but data is used to evaluate 24 -hour and Annual Ambient Air Limits against NHDES RTAP standards. The measured HF emission rates were multiplied by the ratio of molecular weights (19 F, 20 HF) to calculate hydrogen fluoride as F. The result of the HF RTAP evaluation is presented below. The HF adjusted in-stack concentration complies with the 24-hour and annual AALs.

Table 4-3 RTAP Determination of HF Ambient Air Levels

RTAP Compound	Emission Rate (lb/hr)	Exhaust Flow RTO RTAP (acfm)	Adjusted in-stack Concentration (µg/m³)	24-hr AAL (µg/m³)	Annual AAL (µg/m³)
Hydrogen Fluoride as F	1.21E-02	103,600	0.13	1.5	0.98

4.3 RTAP Determination

An RTAP analysis was conducted following the procedures given in the New Hampshire Code of Administrative Rules Part Env-A 1400. The RTAP analysis compares emissions (both on a 24-hour and annual basis) to ambient air levels (AALs) as set forth in NHDES Env-A Table 1450-1: RTAP List. Controlled emissions for HF and APFO were determined by the emissions tests at the RTO.

Measured PFOA emissions were multiplied by the ratio of molecular weights (431 ammonium perfluorooctanoate (APFO), 414 PFOA) to calculate APFO emissions.

A summary of the results of the APFO RTAP analysis are presented in Tables 5-4 below. Ammonia perfluorooctanoate is below the *de minimis* 24-hr and annual emission rate levels. The RTAP calculations are in Appendix F.

Attachment B.7

Scaling Factor Determination for Tower Coating Operations

Determination of Scaling Factor to Convert Actual Emissions in Coating Products to a Potential Basis

Known:
1. Maximum hourly capacity of each Coating Tower (in square feet per hour) [A]
2. Annual Hours of operation of each Coating Tower [E]

Assumptions:
1. In order to estimate Potential to Emit, no bottleneck factor has been assumed (100%) [C]

Calculated:
1. Maximum annual capacity of each Coating Tower (in square feet per year, based on 8,760 hr/yr operation potential) [B = A * 8760]
2. Calculated Potential production based on Maximum ft2/yr multiplied by bottleneck factor [D = B * C]
3. Calculated annual square footage of material based on line speed and hours operated [F = A * E]
4. % of Maximum = Calculated Annual ft2/yr / Potential ft2/yr [G = F / D]

	[A]	[B]	[C]	[D]	[E]	[F]	[G]	
Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2021 Hrs	Calculated 2021 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	3546.4	21,278,400	0.405	
MB	4,375	38,325,000	100%	38,325,000	1006.6	4,403,875	0.115	
MC	9,200	80,592,000	100%	80,592,000	3675.1	33,810,920	0.420	
MR	9,200	80,592,000	100%	80,592,000	2925.4	26,913,680	0.334	
MD	9,200	80,592,000	100%	80,592,000	3124.8	28,748,160	0.357	
QX	6,000	52,560,000	100%	52,560,000	3637	21,822,000	0.415	
20" SBC	500	4,380,000	100%	4,380,000	1363.3	681,650	0.156	
20" Coater	500	4,380,000	100%	4,380,000	905.2	452,600	0.103	
Tower ME**	0	0	100%	0	0	0	-	
Tower MG	4,375	38,325,000	100%	38,325,000	271.4	1,187,375	0.031	
Tower MP	4,375	38,325,000	100%	38,325,000	941.5	4,119,063	0.107	
Tower MI**	0	0	100%	0	0	0	-	
Tower MQ	4,400	38,544,000	100%	38,544,000	1944.1	8,554,040	0.222	
Tower MS	9,200	80,592,000	100%	80,592,000	3570.7	32,850,440	0.408	
R&D*	2,600	17,693,010	100%	17,693,010	133.8	347,880	0.020	
Total	69,925	607,460,010		607,460,010		185,170,083	**0.3048**	**= 2021 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours
Towers ME & MI were removed from the facility in 2017

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2020 Hrs	Calculated 2020 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	3751.937	22,511,622	0.428	
MB	4,375	38,325,000	100%	38,325,000	1879.195	8,221,478	0.215	
MC	9,200	80,592,000	100%	80,592,000	3418.151	31,446,989	0.390	
MR	9,200	80,592,000	100%	80,592,000	3320.467	30,548,296	0.379	
MD	9,200	80,592,000	100%	80,592,000	2854.003	26,256,828	0.326	
QX	6,000	52,560,000	100%	52,560,000	3550.945	21,305,670	0.405	
20" SBC	500	4,380,000	100%	4,380,000	437.082	218,541	0.050	
20" Coater	500	4,380,000	100%	4,380,000	752.152	376,076	0.086	
Tower ME**	0	0	100%	0	0	0	-	
Tower MG	4,375	38,325,000	100%	38,325,000	931.961	4,077,329	0.106	
Tower MP	4,375	38,325,000	100%	38,325,000	1440.753	6,303,294	0.164	
Tower MI**	0	0	100%	0	0	0	-	
Tower MQ	4,400	38,544,000	100%	38,544,000	3154.866	13,881,410	0.360	
Tower MS	9,200	80,592,000	100%	80,592,000	3698.841	34,029,337	0.422	
R&D*	2,600	17,693,010	100%	17,693,010	592	1,539,200	0.087	
Total	69,925	607,460,010		607,460,010		200,716,072	**0.3304**	**= 2020 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours
Towers ME & MI were removed from the facility in 2017

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2019 Hrs	Calculated 2019ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	3487.702	20,926,212	0.398	
MB	4,375	38,325,000	100%	38,325,000	1587.893	6,947,032	0.181	
MC	9,200	80,592,000	100%	80,592,000	3355.288	30,868,650	0.383	
MR	9,200	80,592,000	100%	80,592,000	3193.845	29,383,374	0.365	
MD	9,200	80,592,000	100%	80,592,000	3344.325	30,767,790	0.382	
QX	6,000	52,560,000	100%	52,560,000	4197.469	25,184,814	0.479	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME**	0	0	100%	0	0	0	-	
Tower MG	4,375	38,325,000	100%	38,325,000	1292.858	5,656,254	0.148	
Tower MP	4,375	38,325,000	100%	38,325,000	1877.775	8,215,266	0.214	
Tower MI**	0	0	100%	0	0	0	-	
Tower MQ	4,400	38,544,000	100%	38,544,000	3479.364	15,309,202	0.397	
Tower MS	9,200	80,592,000	100%	80,592,000	4105.536	37,770,931	0.469	
R&D*	2,600	17,693,010	100%	17,693,010	648	1,684,800	0.095	
Total	69,925	607,460,010		607,460,010		212,714,324	**0.3502**	**= 2019 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours
Towers ME & MI were removed from the facility in 2017

	[A]	[B]	[C]	[D]	[E]	[F]	[G]	
Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2018 Hrs	Calculated 2018 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	3726	22,356,000	0.425	
MB	4,375	38,325,000	100%	38,325,000	2578	11,278,750	0.294	
MC	9,200	80,592,000	100%	80,592,000	3301	30,369,200	0.377	
MR	9,200	80,592,000	100%	80,592,000	3758	34,573,600	0.429	
MD	9,200	80,592,000	100%	80,592,000	3972	36,542,400	0.453	
QX	6,000	52,560,000	100%	52,560,000	4507	27,042,000	0.514	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME**	4,000	35,040,000	100%	35,040,000	0	0	-	
Tower MG	4,375	38,325,000	100%	38,325,000	1436	6,282,500	0.164	
Tower MP	4,375	38,325,000	100%	38,325,000	2694	11,786,250	0.308	
Tower MI**	3,000	26,280,000	100%	26,280,000	0	0	-	
Tower MQ	4,400	38,544,000	100%	38,544,000	3368	14,819,200	0.384	
Tower MS	9,200	80,592,000	100%	80,592,000	4006	36,855,200	0.457	
R&D*	2,600	19,532,610	100%	19,532,610	560	1,456,000	0.075	
Total	76,925	670,619,610		670,619,610		233,361,100	**0.3480**	**= 2018 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours
Towers ME & MI were removed from the facility in 2017

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2017 Hrs	Calculated 2017 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	4170	25,020,000	0.476	
MB	4,375	38,325,000	100%	38,325,000	2923	12,788,125	0.334	
MC	9,200	80,592,000	100%	80,592,000	3204	29,476,800	0.366	
MR	9,200	80,592,000	100%	80,592,000	3456	31,795,200	0.395	
MD	9,200	80,592,000	100%	80,592,000	3588	33,009,600	0.410	
QX	6,000	52,560,000	100%	52,560,000	3173	19,038,000	0.362	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME	4,000	35,040,000	100%	35,040,000	0	0	0.000	
Tower MG	4,375	38,325,000	100%	38,325,000	1153	5,044,375	0.132	
Tower MP	4,375	38,325,000	100%	38,325,000	2660	11,637,500	0.304	
Tower MI	3,000	26,280,000	100%	26,280,000	671	2,013,000	0.077	
Tower MQ	4,400	38,544,000	100%	38,544,000	3420	15,048,000	0.390	
Tower MS	9,200	80,592,000	100%	80,592,000	4156	38,235,200	0.474	
R&D*	2,600	19,532,610	100%	19,532,610	560	1,456,000	0.075	
Total	76,925	670,619,610		670,619,610		224,561,800	**0.3349**	**= 2017 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2016 Hrs	Calculated 2016 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	4028	24,168,000	0.460	
MB	4,375	38,325,000	100%	38,325,000	2637	11,536,875	0.301	
MC	9,200	80,592,000	100%	80,592,000	4879	44,886,800	0.557	
MR	9,200	80,592,000	100%	80,592,000	3997	36,772,400	0.456	
MD	9,200	80,592,000	100%	80,592,000	4299	39,550,800	0.491	
QX	6,000	52,560,000	100%	52,560,000	4193	25,158,000	0.479	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME	4,000	35,040,000	100%	35,040,000	1081	4,324,000	0.123	
Tower MG	4,375	38,325,000	100%	38,325,000	1528	6,685,000	0.174	
Tower MP	4,375	38,325,000	100%	38,325,000	2830	12,381,250	0.323	
Tower MI	3,000	26,280,000	100%	26,280,000	1915	5,745,000	0.219	
Tower MQ	4,400	38,544,000	100%	38,544,000	2211	9,728,400	0.252	
Tower MS	9,200	80,592,000	100%	80,592,000	3531	32,485,200	0.403	
R&D*	2,600	19,532,610	100%	19,532,610	680	1,768,000	0.091	
Total	76,925	670,619,610		670,619,610		255,189,725	**0.3805**	**= 2016 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2015 Hrs	Calculated 2015 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	3821	22,926,000	0.436	
MB	4,375	38,325,000	100%	38,325,000	2855	12,490,625	0.326	
MC	9,200	80,592,000	100%	80,592,000	5510	50,692,000	0.629	
MR	9,200	80,592,000	100%	80,592,000	4236	38,971,200	0.484	
MD	9,200	80,592,000	100%	80,592,000	4434	40,792,800	0.506	
QX	6,000	52,560,000	100%	52,560,000	4862	29,172,000	0.555	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME	4,000	35,040,000	100%	35,040,000	1569	6,276,000	0.179	
Tower MG	4,375	38,325,000	100%	38,325,000	2152	9,415,000	0.246	
Tower MP	4,375	38,325,000	100%	38,325,000	2288	10,010,000	0.261	
Tower MI	3,000	26,280,000	100%	26,280,000	2519	7,557,000	0.288	
Tower MQ	4,400	38,544,000	100%	38,544,000	2485	10,934,000	0.284	
Tower MS	9,200	80,592,000	100%	80,592,000	3643	33,515,600	0.416	
R&D*	2,600	19,532,610	100%	19,532,610	1409	3,663,400	0.188	
Total	76,925	670,619,610		670,619,610		276,415,625	**0.4122**	**= 2015 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2014 Hrs	Calculated 2014 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	4744	28,464,000	0.542	
MB	4,375	38,325,000	100%	38,325,000	3303	14,450,625	0.377	
MC	9,200	80,592,000	100%	80,592,000	5606	51,575,200	0.640	
MR	9,200	80,592,000	100%	80,592,000	4905	45,126,000	0.560	
MD	9,200	80,592,000	100%	80,592,000	5478	50,397,600	0.625	
QX	6,000	52,560,000	100%	52,560,000	4715	28,290,000	0.538	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME	4,000	35,040,000	100%	35,040,000	2054	8,216,000	0.234	
Tower MG	4,375	38,325,000	100%	38,325,000	2852	12,477,500	0.326	
Tower MP	4,375	38,325,000	100%	38,325,000	2754	12,048,750	0.314	
Tower MI	3,000	26,280,000	100%	26,280,000	2854	8,562,000	0.326	
Tower MQ	4,400	38,544,000	100%	38,544,000	3402	14,968,800	0.388	
Tower MS	9,200	80,592,000	100%	80,592,000	4150	38,180,000	0.474	
R&D*	2,600	19,532,610	100%	19,532,610	1275	3,315,000	0.170	
Total	76,925	670,619,610		670,619,610		316,071,475	**0.4713**	**= 2014 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2013 Hrs	Calculated 2013 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	4523	27,138,000	0.516	
MB	4,375	38,325,000	100%	38,325,000	2665	11,659,375	0.304	
MC	9,200	80,592,000	100%	80,592,000	5745	52,854,000	0.656	
MR	9,200	80,592,000	100%	80,592,000	5395	49,634,000	0.616	
MD	9,200	80,592,000	100%	80,592,000	5466	50,287,200	0.624	
QX	6,000	52,560,000	100%	52,560,000	4693	28,158,000	0.536	
20" SBC	500	4,380,000	100%	4,380,000	1316	658,000	0.150	
20" Coater	500	4,380,000	100%	4,380,000	0	0	0.000	
Tower ME	4,000	35,040,000	100%	35,040,000	1046	4,184,000	0.119	
Tower MG	4,375	38,325,000	100%	38,325,000	2539	11,108,125	0.290	
Tower MP	4,375	38,325,000	100%	38,325,000	2768	12,110,000	0.316	
Tower MI	3,000	26,280,000	100%	26,280,000	2056	6,168,000	0.235	
Tower MQ	4,400	38,544,000	100%	38,544,000	2463	10,837,200	0.281	
Tower MS	9,200	80,592,000	100%	80,592,000	3886	35,751,200	0.444	
R&D*	2,600	19,532,610	100%	19,532,610	0	0	0.000	
Total	76,925	670,619,610		670,619,610		300,547,100	**0.4482**	**= 2013 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours

Tower	Maximum ft2/hr	Maximum ft2/year	Bottleneck Factor	Potential ft2/year	Actual 2012 Hrs	Calculated 2012 ft2	% of Maximum	
MA	6,000	52,560,000	100%	52,560,000	4594	27,564,000	0.524	
MB	4,375	38,325,000	100%	38,325,000	4959	21,695,625	0.566	
MC	9,200	80,592,000	100%	80,592,000	4298	39,541,600	0.491	
MR	9,200	80,592,000	100%	80,592,000	4493	41,335,600	0.513	
MD	9,200	80,592,000	100%	80,592,000	4927	45,328,400	0.562	
QX	6,000	52,560,000	100%	52,560,000	5241	31,446,000	0.598	
20" SBC	500	4,380,000	100%	4,380,000	0	0	0.000	
20" Coater	500	4,380,000	100%	4,380,000	1424	712,000	0.163	
Tower ME	4,000	35,040,000	100%	35,040,000	4544	18,176,000	0.519	
Tower MG	4,375	38,325,000	100%	38,325,000	4778	20,903,750	0.545	
Tower MP	4,375	38,325,000	100%	38,325,000	4172	18,252,500	0.476	
Tower MI	3,000	26,280,000	100%	26,280,000	182	546,000	0.021	
Tower MQ	4,400	38,544,000	100%	38,544,000	2148	9,451,200	0.245	
Tower MS	9,200	80,592,000	100%	80,592,000	3119	28,694,800	0.356	
R&D*	2,600	19,532,610	100%	19,532,610	516	1,341,600	0.069	
Total	76,925	670,619,610		670,619,610		304,989,075	**0.4548**	**= 2012 Actual/PTE Scaling Factor**

Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours

Attachment C

Air Dispersion and Deposition Modeling Prepared by Barr Engineering

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Technical Memorandum

To: Mr. William Kempskie – Director Environmental Health and Safety
Saint-Gobain Performance Plastics, Merrimack, New Hampshire
From: Eric Edwalds
Subject: Bypass Stack, Air Deposition and Dispersion Modeling
Date: December 16, 2021
Project: Merrimack, New Hampshire Facility
c: Brett Slensky, Saint-Gobain

Executive Summary

To address Item #4 in the November 18, 2021 Letter of Deficiency (LOD), air dispersion and deposition modeling was conducted to include emissions from the regenerative thermal oxidizer's (RTO) bypass stack to address RSA 125-C:10-e (deposition of perfluorinated compounds (PFC's)) and Env-A 1400 Regulated Toxic Air Pollutants (RTAP) in accordance with Table 8, Item 6 of Saint-Gobain's Temporary Air Permit TP-0256.

The modeling analysis shows:

- Operating at a maximum of 4,145 hours per year, the bypass stack would be in compliance with RSA 125-C:10-e and will not cause or contribute to an exceedance of groundwater or surface water quality standards (AGQS and SWQS).
- Permit limits for annual operations of the bypass stack pursuant to Env-A 607.01 can be incorporated into Saint-Gobain's Temporary Air Permit TP-0256 to demonstrate compliance with RSA 125-C:10-e.
- The bypass stack is in compliance with Env-A 1400 RTAP limits for hydrogen fluoride (HF) and ammonium perfluorooctanoate (APFO).

Letter of Deficiency and Air Permit Requirements

Item #4 of the November 18, 2021 LOD cites condition VIII, Table 8, Item 6 of the permit (*Update to Air Dispersion and Deposition Modeling Impact Analysis*) that the bypass stack is a new emissions source not included in the modeling analysis for the permit, and consequently the modeling must be updated:

Requested action:

- **No later than 30 days from the date of this letter**, provide an update to the modeling analysis that was submitted with the Application that includes the bypass stack in the analysis. In addition, present the methodology for estimating uncontrolled per- and polyfluoroalkyl substances (PFAS)

emissions and the rationale for the number of hours for any consecutive 12-month included in the analysis.

An updated modeling analysis is also required by permit condition VIII, Table 8, Item 5 *Compliance Demonstration for Env-A 1400, Regulated Toxic Air Pollutant Regulation and RSA 125-C:10-e, Requirements for Air Emissions of Perfluorinated Compounds Impacting Soil and Water* based on final as-built RTO emission parameters and the results of the stack testing conducted pursuant to Table 6, Item 14 for RTAPs and PFCs, respectively of the permit[1]. The updated modeling analysis for the RTO as-built emission parameters[2] has been utilized for developing modeling parameters in the bypass stack modeling analysis.

Updated Modeling Analysis to Include the Bypass Stack

The bypass stack is a necessary safety component of the RTO. The bypass stack allows process exhaust gases to be diverted from entering the RTO in the event that the RTO is inoperable. As such, the RTO and the bypass stack do not operate at the same time, meaning that emissions would not occur from both stacks simultaneously. Consequently, the RTO and the bypass stack do not have combined modeled impacts such that the bypass stack can be modeled independently of the RTO.

Bypass Stack Modeling Parameters

The bypass stack is located on the roof and connected to the process exhaust gas ductwork as shown in **Figure 1**. The bypass stack has a slightly downward horizontal discharge to keep precipitation and other material from entering the process exhaust system. The bypass stack was modeled as source type POINTHOR (horizontal point source).

The modeling input parameters for the bypass stack were developed from the stack testing inlet parameters for the RTO. The RTO inlet measurements were collected just downstream of the bypass stack and represent what would be discharged through the bypass stack. These parameters are appropriate for this modeling analysis because the stack testing was designed to measure maximum pollutant emissions. Modeled emission parameters for the bypass stack are shown in **Table 1**.

For the purposes of preparing a permit amendment to incorporate the bypass stack into Saint-Gobain's temporary permit, a second set of modeling runs were conducted at a typical flow rate of 50,000 scfm to encompass the range of potential maximum modeled impacts.

[1] Saint-Gobain RTO Compliance Test Report 11-09-2021.

[2] December 16, 2021 Technical Memorandum: RTO As-Built Emission Parameters, Air Deposition and Dispersion Modeling

Modeling Methodology

The modeling was conducted following the methodology used in the RTO as-built emission parameter modeling. The model set-up is summarized in **Table 2**.

Compliance Demonstration for *RSA 125-C:10-e, Requirements for Air Emissions of Perfluorinated Compounds Impacting Soil and Water*

Revised Table 11 (from Permit Application Review Summary) on Page 16 of the Permit Document *Temporary Permit – Findings of Fact and Director's Decision* (330110016518-0227TypeFindingsOfFact.pdf) specifies the methodology for evaluating compliance with RSA 125-C:10-e. Compliance demonstration with RSA 125-C:10-e for the bypass stack is shown in **Table 3**. Consistent with previous deposition modeling, Method 2 deposition was greater than Method 1 deposition. Method 2 deposition results were used in the compliance demonstration. Maximum unit impact deposition ($g/m^2/yr$ per g/s) was slightly greater for the measured flow modeling run as compared to the typical flow modeling run. As shown in **Table 3**, PFOA deposition would potentially be detectable if the bypass stack operated continuously. **Table 3** also shows the number of hours per year that the bypass stack could theoretically operate and still demonstrate compliance with RSA 125-C:10-e. **Figure 2** shows the unit impact deposition results for the measured flow rate bypass stack modeling scenario.

This modeling demonstration satisfies the requirement that the operation of the bypass stack (at less than 4,145 hours per year based on conditions at the measured flow rate, which is the more restrictive of the scenarios modeled) does not cause or contribute to or have the potential to cause or contribute to an exceedance of an ambient groundwater quality standard (AGQS) or surface water quality standard (SWQS) due to the deposition of the contaminant from the air. This modeling demonstration will be used as supporting documentation for any permitted annual operating hours limitations.

Compliance Demonstration for *Env-A 1400, Regulated Toxic Air Pollutant Regulation*

Hydrogen fluoride (HF) emissions were not measured at the RTO inlet as part of the compliance testing, consequently, HF emissions from the bypass stack are unquantified. Because one of the primary concerns for operation of the RTO is the potential for generation of HF due to the thermal destruction of PFCs, we have assumed that the measured HF emissions at the RTO outlet would be a conservative representation of HF emissions from the bypass stack.

Measured PFOA emissions at the RTO inlet were multiplied by the ratio of molecular weights (431 APFO, 414 PFOA) to calculate APFO emissions from the bypass stack. APFO emissions from the bypass stack are well below Env-A 1400 *de minimis* emissions and modeled concentrations are well below RTAP AALs.

Compliance demonstration with Env-A 1400, RTAP regulation for the bypass stack is shown in **Table 4**. Very small differences in modeled concentrations occurred between the measured flow rate and the typical flow rate model runs.

Table 1 - Bypass Stack Modeled Stack Parameters
Bypass Stack Air Dispersion Modeling Technical Memorandum
St. Gobain Perfomance Plastics Inc., Merrimack, NH Facility

	UTM Zone 19 Meters		English Units					Metric (Modeling) Units			
Modeled Flow Rate	**X-Coordinate (easting)**	**Y-Coordinate (northing)**	**Ht (ft)**	**Temp (F)**	**Diam (in)**	**Flow (SCFM)**	**Flow (ACFM)**	**Ht (m)**	**Temp (K)**	**Diam (m)**	**Vel (m/s) [2]**
Measured [1]	298,780.62	4,752,031.23	63.52	236	60	57,500	76,900	19.36	386	1.524	19.90
Typical						50,000	65,660				16.99

[1] Saint-Gobain RTO Compliance Test Report 11-09-2021:
Results of the September 7-10, 2021, Regenerative Thermal Oxidizer Compliance Tests
at Saint-Gobain Performance Plastics in Merrimack, New Hampshire
Table 2 - RTO Inlet

[2] Stack gas exit velocity is based on actual airflow (ACFM)

Table 2 – Bypass Stack Model Set-Up Summary
Bypass Stack Air Deposition and Dispersion Modeling Technical Memorandum
St. Gobain Performance Plastics Inc., Merrimack, NH Facility

Model Set-Up

- AERMOD v.21112
- 2013 – 2017 Manchester, NH meteorological data
    - Processed by NHDES – AERMET v.18081 with AERMINUTE and adjusted u-star
    - Upper air data from Gray, ME
- Model Bypass stack at 1 g/s
    - Calculate Unit Impact Rate (UIR)
        - Deposition ($g/m^2/yr$ per g/s)
        - Ambient air concentration ($\mu g/m^3$ per g/s)
- Source type = POINTHOR
- Receptor Grids
    - OXIDIZER.ROU (PFAS deposition) includes receptors on property
    - RTAP_GRID (RTAP compliance) receptors start at facility property boundary
- Deposition Parameters
    - Unknown particle size distribution in bypass stack exhaust
    - Method 1 deposition parameters from Barton et al., 2006, Table 4

Table 4. Average particle size distribution for PFOA at fence line.

Particle Diameter, µm	Mass Fraction %
>4.0	5.6
1.7	12.9
0.8	9.2
0.5	7.2
0.3	5.3
<0.28	59.8

    -
    - Density = 1.8 g/cm^3 (perfluorooctanoic acid - https://pubchem.ncbi.nlm.nih.gov/source/ILO-ICSC)
    - Method 2 deposition parameters (< 2.5 µm) fraction of 0.61 (Barton, 2010)

References:

Barton, C.A., Butler, L.E., Zarzecki, C.J., Flaherty, J., and Kaiser, M., 2006. Characterizing Perfluorooctanoate in Ambient Air near the Fence Line of a Manufacturing Facility: Comparing Modeled and Monitored Values. Journal of the Air & Waste Management Association, 56:48-55.

Barton, C.A., Zarzecki, C.J., and Russell, M.H., 2010. A Site-Specific Screening Comparison of Modeled and Monitored Air Dispersion and Deposition for Perfluorooctanoate. Journal of the Air & Waste Management Association, 60:4, 402-411, DOI:10.3155/1047-3289.60.4.402

Table 3 - Compliance Demonstration for RSA 125-C:10-e [1]
Bypass Stack Air Dispersion and Deposition Modeling Technical Memorandum
St. Gobain Perfomance Plastics Inc., Merrimack, NH Facility

Measured Flow Rate

PFC	Lowest Concentration Minimum Reporting Limits (LCMRL) for Lab Analysis [2] (ppt)	Maximum Concentration of PFC (MC_{PFC}) Infiltrating to Groundwater [3] (ppt)	Maximum Deposition Rate (MDR_{PFC}) [4] ($\mu g/m^2/yr$)	Maximum Annualized Emission Rate [5] (g/s)	Maximum Annualized Emission Rate [6] (lb/hr)	Maximum Annualized Emission Rate [7] (lb/yr)	Annual Emission Rate Based on September 2021 Stack Tests [8] (lb/yr)	Annual Emission Rate Below Maximum Annualized Emission Rate? [9] (Yes / No)	Annual Operating Hours to Meet Limit [10]
PFOA	3.4	< 3.4	< 1.8	< 1.23E-06	< 9.72E-06	< 0.085	0.18	**No**	4,145
PFOS	4.4	< 4.4	< 2.3	< 1.59E-06	< 1.26E-05	< 0.110	0.0024	**Yes**	- -

Typical Flow Rate

PFOA	3.4	< 3.4	< 1.8	< 1.33E-06	< 1.06E-05	< 0.093	0.18	**No**	4,509
PFOS	4.4	< 4.4	< 2.3	< 1.72E-06	< 1.37E-05	< 0.120	0.0024	**Yes**	- -

[1] The calculation methodology used in this table follows the NHDES methodology shown in Table 11 of the Permit Application Review Summary and in the Revised Table 11 in the NHDES response to Comment #16 in the Temporary Permit - Findings of Fact and Director's Decision.

[2] LCMRLs used in the Revised Table 11 from the November 2019 EPA document *Method 533: Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry*

[3] The maximum concentration of PFC (MC_{PFC}) infiltrating to groundwater needs to be less than the LCMRL to demonstrate no impact to groundwater.

[4] MDR_{PFC} ($(\mu g/m^2)/yr$) = MC_{PFC} ($\mu g/m^3$ or ppt) * IR (m/yr)
Precipitation Infiltration Rate (IR) (m/yr) 0.53
IR based on annual precipitation of 46 inches per year as described in the permit application review summary.

[5] Maximum Annualized Emission Rate (g/s) = MDR_{PFC} ($(\mu g/m^2)/yr$) / (UIR ($g/m^2/yr$ per g/s) * 1,000,000 ($\mu g/g$))
Unit Impact Rate (UIR) ($g/m^2/yr$ per g/s) at maximum impact receptor (measured flow rate) 1.47 Method 2 Deposition
Unit Impact Rate (UIR) ($g/m^2/yr$ per g/s) at maximum impact receptor (typical flow rate) 1.35 Method 2 Deposition
UIR from Method 2 deposition (worst-case). Method 1 UIR = 0.423 ($g/m^2/yr$ per g/s) (measured flow rate).

[6] Maximum Annualized Emission Rate (lb/hr) = Maximum Annualized Emission Rate (g/s) * 3600 s/hr * 1 lb/453.6 g/lb

[7] Maximum Annualized Emission Rate (lb/yr) = Maximum Annualized Emission Rate (lb/hr) * 8760 hr/yr

[8] Table 2 - Saint-Gobain RTO Compliance Test Report 11-09-2021.

[9] If the annual emission rate is less than the maximum annualized emission rate (which represents the level at which the PFC would be detectable), this result demonstrates that operation of the RTO will not cause or contribute to an exceedance of a groundwater or surface water quality standard (AGQS and SWQS, respectively) and satisfies the requirements of RSA 125-C:10-e.

[10] Annual operating hours to meet limit = maximum annualized emission rate / stack test annual emission rate * 8,760 hours per year

Table 4 - Compliance Demonstration for Env-A 1400 Regulated Toxic Air Pollutants (RTAP)
Bypass Stack Air Dispersion and Deposition Modeling Report
Saint-Gobain Performance Plastics - Merrimack, NH

Model Run	RTAP	Emission Rate (lbs/hr) [2]	24-hr H1H Concentration [3][4]	24-hr Maximum % of AAL	Maximum Annual Concentration [5]	Annual Maximum % of AAL	24-hr AAL ($\mu g/m^3$) [6]	Annual AAL ($\mu g/m^3$) [6]
As-Built Parameters [1]	Hydrogen fluoride, HF as F-	0.012	0.061	4.1%	0.0092	0.94%	1.5	0.98
	Ammonium perfluorooctanoate (APFO)	2.70E-06	1.4E-05	0.0%	2.1E-06	0.0%	0.05	0.024
Typical Flow Rate (50,000 scfm)	Hydrogen fluoride, HF as F-	0.012	0.061	4.1%	0.0091	0.93%	1.5	0.98
	Ammonium perfluorooctanoate (APFO)	2.70E-06	1.4E-05	0.0%	2.1E-06	0.0%	0.05	0.024

[1] As-Built Bypass Stack Parameters
Stack height - 63.5 feet
Stack temperature - 236 F
Stack diameter - 60 inches
Flow rate - 76,900 acfm (57,500 scfm)

[2] - HF was not measured at the inlet. RTO outlet emission rate (Table 3 Saint-Gobain RTO Compliance Test Report 11-09-2021, HF as Fluoride (F-)) assumed to be worst-case for inlet.

[2] - PFOA measured at RTO inlet (lb/hr) converted to APFO (lb/hr). 2.70E-06 APFO lb/hr
[3] - Maximum modeled concentration for 1 g/s emission rate * RTAP lbs/hr * 0.126 g/s / lbs/hr 0.126 lbs/hr to g/s
[4] - Highest (High-1st-high) 24-hour concentration over 5 years of meteorological data
[5] - Highest annual concentration over 5 years of meteorological data
[6] - New Hampshire Code of Administrative Rules Env-A 1405.01 Table of All Regulated Toxic Air Pollutants.

Figure 1 – Bypass Stack Location

Unit Impact Rate (UIR) Deposition ($g/m^2/yr$ per g/s)

- 0 - 0.05
- 0.05 - 0.50
- 0.50 - 1.0
- 1.0 - 1.3
- 1.3 - 1.47

Bypass Stack

AERMOD Method 2 Deposition

0 35 70 140 210 280

Meters

BARR

PFOA DEPOSITION - NEAR FIELD
BYPASS STACK AIR DEPOSITION MODELING
Measured Flow Rate Scenario
Unit Impact Rate (UIR) Deposition

Merrimack, New Hampshire
Saint-Gobain

FIGURE 2

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Mr. William Kempskie – Director Environmental Health and Safety
Saint-Gobain Performance Plastics, Merrimack, New Hampshire
From: Eric Edwalds
Subject: RTO As-Built Emission Parameters, Air Deposition and Dispersion Modeling
Date: December 16, 2021
Project: Merrimack, New Hampshire Facility
c: Brett Slensky, Saint-Gobain

Executive Summary

Air dispersion and deposition modeling was conducted to evaluate the performance of the regenerative thermal oxidizer (RTO) with respect to RSA 125-C:10-e (deposition of perfluorinated compounds (PFC's)) and Env-A 1400 Regulated Toxic Air Pollutants (RTAP) in accordance with Table 8, Item 5 of Saint-Gobain's Temporary Air Permit TP-0256.

The modeling analysis shows:

- The RTO is in compliance with RSA 125-C:10-e and will not cause or contribute to an exceedance of groundwater or surface water quality standards (AGQS and SWQS).
- The RTO does not require permit limits to demonstrate compliance with RSA 125-C:10-e pursuant to Env-A 607.01 (n).
- The RTO is in compliance with Env-A 1400 RTAP limits for hydrogen fluoride (HF) and ammonium perfluorooctanoate (APFO).
- The RTO does not need a permit for control of HF emissions pursuant to Env-A 607.01(t) and Env-A 1403.

Air Permit Requirements

Saint Gobain's Temporary Air Permit TP-0256 for the installation and operation of a regenerative thermal oxidizer has the following condition: Table 8 – Reporting Requirements, Item 5 *Compliance Demonstration for Env-A 1400, Regulated Toxic Air Pollutant Regulation and RSA 125-C:10-e, Requirements for Air Emissions of Perfluorinated Compounds Impacting Soil and Water*

> a.) The owner or operator shall update and submit an Env-A 1400 compliance demonstration in accordance with Table 7, Item 10 and an updated air deposition modeling analysis of post-controlled PFC emissions based on final as-built RTO emission parameters and the results of the stack testing conducted pursuant to Table 6, Item 14 for RTAPs and PFCs, respectively.
> b.) The Env-A 1400 compliance demonstration required in Table 8, Item 5(a) above, shall include the submission of the air dispersion model for RTAP emissions, an evaluation of compliance with the

limitations in Env-A 1400, a determination if the RTO requires a permit pursuant to Env-A 607.01(t) and Env-A 1403, *Permit Requirements*

The results from the September 7-10, 2021 stack testing (conducted pursuant to Table 6, Item 14) were submitted on November 9, 2021[1]. The compliance modeling demonstration described in Table 8, Items 5(a) and 5(b) above, is due to the NHDES within 30 business days of submittal of the stack testing report. This modeling report fulfills the above requirements and demonstrates compliance with RSA 125-C:10-e and Env-A 1400 without any additional permit limits or permitting actions pursuant to Env-A 607.01(n) (PFCs) or Env-A 607.01(t) (RTAP).

As-Built RTO Emission Parameters

Separate performance tests were conducted for PFAS compounds (Modified EPA OTM-45) and HF (EPA Method 26A). Although the measured flow parameters were very similar, the PFAS deposition modeling used the flow parameters from OTM-45, and the RTAP modeling for HF used the flow parameters from Method 26A. Modeled as-built emission parameters are shown in **Table 1**.

The location of the RTO stack is approximately 60 feet northeast of the RTO location in the permit application modeling. The building downwash model (BPIP) was rerun to accommodate this change.

Modeling Methodology

The modeling was conducted following the methodology used in the permit application with the one exception being that the latest version of AERMOD v.21112 was used instead of the AERMOD v.18081[2]. The model set-up is summarized in **Table 2**.

Compliance Demonstration for *RSA 125-C:10-e, Requirements for Air Emissions of Perfluorinated Compounds Impacting Soil and Water*

Revised Table 11 (from Permit Application Review Summary) on Page 16 of the Permit Document *Temporary Permit – Findings of Fact and Director's Decision* (330110016518-0227TypeFindingsOfFact.pdf) specifies the methodology for evaluating compliance with RSA 125-C:10-e. Compliance demonstration with RSA 125-C:10-e for the RTO as-built emission parameters is shown in **Table 3**. **Figure 1** shows the unit impact deposition results ($g/m^2/s$ per g/s) for the as-built emission parameters.

This modeling demonstration satisfies the requirement that the operation of the RTO does not cause or contribute to or have the potential to cause or contribute to an exceedance of an ambient groundwater

[1] Saint-Gobain RTO Compliance Test Report 11-09-2021

[2] AERMOD versions are identified by year and day of year.

quality standard (AGQS) or surface water quality standard (SWQS) due to the deposition of the contaminant from the air.

Compliance Demonstration for *Env-A 1400, Regulated Toxic Air Pollutant Regulation*

Compliance demonstration for Env-A 1400 was provided in the stack test report for hydrogen fluoride, as F (HF), and ammonium perfluorooctanoate (APFO)[3], however the compliance demonstration did not require dispersion modeling. In keeping with Permit Condition VIII Table 8 – Item 5(b) shown above, this report constitutes the submission of the air dispersion model for RTAP emissions. **Table 4** shows the RTAP dispersion modeling results which also demonstrate compliance with Env-A 1400.

In accordance with Env-A 607.01(t) and Env-A 1403.02, the air modeling results demonstrate compliance with the Env-A 1450.01 Ambient Air Levels. Accordingly, Saint-Gobain is not required to obtain a permit to control HF emissions from the RTO based on the measured emissions.

Discussion

For the RTO as-built emission parameters deposition modeling, both AERMOD Method 1 and Method 2 deposition were evaluated. Consistent with previous modeling, Method 2 deposition was greater than Method 1 deposition.

As mentioned above, AERMOD v.18081 was used for the permit application modeling and AERMOD v.21112 was used for the RTO as-built emission parameters compliance demonstration modeling. The model algorithm for Method 2 wet deposition was significantly changed in AERMOD v.19191 to modify an inconsistent calculation[4]. In addition to the wet deposition algorithm change, Method 2 was reclassified to being an ALPHA option in AERMOD, meaning that the Method 2 deposition algorithm has not been rigorously evaluated and use of Method 2 deposition is not approved for regulatory applications by default. Method 1 deposition is not affected by the model update and use of Method 1 is approved by default for regulatory applications.

Method 2 total deposition (wet + dry) Unit Impact Rate (UIR) increased by slightly more than a factor of 10 for the as-built modeling (UIR = 2.91) from that in Revised Table 11 (from Permit Application Review Summary) (UIR = 0.282). Due to low measured emission rates during the September 2021 stack test, even with the increase in UIR, the PFC emissions from the RTO readily demonstrate compliance with RSA 125-C:10-e.

[3] HF demonstrated compliance using the adjusted in-stack concentration ratio method and APFO demonstrated compliance using the *de minimis* emission level method. Refer to Tables 4-3 (HF) and 4-4 (APFO) in the compliance test report.
[4] See AERMOD Model Change Bulletin (MCB) 14 – AERMOD version 19191 for a full description of the wet deposition algorithm change.

Table 1 - RTO As-Built Emission Parameters [1]
RTO As-Built Emission Parameters Air Deposition and Dispersion Modeling Technical Memorandum
St. Gobain Perfomance Plastics Inc., Merrimack, NH Facility

Model Run	UTM Zone 19 Meters		English Units					Metric (Modeling) Units			
	X-Coordinate (easting)	Y-Coordinate (northing)	Ht (ft)	Temp (F)	Diam (in)	Flow (SCFM)	Flow (ACFM)	Ht (m)	Temp (K)	Diam (m)	Vel (m/s) [2]
PFAS Deposition - OTM-45	298,810.07	4,752,033.26	60	350	70	63,500	98,300	18.288	450	1.778	18.69
RTAP - Method 26A			60	351	70	66,900	103,600	18.288	450	1.778	19.69

[1] Saint-Gobain RTO Compliance Test Report 11-09-2021:
Results of the September 7-10, 2021, Regenerative Thermal Oxidizer Compliance Tests
at Saint-Gobain Performance Plastics in Merrimack, New Hampshire
[2] Stack gas exit velocity based on ACFM

Table 2 – RTO As-Built Emission Parameters Model Set-Up Summary
RTO As-Built Emission Parameters Air Deposition and Dispersion Modeling Technical Memorandum
St. Gobain Performance Plastics Inc., Merrimack, NH Facility

Model Set-Up

- AERMOD v.21112
- 2013 – 2017 Manchester, NH meteorological data
    - Processed by NHDES – AERMET v.18081 with AERMINUTE and adjusted u-star
    - Upper air data from Gray, ME
- Model RTO stack at 1 g/s
    - Calculate Unit Impact Rate (UIR)
        - Deposition ($g/m^2/yr$ per g/s)
        - Ambient air concentration ($\mu g/m^3$ per g/s)
- Receptor Grids
    - OXIDIZER.ROU (PFAS deposition) includes receptors on property
    - RTAP_GRID (RTAP compliance) receptors start at facility property boundary
- Deposition Parameters
    - Unknown particle size distribution in RTO exhaust, but most likely 100% < 1 um.
    - Method 1 deposition parameters from Barton et al., 2006, Table 4

Table 4. Average particle size distribution for PFOA at fence line.

Particle Diameter, µm	Mass Fraction %
>4.0	5.6
1.7	12.9
0.8	9.2
0.5	7.2
0.3	5.3
<0.28	59.8

    -
    - Density = 1.8 g/cm^3 (perfluorooctanoic acid - https://pubchem.ncbi.nlm.nih.gov/source/ILO-ICSC)
    - Method 2 deposition parameters (< 2.5 µm) fraction of 0.61 (Barton, 2010)

References:

Barton, C.A., Butler, L.E., Zarzecki, C.J., Flaherty, J., and Kaiser, M., 2006. Characterizing Perfluorooctanoate in Ambient Air near the Fence Line of a Manufacturing Facility: Comparing Modeled and Monitored Values. Journal of the Air & Waste Management Association, 56:48-55.

Barton, C.A., Zarzecki, C.J., and Russell, M.H., 2010. A Site-Specific Screening Comparison of Modeled and Monitored Air Dispersion and Deposition for Perfluorooctanoate. Journal of the Air & Waste Management Association, 60:4, 402-411, DOI:10.3155/1047-3289.60.4.402

Table 3 - Compliance Demonstration for RSA 125-C:10-e [1]
RTO As-Built Emission Parameters Air Deposition and Dispersion Modeling Technical Memorandum
St. Gobain Perfomance Plastics Inc., Merrimack, NH Facility

PFC	Lowest Concentration Minimum Reporting Limits (LCMRL) for Lab Analysis [2] (ppt)	Maximum Concentration of PFC (MC_{PFC}) Infiltrating to Groundwater [3] (ppt)	Maximum Deposition Rate (MDR_{PFC}) [4] ($\mu g/m^2/yr$)	Maximum Annualized Emission Rate [5] (g/s)	Maximum Annualized Emission Rate [6] (lb/hr)	Maximum Annualized Emission Rate [7] (lb/yr)	Annual Emission Rate Based on September 2021 Stack Tests [8] (lb/yr)	Annual Emission Rate Below Maximum Annualized Emission Rate? [9] (Yes / No)
PFOA	3.4	< 3.4	< 1.8	< 6.20E-07	< 4.92E-06	< 0.043	0.014	**Yes**
PFOS	4.4	< 4.4	< 2.3	< 8.02E-07	< 6.36E-06	< 0.056	0.0006	**Yes**

[1] The calculation methodology used in this table follows the NHDES methodology shown in Table 11 of the Permit Application Review Summary and in the Revised Table 11 in the NHDES response to Comment #16 in the Temporary Permit - Findings of Fact and Director's Decision.

[2] LCMRLs used in the Revised Table 11 from the November 2019 EPA document *Method 533: Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry* .

[3] The maximum concentration of PFC (MC_{PFC}) infiltrating to groundwater needs to be less than the LCMRL to demonstrate no impact to groundwater.

[4] MDR_{PFC} (($\mu g/m^2$)/yr) = MC_{PFC} ($\mu g/m^3$ or ppt) * IR (m/yr)
Precipitation Infiltration Rate (IR) (m/yr) 0.53
IR based on annual precipitation of 46 inches per year as described in the permit application review summary.

[5] Maximum Annualized Emission Rate (g/s) = MDR_{PFC} (($\mu g/m^2$)/yr) / (UIR (g/m^2/yr per g/s) * 1,000,000 ($\mu g/g$))
Unit Impact Rate (UIR) (g/m^2/yr per g/s) at maximum impact receptor 2.91
UIR from Method 2 deposition (worst-case). Method 1 UIR = 0.121 (g/m^2/yr per g/s).

[6] Maximum Annualized Emission Rate (lb/hr) = Maximum Annualized Emission Rate (g/s) * 3600 s/hr * 1 lb/453.6 g/lb

[7] Maximum Annualized Emission Rate (lb/yr) = Maximum Annualized Emission Rate (lb/hr) * 8760 hr/yr

[8] Table 1 - Saint-Gobain RTO Compliance Test Report 11-09-2021.

[9] Because the annual emission rate is less than the maximum annualized emission rate (which represents the level at which the PFC would be detectable), this result demonstrates that operation of the RTO will not cause or contribute to an exceedance of a groundwater or surface water quality standard (AGQS and SWQS, respectively) and satisfies the requirements of RSA 125-C:10-e.

Table 4 - Compliance Demonstration for Env-A 1400
RTO As-Built Emission Parameters Air Deposition and Dispersion Modeling Technical Memorandum
Saint-Gobain Performance Plastics - Merrimack, NH

RTAP	Emission Rate (lbs/hr) [1]	24-hr H1H Concentration [2]	24-hr Maximum % of AAL	Maximum Annual Concentration [3]	Annual Maximum % of AAL	24-hr AAL ($\mu g/m^3$) [4]	Annual AAL ($\mu g/m^3$) [4]
Hydrogen fluoride, as F-	0.012	0.032	2.1%	0.0027	0.3%	1.5	0.98
Ammonium perfluorooctanoate	1.7E-06	4.5E-06	0.0%	3.8E-07	0.0%	0.05	0.024

[1] - HF as F- Saint-Gobain RTO Compliance Test Report 11-09-2021, Table 3 (RTO Outlet)

[1] - Saint-Gobain RTO Compliance Test Report 11-09-2021, Table 1 (RTO Outlet) PFOA = 0.014 lbs/yr
APFO (lbs/hr) = PFOA (lbs/yr) * (yr/8760 hr) * 431 (mol wt APFO) / 414 (mol wt PFOA)

[2] - Highest (High-1st-high) 24-hour concentration over 5 years of meteorological data

[2] - Maximum modeled concentration for 1 g/s emission rate * RTAP lbs/hr * 0.126 g/s / lbs/hr 0.126 lbs/hr to g/s

[3] - Highest annual concentration over 5 years of meteorological data

[4] - New Hampshire Code of Administrative Rules Env-A 1450.01 Table of All Regulated Toxic Air Pollutants.

Unit Impact Rate (UIR) Deposition ($g/m^2/yr$ per g/s)

- 0 - 0.05
- 0.05 - 0.50
- 0.50 - 1.5
- 1.5 - 2.5
- 2.5 - 2.91

RTO

AERMOD Method 2 Deposition

N

0 35 70 140 210 280

Meters

BARR

PFOA DEPOSITION - NEAR FIELD
RTO AS-BUILT AIR DEPOSITION MODELING
Unit Impact Rate (UIR) Deposition

Merrimack, New Hampshire
Saint-Gobain

FIGURE 1

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture, Landscape Architecture & Geology, D.P.C.

50 Century Hill Drive, Latham, NY 12110
518.786.7400 FAX 518.786.7299 ctmale@ctmale.com

April 12, 2023

Ms. Cathy Beahm
SIP Planning Administrator
NH Department of Environmental Services
Air Resources Division
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095

Re: Saint-Gobain Performance Plastics Merrimack, NH
Significant Permit Amendment – EU24 / MTM
C.T. Male Project No.: 16.6126

Dear Ms. Beahm:

On behalf of Saint-Gobain Performance Plastics Corp. (SGPP), please find attached information relative to a requested amendment to the facility's Air Permit relative to modifying an existing permitted Emission Unit in order to operate the equipment similar to other coating equipment at the facility. SGPP most recently submitted an application for State Permit to Operate in May 2022 and this correspondence seeks to modify operation of one (1) Emission Unit contained within the permit.

Due to the completion of RTO and related systems construction including the RTO Bypass stack, and the pending expected issuance of a State Permit to Operate, this amendment includes modification to one (1) emission source, EU24 (referred to as MTM). The Emission Unit will be retrofitted with a dip tray in order to be able to function similar to other Towers at the facility. This piece of equipment was previously used only for laminating and did not use products containing VOC/HAP/RTAP. With the added ability to utilize formulations containing VOC/HAP/RTAP in processing on the Emission Unit, this modification will provide additional manufacturing resiliency to the facility's operations. The MTM would have the functionality to use VOC/HAP/RTAP containing formulations or continue to operate as it historically did without the use of such materials. No new formulations are planned to be used on EU24, and no change to the list of chemicals emitted from the facility will occur as a result of this modification. The EU currently discharges to the facility's RTO and no change to the exhaust is being sought under the application.

In order to minimize the complexity of the application document, only those areas which would be directly updated as a result of this change are being revised/resubmitted. All other attachments to the May 2022 application remain

consistent with facility operation. Forms ARD-1 and ARD-3 are included in Attachment A.1 and A.2, respectively and include the requested modification to the operation of EU24. This change would effectively update the facility description within the permit to include EU24 within the same grouping which currently includes EU01-EU05, EU08, EU12, EU13, EU15 and EU16.

Emission Calculations

Saint-Gobain and C.T. Male previously reviewed Safety Data Sheets for all products currently in the inventory tracking system for products used in Coating Tower operations at the facility (±166 materials). Of these materials, 22 contain RTAP and/or HAP. No changes to these products or concentrations are being sought as part of this modification.

In order to estimate potential annual emissions, a scaling factor was developed to extrapolate full production across all product lines. Details of the scaling factor development were included in Attachment B.7 of the May 2022 application and were used in VOC/HAP/RTAP potential emission estimates. This calculation has been updated to include the additional capacity of the MTM in similar service to other towers operated at the facility with respect to VOC/HAP/RTAP emissions.

Previous documentation did not track the number of operating hours of EU24 as the activity did not include emissions of VOC/HAP/RTAP. The closest comparison of the MTM to the existing emission units would be Tower MA, which has a maximum product width of 60 inches and maximum production of 6,000 square feet per hour as compared to the MTM which has a maximum product width of 50 inches and a 5,000 square foot per hour capacity. For the purposes of this application amendment, annual hours of operation used to calculate the MTM scaling factor were estimated based on duplicating Tower MA information.

RTO Operation

No change in operation relative to the RTO is needed for this modification. EU24 would continue to exhaust to the RTO in a similar manner as the remaining towers. No changes to the RTO operating parameters are being sought as part of this modification.

EU24 Testing

As part of the proposed modification to EU24, it is anticipated that upon approval by NHDES, the work could be implemented prior to the next emission testing event which includes testing of the RTO and dip pans. EU24 was not previously tested via Method 204 for permanent total enclosure, and would be subject to such testing as part of the next testing regimen.

Deposition Modeling

PFC and Fluoride estimates previously completed demonstrated that each of these compounds were well below their respective AAL. As a result of this modification, the additional production capacity of the facility (i.e., the maximum raw material process rate of the towers) would increase from 72,850 square feet per hour to 77,850 square feet per hour (a ±6.9 percent increase).

As this modification would add ±6.9% additional capacity to the towers, it is anticipated that the results of the previous stack testing could increase by that same percentage for VOC/HAP/RTAP. As such, this modification would not cause exceedances of AAL for any of the emitted compounds.

Capture Efficiency Verification Plan

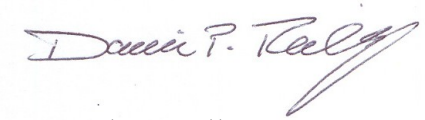
As this modification would include changes to the natural draft opening characteristics of EU24, the MTM would need to be included within SGPP's Capture Efficiency Verification Plans which previously included EU01-EU08, EU12, EU13, EU15, EU16 and EU22.

Permit Changes

Permit changes which would occur based on this modification include citation of EU24 within requirements of Env-A 604.02, 606.02(a)(4), 607.01(g), 607.01(n) and 1200 at the State level and 40 CFR 60.740, NSPS Subpart VVV as EU24 would be permitted to process VOC/HAP/RTAP.

If you have any questions or require additional information please contact me at (518) 786-7625.

Sincerely,
C.T. MALE ASSOCIATES



Daniel P. Reilly, P.E.
Division Manager, Environmental Services

Enclosures

ec: David Calentine, Will Kempskie, Chris Angier (SGPP)
Craig Wright (NHDES)

Attachment A
Air Permit Application Forms

Attachment A.1
NHDES Form ARD-1

ARD-1 FORM
GENERAL FACILITY INFORMATION

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

This ARD-1 General Facility Information form shall be submitted with every application for an air permit, except for a Permit by Notification (PBN).

1. TYPE OF FACILITY[1]

☐ Title V ☒ Non-Title V ☐ Unknown

2. TYPE OF PERMIT[2]

☐ Temporary Permit (Construction) ☒ State Permit to Operate ☐ Title V Operating Permit

☐ General State Permit ☐ Limitation on Potential to Emit (Env-A 625)

3. TYPE OF APPLICATION[3]

☐ New ☐ Renewal ☒ Modification ☐ Administrative Amendment

4. FACILITY INFORMATION

FACILITY NAME[4]: Saint-Gobain Performance Plastics Corp.	AFS NUMBER[5]: 3301100165	
PHYSICAL ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
GOVERNMENT FACILITY CODE[6]: 0		

5. BUSINESS INFORMATION AS REGISTERED WITH SECRETARY OF STATE (If applicable)

REGISTERED NAME: Saint-Gobain Performance Plastics Corp.		
REGISTERED ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054

6. PARENT CORPORATION INFORMATION (If applicable)

PARENT CORPORATION NAME: Saint-Gobain Corporation		
MAILING ADDRESS: 20 Moores Road		
TOWN/CITY: Malvern	STATE: PA	ZIP: 19355

7. MAJOR ACTIVITY OR PRODUCT DESCRIPTION

List all activities performed at this facility and provide SIC and/or NAICS Code(s).

SIC Code	Activity Description	NAICS Code	Activity Description
2221	Woven Fiber Glass		
2296	Industrial Fabrics		
2851	Fluoropolymer Films		

At a minimum, please provide contact information below for Responsible Official, Prepared Application, Technical, and Invoicing contacts. Make as many copies of this page as necessary in order to include all contacts that you wish to associate with the application. Multiple people can be assigned one role; multiple roles can be assigned to one person.

8. RESPONSIBLE OFFICIAL INFORMATION		
RESPONSIBLE OFFICIAL NAME[7]: David Calentine		
TITLE: Plant Manager		
COMPANY NAME: Saint-Gobain Performance Plastics Corp.		
MAILING ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
EMAIL ADDRESS: David.Calentine@saint-gobain.com		
TELEPHONE NUMBER: 603-420-1267	EXTENSION:	
FAX NUMBER:		
ROLES: ☒ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

9. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME: William Kempskie		
TITLE: EHS Manager		
COMPANY NAME: Saint-Gobain Performance Plastics Corporation		
MAILING ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
EMAIL ADDRESS: William.kempskie@saint-gobain.com		
TELEPHONE NUMBER: 603-420-1387	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☒ Technical ☒ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

10. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME: Daniel Reilly		
TITLE: Division Manager, Environmental Services		
COMPANY NAME: C.T. Male Associates		
MAILING ADDRESS: 50 Century Hill Drive		
TOWN/CITY: Latham	STATE: NY	ZIP: 12110
EMAIL ADDRESS: d.reilly@ctmale.com		
TELEPHONE NUMBER: 518-786-7400	EXTENSION:	
FAX NUMBER: 518-786-7299		
ROLES: ☐ Responsible Official ☒ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☒ Consultant		

11. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

12. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

13. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

For ALL APPLICATIONS except Administrative Amendments, General State Permits, and Limitations on Potential to Emit:

14. FACILITY-WIDE EMISSIONS		
POLLUTANT[8]	POTENTIAL TPY	ACTUAL TPY
VOC	<50	TOTAL = 2.2 TONS PER YEAR
Total HAP	<25	TOTAL = 0.37 TONS PER YEAR
Individual HAP	<10	LARGEST = 0.20 TONS PER YEAR
PFOA	<0.45 lb/yr; 0.000225 ton/yr	0.0012 lb/yr; 0.0000006 ton/yr
PFOS	<0.57 lb/yr; 0.000285 ton/yr	0.000049 lb/yr; 0.000000025 ton/yr

Please include calculations used in determining emissions and include any non-permitted emission devices.

15. FOR NEW APPLICATIONS OR IF CHANGES ARE MADE – PLEASE INCLUDE:	
☐	A copy of the USGS map, property identified, which shows the facility's location.
☐	A site plan to scale of the facility showing: 1. The locations of all emission points; 2. The dimensions of all buildings and tiers, including roof heights; and 3. The facility's property boundary and any security features (fences, walls, etc.).

16. FOR TITLE V PERMIT APPLICATIONS – PLEASE INCLUDE:[9]		
Included in Application	**Previously Submitted and Unchanged**	
☐	☐	A. Identification and details of limitations on source operation, or any work practice standards affecting emissions for all regulated pollutants.
☐	☐	B. Information required by any other applicable requirement of the Act, including, but not limited to, information related to stack height limitations developed pursuant to section 123 of the federal Clean Air Act (42 U.S.C. §7401).
☐	☐	C. A citation and description of state and federal air pollution control regulations and requirements applicable to each emission unit.
☐	☐	D. A narrative description or reference to test methods used or required for initial compliance demonstration with each applicable regulation.
☐	☐	E. Any additional information required to be provided pursuant to the Act or to determine applicability of any other requirements of the Act.
☐	☐	F. A written explanation of proposed exemptions.
☐	☐	G. Any information required to be provided to the director pursuant to the Act in order to evaluate alternative operating scenarios, or to define permit terms and conditions.
☐	☐	H. A list of all equipment and devices located at the source classified as insignificant activities pursuant to Env-A 600, including appropriate sizing data for equipment and devices which are exempt from permitting requirements based on their process ratings, fuel consumption rate, or both.

16. CONTINUED - FOR TITLE V PERMIT APPLICATIONS – PLEASE INCLUDE:[10]	
Included in Application	
☐	I. Compliance plan information containing: 1. A narrative description of the compliance status of the source with respect to all applicable requirements; 2. A narrative statement of methods used to determine continued compliance, including a description of monitoring, recordkeeping and reporting requirements and test methods; 3. A statement indicating the source's compliance status with an applicable enhanced monitoring and compliance certification requirements specified in Env-A 800; 4. A statement that the source shall continue to comply with all applicable requirements; 5. A statement that the source shall meet all applicable requirements that will become effective during the permit term on a timely basis; 6. A compliance schedule stating all applicable requirements with which the source is not in compliance, consistent with the following: a. The compliance schedule shall incorporate the requirements of and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject; b. Such compliance schedule shall be supplemental to, and not sanction non-compliance with, the applicable requirements on which it is based; and c. The compliance schedule shall include the following statements and schedules: i. A narrative description of how the source shall achieve compliance with such requirements; ii. A schedule of remedial measures, including an enforceable sequence of actions with milestones leading to compliance with any applicable requirements for which the source shall be in non-compliance with at the time of permit issuance; and iii. A schedule for submission of certified progress reports no less frequently than every 6 months. 7. For sources deemed in compliance with all applicable requirements, a certified statement signed by a responsible official stating: "The undersigned certifies that, based on information and belief formed after reasonable inquiry, the source is in compliance with all applicable regulations"; and 8. A schedule for submission of compliance certifications during the permit term, to be submitted annually or more frequently as specified by the underlying applicable requirement.
☐	J. For sources subject to Title IV of the Act, the compliance plan requirements, specified in (I.) above, shall apply to and be included in the acid rain portion of a compliance plan for an affected source, except as specifically superseded by regulations promulgated under Title IV of the Act with regard to the schedule and method(s) the source will use to achieve compliance with the acid rain emission limitations.
☐	K. In addition to the forms required pursuant to Env-A 1700, sources subject to Title IV of the Act shall use the nationally standardized forms for the acid rain portions of the Title V operating permit application, pursuant to 40 CFR 72.30.

This section of the form must be completed and signed by the Responsible Official only.

17. CERTIFICATIONS	
	I certify that the applicant, or the owner or operator the applicant represents, has right, title, or interest in all of the property that is proposed for development or use because the owner or operator owns, leases, or has binding options to purchase all of the property proposed for development or use.
☒	I am authorized to make this submission on behalf of the affected source or affected units for which this submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the information submitted in this document and all of its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

18. RESPONSIBLE OFFICIAL INFORMATION AND SIGNATURE	
RESPONSIBLE OFFICIAL NAME: David Calentine	
TITLE: Plant Manager	
RESPONSIBLE OFFICIAL'S SIGNATURE	DATE:

ARD-1 GENERAL FACILITY INFORMATION INSTRUCTIONS

1 A list of Title V facilities in NH can be found to the NHDES website. Most facilities are Non-Title V. Check Unknown if you are unsure.

2 Temporary Permit = New Construction at Existing or New Facility
State Permit to Operate = Existing Non-Title V Facilities
Title V Operating Permit = Existing Title V Facilities
GSP = General State Permit
Limitation on Potential to Emit = Small Facilities requesting coverage under Env-A 625

3 New = New devices at facility, change in operation at Existing facility or New facility never permitted before
Renewal = Renewal of any permit type
Modification = Currently permitted by non-expired permit and wants to make amendment/modification to information contained in permit. This includes adding/removing devices covered by GSP.
Administrative Amendment = changes in ownership or responsible official.

4 Facility Name = Trade Name or Doing Business As

5 AFS number is assigned by NHDES and is a 10-digit number starting with 33 (example 3300100001).

6 0 = Facility is not government owned
1 = Source owned by the Federal Government
2 = Source owned by the State
3 = Source owned by the County
4 = Source owned by the Municipality
5 = Source owned by the District

7 Responsible Official:
For a corporation = President, Secretary, treasurer, or vice-president in charge of a principal business function
For a partnership = General partner or proprietor
For a municipality = Principal executive officer or ranking elected official

8 For Title V sources, include facility wide emissions of filterable PM, filterable PM_{10}, filterable $PM_{2.5}$, condensable PM, SO_2, NO_x, CO, NMVOCs, Pb (if appropriate), HAPs, and CO_2e.

9 If any of the information requested in Section 16 A-H was submitted in a previous Title V Operating Permit application and has **not** changed, it can be incorporated by reference in the renewal application package. This previous information must be clearly referenced in the renewal application package and must accurately reflect current operations at the facility. If any changes have occurred at the facility or if changes are proposed in the renewal application package, new information must be provided. The information requested in Section 16 I-K must be completed based on current operations at the facility. Due to the time sensitive nature of this required information, incorporation by reference in the application package is **not** allowed.

Attachment A.2
NHDES Form ARD-3: PCE01
(Stacks 1A & 1B)

ARD-3 FORM
INFORMATION REQUIRED FOR PERMITS FOR A UNIT OF PROCESSING OR MANUFACTURING EQUIPMENT

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

I. EQUIPMENT INFORMATION – *Complete a separate form for each Emission Unit.*

Emission Unit Description: PCE01 (Stacks 1A & 1B)

Process/ Device	Manufacturer Model # Serial #	Maximum Raw Material Process Rate	Maximum Finished Material Process Rate	Manufacture Date[1]	Installation Date[1]	Stack #	Hours of Operation per day and days/yr
Paint Booth #3 (Example)	*N/A (Example)*	*8 gal/hr (Example)*	*N/A (Example)*	*1997 (Example)*	*1999 (Example)*	*#1 (Ex)*	*3 hr/day; 250 days/yr (Example)*
Metal Furnace #2 (Example)	*Consumat Model C12 S/N: 2569 (Example)*	*N/A (Example)*	*500 lbs/hr (Example)*	*2002 (Example)*	*2002 (Example)*	*#5 (Ex)*	*9 hr/day; 300 days/yr (Example)*
See Attached							

Process Description - Please provide a brief description of each process performed (attach additional pages as needed):

EU01-EU08, EU12, EU13 EU15, EU16, & EU24 - Coating operations for paper, fabric, film, or foil; EU22, research and development coating operations for paper, fabric, film, or foil; EU23 - Chemsil Coater coats and dries silicone onto fiberglass through thermally treating a solid paste without the addition of solvent; EU24 & EU25 - MTM and Step Press/Laminator utilize heat to laminate or otherwise affix coated fabrics and films; EU26 - Heat Clean oven used for cleaning by heating.

A. Parts Washers/Solvent Degreasers

☒ **Not Applicable**

Process/Device	Manufacturer & Model #	Capacity (gal)	Solvent Used	# Solvent Changes per Year
Degreaser #2 (Example)	*Safety-Kleen Model 16 (Example)*	*16 gal (Example)*	*Recycled 150 Solvent (Example)*	*2 (Example)*

B. Coatings, Solvents, and Inks Entering Process – *Use additional sheets if necessary*

☐ **Not Applicable**

Process/ Device	Raw Material or Chemical Compound	Potential Usage (gal or lb per hour and per year)		Density (lb/gal)	Percent VOC[2] (wt %)	Percent HAP[3] (wt %)	Potential VOC emissions (lb/yr)	Potential HAP emissions (lb/yr)
Paint Booth (Example)	*Black Enamel #5693 (Example)*	*13 gal/hr (Example)*	*1360 gal/yr (Example)*	*7.5 lb/gal (Example)*	*67.96% (Example)*	*13.17% (Example)*	*6,932 lb/yr (Example)*	*1,343 lb/yr (Example)*
See Attached								

Provide an example of the calculations used to determine total potential VOC and HAP emitted. Indicate if the results are based on test results; if control equipment was taken into account; if conditions exist where solvents remain in the substrate rather than complete volatilization, transfer efficiency, etc.:

Stack test results are utilized for calculating bypass emissions and allowable hours of operation in lieu of a material balance approach.

Coating Application Method:

☐ High Volume-Low Pressure (HVLP) Spray ☐ Electrostatic Spray ☐ Zinc-Arc Spray
☐ Air-Assisted Airless Spray ☐ Airless Spray ☒ Dip Coat
☐ A Flow Coating Technique ☐ Other (specify): _____

C. Amount of Liquid Waste Discarded:

_____ ☐ gal/yr ☐ tons/yr

D. Stack Information

Is device equipped with multiple stacks? ☒ Yes ☐ No *(If yes, provide data for each stack)*
Are multiple units connected to this stack? ☐ Yes ☒ No
*(If **yes**, identify other devices on this stack:)*

Stack #	Discharge Height Above Ground Level (ft)	Inside Diameter (ft) or Area (ft^2) at Stack Exit[4]	Exhaust Temperature (°F)	Exhaust Flow (acfm)	Stack Capped or Otherwise Restricted[5] (Yes - Type/No)	Exhaust Orientation[6]	Stack Monitor (Yes/No) and Description
#5 (Ex)	*65 ft (Example)*	*4 ft (Example)*	*70 °F (Example)*	*1500 acfm (Example)*	*Yes - Rain Cap (Example)*	*Vertical (Example)*	*No (Example)*
1A (Main RTO Stack)	60 ft.	6 ft.	350◦F	100,000 ACFM	No	Vertical	No
1B (RTO Bypass Stack)	63.52 ft.	5 ft.	236◦F	76,900 ACFM	No	Horizontal	Yes - Open/Closed Monitor

E. Hours of Operation

Hours per day: up to 24 Days per year: up to 365

II. NEW HAMPSHIRE REGULATED TOXIC AIR POLLUTANTS (RTAPs) – Env-A 1400

Do any of the devices or processes emit any of the RTAPs listed in Env-A 1400?

☒ Yes ☐ No

If **Yes**, attach your facility's most recent compliance demonstration.

III. SUPPLEMENTAL FUEL USAGE INFORMATION

☐ Not Applicable

A. Fuel Information (List each fuel utilized by the devices)

Device	Fuel Type	Heat Value[7]	Units	Sulfur Content (%)	Maximum Fuel Flow Rate	Units	Maximum Gross Heat Input Rate	Units
Thermal Oxidizer (Example)	*#2 Fuel Oil (Example)*	*140,000 (Example)*	*Btu/gal (Example)*	*0.0015 (Example)*	*20 (Example)*	*gal/hr (Example)*	*1.2 (Example)*	*MMBtu/hr (Example)*
See Attached								

B. Air Pollutant Emissions from Combustion

Pollutant	Emission Factor	Units	Emission Factor Source[8]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
TSP	See Attached						
PM_{10}							
NO_x							
VOC							
CO							
SO_2							
Other *(specify)*							

Provide an example of the calculations used to determine uncontrolled air pollutant emissions, if applicable:

Calculations detailed in attachment.

Note: If process utilizes more than one Supplemental Fuel Burning Device, provide all six pollutant emissions information for each device. Use additional pages if necessary.

IV. POLLUTION CONTROL EQUIPMENT

☐ **Not Applicable**

Note: If the devices utilize more than one type of pollution control equipment, provide data for each type of equipment.

Device	Type of Control Device	Manufacturer of Control Device	Model and Serial Number of Control Device (if known)	Pollutant(s) Controlled by Device
Metal Furnace #2 (Example)	*Baghouse #2 (Example)*	*Ultra-Flow Inc. (Example)*	*2400 CFM Small Dust Collector Serial #: N/A (Example)*	*TSP (Example)*
Paint Spray Booth (Example)	*Filter (Example)*	*Paint Arrestors (Example)*	*3100 Series (Example)*	*Zinc Chromate (Example)*
PCE01	Regenerative Thermal Oxidizer	Air Clear	Thermgen 3 Canister RTO Serial No. 64504J5	PFOA and PFOS

For each control device, include an Air Pollution Control Equipment Monitoring Plan pursuant to Env-A 810.

A. Controlled Air Pollution Emissions (list emissions that result <u>after all</u> add on controls – *use additional sheets if necessary*)

Pollutant	Controlled Emission Factor	Units	Emission Factor Source[9]	Actual (lb/hr)	Potential (lb/hr)	Actual (tpy)	Potential (tpy)
See Attached							

Provide an example of the calculations used to determine controlled air pollutant emissions, if applicable:

Calculations detailed in attachment

ARD-3 FORM INFORMATION INSTRUCTIONS

1 If exact date is unknown for Manufacture Date or Installation Date, you may use 01/01/year. Manufacture Date refers to the date the emission unit was originally produced. Installation Date refers to the date the emission unit is installed at the facility.

2 Volatile Organic Compound, as defined in Env-A 100.

3 Hazardous Air Pollutant, as defined in section 112 of the 1990 Clean Air Act Amendments.

4 Examples of Inside Diameter or Area at Stack Exit: Diameter at discharge point of convergence cone, if applicable

5 Flapper valves and other devices which do not restrict the vertical exhaust flow while the device is operating are not considered obstructions or restrictions.

6 Examples of Exhaust Orientation: Vertical, Horizontal, Downward
Note: for a stack to be considered vertical and unobstructed, there shall be no impediment to vertical flow, and the exhaust stack extends 2 feet higher than any roofline within 10 horizontal feet of the exhaust stack

7

Liquid Fuels	Heat Value
Ultra-Low Sulfur Diesel (ULSD)	137,000 Btu/gal
#2 Fuel Oil	140,000 Btu/gal
Kerosene	135,000 Btu/gal
Other – Liquid	Obtain from Fuel Supplier

Gaseous Fuels	Heat Value
Natural Gas	1,020 Btu/cubic foot
Propane (LPG)	94,000 Btu/gal
Gasoline	130,000 Btu/gal
Other (Gaseous)	Obtain from Fuel Supplier

8 Emission factor sources may include:
- Continuous Emissions Monitor (CEM)
- Stack Test (Provide Date)
- Vendor Guaranteed Rates (Provide Documentation)
- AP-42 Emission Factors
- Material Balance (Provide Sample Calculation)
- Engineering Estimate

Attachment B
Emission Calculations

Updated Attachment B.5
RTAP/HAP Summary

Evaluation of RTAP/HAP associated with Coating Tower operation (Updated 2021 Values to Include EU24/MTM)

1. Actual/PTE scaling factor as calculated for each year used in calculations (MTM estimated for 2021)
2. Actual amount of RTAP/HAP available for release per maximum concentrations listed on Safety Data Sheets
3. Convert actual annual emissions to PTE by dividing annual emissions by scaling factor
4. For worst-case evaluation, use max. PTE calculated for years 2012-2021 to account for product variation
5. Convert to hourly PTE by dividing PTE (lb/yr) by 8,760 hours
6. Demonstrate compliance with Adjusted In-Stack Concentration limits established under Env-A 1405.05

Year	Actual/PTE Scaling Factor	Ethylene Glycol		Toluene		Isopropanol		Formaldehyde		Ethanol		1,4-Dioxane		Benzene		Polyethylene Glycol		Chromic Acid (Chromium		Tetrafluoroethylene	
		107-21-1		108-88-3		67-63-0		50-00-0		64-17-5		123-91-1		71-43-2		25322-68-3		7738-94-5		116-14-3	
		RTAP/HAP		RTAP/HAP		RTAP		RTAP/HAP		RTAP		RTAP/HAP		RTAP/HAP		RTAP		RTAP/HAP		RTAP	
		Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE
		lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr
2021	0.312	0	0	7.68	24.65	0	0	0	0	0.14	0.44	0.37	1.19	0.0046	0.015	76.16	244.5	0	0	597.8	1,919
2020	0.330	0	0	13.02	39.40	0	0	0	0	2.12	6.42	1.05	3.18	0.0056	0.017	136.6	413.3	0	0	652.4	1,975
2019	0.350	0	0	4.20	11.99	0	0	0.0	0	0.30	0.85	1.33	3.79	0.018	0.051	137.0	391.2	0	0	717.0	2,047
2018	0.348	0	0	15.90	45.69	0	0	0	0	0.31	0.88	2.25	6.48	0.012	0.034	193.8	556.9	0	0	857.1	2,463
2017	0.335	98.60	294.5	0	0	0	0	0	0	0.25	0.74	1.70	5.08	0.032	0.096	179.0	534.6	0	0	331.2	989.0
2016	0.381	0	0	0	0	0	0	0	0	0.35	0.91	2.56	6.73	0.0085	0.022	236.4	621.2	0	0	959.52	2,522
2015	0.412	736.2	1,786	538.8	1,307	53.88	130.7	0	0	3.18	7.72	0	0	0	0	333.1	808.0	0	0	1,089	2,642
2014	0.471	1,105	2,344	697.8	1,481	69.78	148.1	0	0	0.68	1.44	0.59	1.26	0	0	315.4	669.1	0	0	1,153	2,447
2013	0.448	1,698	3,789	493.1	1,100	49.31	110.0	0	0	0.28	0.62	3.52	7.86	0.0020	0.0045	396.8	885.4	0	0	589.8	1,316
2012	0.455	3,733	8,208	1,329	2,922	132.9	292.2	0	0	0.49	1.08	6.68	14.69	0.021	0.046	724.6	1,593	0	0	0	0
Maximum =	0.471	3733	8208	1329	2922	132.9	292.2	0	0	3.18	7.72	6.68	14.69	0.032	0.096	724.6	1593	0	0	1153	2642
Average =	0.384	737	1642	310.0	693.2	30.59	68.10	0	0	0.81	2.11	2.01	5.03	0.010	0.029	272.9	671.7	0	0	694.7	1832
PTE (lb/hr) = (based on 8,760 hr/yr)		0.937 lb/hr		0.334 lb/hr		0.0334 lb/hr		0 lb/hr		0.000881 lb/hr		0.00168 lb/hr		0.0000110 lb/hr		0.182 lb/hr		0 lb/hr		0.302 lb/hr	
RTAP Evaluation																					
X (lb/hr) =		0.937 lb/hr		0.334 lb/hr		0.0334 lb/hr		0 lb/hr		0.000881 lb/hr		0.00168 lb/hr		0.00001101 lb/hr		0.182 lb/hr		0 lb/hr		0.302 lb/hr	
Y = X / 7.94 =		0.1180		0.0420		0.00420		0		0.0001109		0.000211		0.00000139		0.0229		0		0.0380	
Z = Y x 10^6 =		118,003 ug/sec		42,017 ug/sec		4,202 ug/sec		0 ug/sec		110.92 ug/sec		211.3 ug/sec		1.39 ug/sec		22,906 ug/sec		0 ug/sec		37,984 ug/sec	
A = Stack Volume (±70,000 CFM)																					
B = A / 2119 =		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec	
In-Stack Concentration = Z/B		3572 ug/m^3		1272 ug/m^3		127.2 ug/m^3		0 ug/m^3		3.36 ug/m^3		6.40 ug/m^3		0.042 ug/m^3		693.4 ug/m^3		0 ug/m^3		1149.8 ug/m^3	
Adj. In-Stack Conc. = (Z/B) / 700		5.10 ug/m^3		1.82 ug/m^3		0.18 ug/m^3		0 ug/m^3		0.0048 ug/m^3		0.0091 ug/m^3		0.000060 ug/m^3		0.99 ug/m^3		0 ug/m^3		1.64 ug/m^3	
RTAP Limits Comparison																					
24 Hour AAL		503 ug/m^3		5000 ug/m^3		1757 ug/m^3		1.3 ug/m^3		6714 ug/m^3		258 ug/m^3		5.7 ug/m^3		208 ug/m^3		0.036 ug/m^3		171 ug/m^3	
Annual AAL		335 ug/m^3		5000 ug/m^3		1171 ug/m^3		0.88 ug/m^3		4476 ug/m^3		30 ug/m^3		3.8 ug/m^3		99 ug/m^3		0.024 ug/m^3		81 ug/m^3	
Adj. In-Stack Conc./24 Hour AAL		1.01%		0.036%		0.0103%		0%		0.000071%		0.0035%		0.00105%		0.48%		0%		0.96%	
Adj. In-Stack Conc./Annual AAL		1.52%		0.036%		0.016%		0%		0.000107%		0.030%		0.0016%		1.00%		0%		2.03%	
In Compliance with AALs?		Yes		Yes		Yes		N/A		Yes		Yes		Yes		Yes		N/A		Yes	

Evaluation of RTAP/HAP associated with Coating Tower operation (Updated 2021 Values to Include EU24/MTM)

1. Actual/PTE scaling factor as calculated for each year used in calculations
2. Actual amount of RTAP/HAP available for release per maximum concentrations listed on Safety Data Sheets
3. Convert actual annual emissions to PTE by dividing annual emissions by scaling factor
4. For worst-case evaluation, use max. PTE calculated for years 2012-2021 to account for product variation
5. Convert to hourly PTE by dividing PTE (lb/yr) by 8,760 hours
6. Demonstrate compliance with Adjusted In-Stack Concentration limits established under Env-A 1405.05

Year	Actual/PTE Scaling Factor	Methanol		Acetaldehyde		Ethylene Oxide		Propylene Oxide		Methyl Ethyl Ketone		2-Pyrrolidinone, 1-methyl-		Hexane	
		67-56-1		75-07-0		75-21-8		75-56-9		78-93-3		872-50-4		110-54-3	
		RTAP/HAP		RTAP/HAP		RTAP/HAP		RTAP/HAP		RTAP		RTAP		RTAP/HAP	
		Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual	PTE
		lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr
2021	0.312	99.90	320.6	0	0	0	0	0	0	23.28	74.72	29.80	95.65	1.28	4.11
2020	0.330	72.25	218.6	0	0	0	0	0	0	31.42	95.09	23.04	69.74	2.17	6.57
2019	0.350	67.04	191.4	0	0	0	0	0	0	11.20	31.98	12.37	35.33	0.70	2.00
2018	0.348	45.37	130.4	0	0	0	0	0	0	49.60	142.5	43.30	124.4	2.65	7.62
2017	0.335	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0.381	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0.412	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0.471	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0.448	0	0	0	0	0	0	0	0	0.0	0	0.0	0	0	0
2012	0.455	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum =	0.471	99.90	320.65	0	0	0	0	0	0	49.60	142.5	43.30	124.43	2.65	7.62
Average =	0.384	28.46	86.11	0	0	0	0	0	0	11.55	34.43	10.85	32.52	0.68	2.03
PTE (lb/hr) = (based on 8,760 hr/yr)		0.0366 lb/hr		0 lb/hr		0 lb/hr		0 lb/hr		0.0163 lb/hr		0.0142 lb/hr		0.000869 lb/hr	
RTAP Evaluation															
X (lb/hr) =		0.0366 lb/hr		0 lb/hr		0 lb/hr		0 lb/hr		0.0163 lb/hr		0.0142 lb/hr		0.000869 lb/hr	
Y = X / 7.94 =		0.00461		0		0		0		0.00205		0.00179		0.0001095	
Z = Y x 10^6 =		4,610 ug/sec		0 ug/sec		0 ug/sec		0 ug/sec		2,049 ug/sec		1,789 ug/sec		109.49 ug/sec	
A = Stack Volume (±70,000 CFM)															
B = A / 2119 =		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec		33.034 m^3/sec	
In-Stack Concentration = Z/B		139.55 ug/m^3		0 ug/m^3		0 ug/m^3		0 ug/m^3		62.04 ug/m^3		54.16 ug/m^3		3.31 ug/m^3	
Adj. In-Stack Conc. = (Z/B) / 700		0.199 ug/m^3		0 ug/m^3		0 ug/m^3		0 ug/m^3		0.089 ug/m^3		0.077 ug/m^3		0.0047 ug/m^3	
RTAP Limits Comparison															
24 Hour AAL		20000 ug/m^3		161 ug/m^3		6.4 ug/m^3		17 ug/m^3		5000 ug/m^3		1429 ug/m^3		885 ug/m^3	
Annual AAL		20000 ug/m^3		9 ug/m^3		4.3 ug/m^3		11 ug/m^3		5000 ug/m^3		952 ug/m^3		700 ug/m^3	
Adj. In-Stack Conc./24 Hour AAL		0.00100%		0%		0%		0%		0.0018%		0.0054%		0.00054%	
Adj. In-Stack Conc./Annual AAL		0.00100%		0%		0%		0%		0.0018%		0.0081%		0.00068%	
In Compliance with AALs?		Yes		N/A		N/A		N/A		Yes		Yes		Yes	

Updated Attachment B.7
Scaling Factor Determination for Tower Coating Operations

Determination of Scaling Factor to Convert Actual Emissions in Coating Products to a Potential Basis (Updated to Include EU24/MTM)

Known:
1. Maximum hourly capacity of each Coating Tower (in square feet per hour) [A]
2. Annual Hours of operation of each Coating Tower [E]

Assumptions:
1. In order to estimate Potential to Emit, no bottleneck factor has been assumed (100%) [C]

Calculated:
1. Maximum annual capacity of each Coating Tower (in square feet per year, based on 8,760 hr/yr operation potential) [B = A * 8760]
2. Calculated Potential production based on Maximum ft2/yr multiplied by bottleneck factor [D = B * C]
3. Calculated annual square footage of material based on line speed and hours operated [F = A * E]
4. % of Maximum = Calculated Annual ft2/yr / Potential ft2/yr [G = F / D]

	[A]	[B]	[C]	[D]	[E]	[F]	[G]	
Tower	**Maximum ft2/hr**	**Maximum ft2/year**	**Bottleneck Factor**	**Potential ft2/year**	**Actual 2021 Hrs**	**Calculated 2021 ft2**	**% of Maximum**	
MA	6,000	52,560,000	100%	52,560,000	3546.4	21,278,400	0.405	
MB	4,375	38,325,000	100%	38,325,000	1006.6	4,403,875	0.115	
MC	9,200	80,592,000	100%	80,592,000	3675.1	33,810,920	0.420	
MR	9,200	80,592,000	100%	80,592,000	2925.4	26,913,680	0.334	
MD	9,200	80,592,000	100%	80,592,000	3124.8	28,748,160	0.357	
QX	6,000	52,560,000	100%	52,560,000	3637	21,822,000	0.415	
20" SBC	500	4,380,000	100%	4,380,000	1363.3	681,650	0.156	
20" Coater	500	4,380,000	100%	4,380,000	905.2	452,600	0.103	
Tower ME***	0	0	100%	0	0	0	-	
Tower MG	4,375	38,325,000	100%	38,325,000	271.4	1,187,375	0.031	
Tower MP	4,375	38,325,000	100%	38,325,000	941.5	4,119,063	0.107	
Tower MI***	0	0	100%	0	0	0	-	
Tower MQ	4,400	38,544,000	100%	38,544,000	1944.1	8,554,040	0.222	
Tower MS	9,200	80,592,000	100%	80,592,000	3570.7	32,850,440	0.408	
MTM**	5,000	43,800,000	100%	43,800,000	3546.4	17,732,000	0.405	
R&D*	2,600	17,693,010	100%	17,693,010	133.8	347,880	0.020	
Total	74,925	651,260,010		651,260,010		202,902,083	**0.3116**	**= 2021 Actual/PTE Scaling Factor**

*Assume 3% of Annual total across other lines is equivalent to R&D Coater based on historic operating hours
**Assume MTM to have same Actual 2021 Hrs [Column E] as Tower MA in 2023 updated analysis
***Towers ME & MI were removed from the facility in 2017

ARD-1 FORM
GENERAL FACILITY INFORMATION

Air Resources Division/Permitting and Environmental Health Bureau

RSA/Rule: RSA 125-C:12 and Env-A 1700

This ARD-1 General Facility Information form shall be submitted with every application for an air permit, except for a Permit by Notification (PBN).

1. TYPE OF FACILITY[1]

☐ Title V ☒ Non-Title V ☐ Unknown

2. TYPE OF PERMIT[2]

☐ Temporary Permit (Construction) ☒ State Permit to Operate ☐ Title V Operating Permit

☐ General State Permit ☐ Limitation on Potential to Emit (Env-A 625)

3. TYPE OF APPLICATION[3]

☐ New ☐ Renewal ☒ Modification ☐ Administrative Amendment

4. FACILITY INFORMATION

FACILITY NAME[4]: Saint-Gobain Performance Plastics Corp.	AFS NUMBER[5]: 3301100165	
PHYSICAL ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
GOVERNMENT FACILITY CODE[6]: 0		

5. BUSINESS INFORMATION AS REGISTERED WITH SECRETARY OF STATE (If applicable)

REGISTERED NAME: Saint-Gobain Performance Plastics Corp.		
REGISTERED ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054

6. PARENT CORPORATION INFORMATION (If applicable)

PARENT CORPORATION NAME: Saint-Gobain Corporation		
MAILING ADDRESS: 20 Moores Road		
TOWN/CITY: Malvern	STATE: PA	ZIP: 19355

7. MAJOR ACTIVITY OR PRODUCT DESCRIPTION
List all activities performed at this facility and provide SIC and/or NAICS Code(s).

SIC Code	Activity Description	NAICS Code	Activity Description
2221	Woven Fiber Glass		
2296	Industrial Fabrics		
2851	Fluoropolymer Films		

At a minimum, please provide contact information below for Responsible Official, Prepared Application, Technical, and Invoicing contacts. Make as many copies of this page as necessary in order to include all contacts that you wish to associate with the application. Multiple people can be assigned one role; multiple roles can be assigned to one person.

8. RESPONSIBLE OFFICIAL INFORMATION		
RESPONSIBLE OFFICIAL NAME[7]: David Calentine		
TITLE: Plant Manager		
COMPANY NAME: Saint-Gobain Performance Plastics Corp.		
MAILING ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
EMAIL ADDRESS: David.Calentine@saint-gobain.com		
TELEPHONE NUMBER: 603-420-1267	EXTENSION:	
FAX NUMBER:		
ROLES: ☒ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

9. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME: William Kempskie		
TITLE: EHS Manager		
COMPANY NAME: Saint-Gobain Performance Plastics Corporation		
MAILING ADDRESS: 701 Daniel Webster Highway		
TOWN/CITY: Merrimack	STATE: NH	ZIP: 03054
EMAIL ADDRESS: William.kempskie@saint-gobain.com		
TELEPHONE NUMBER: 603-420-1387	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☒ Technical ☒ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

10. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME: Daniel Reilly		
TITLE: Division Manager, Environmental Services		
COMPANY NAME: C.T. Male Associates		
MAILING ADDRESS: 50 Century Hill Drive		
TOWN/CITY: Latham	STATE: NY	ZIP: 12110
EMAIL ADDRESS: d.reilly@ctmale.com		
TELEPHONE NUMBER: 518-786-7400	EXTENSION:	
FAX NUMBER: 518-786-7299		
ROLES: ☐ Responsible Official ☒ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☒ Consultant		

11. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

12. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

13. ADDITIONAL CONTACT INFORMATION		
CONTACT NAME:		
TITLE:		
COMPANY NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP:
EMAIL ADDRESS:		
TELEPHONE NUMBER:	EXTENSION:	
FAX NUMBER:		
ROLES: ☐ Responsible Official ☐ Technical ☐ Invoicing ☐ Legal ☐ Emissions ☐ Prepared Application ☐ Corporate ☐ Owner/Operator ☐ Consultant		

For ALL APPLICATIONS except Administrative Amendments, General State Permits, and Limitations on Potential to Emit:

14. FACILITY-WIDE EMISSIONS		
POLLUTANT[8]	POTENTIAL TPY	ACTUAL TPY
VOC	<50	TOTAL = 2.2 TONS PER YEAR
Total HAP	<25	TOTAL = 0.37 TONS PER YEAR
Individual HAP	<10	LARGEST = 0.20 TONS PER YEAR
PFOA	<0.45 lb/yr; 0.000225 ton/yr	0.0012 lb/yr; 0.0000006 ton/yr
PFOS	<0.57 lb/yr; 0.000285 ton/yr	0.000049 lb/yr; 0.000000025 ton/yr

Please include calculations used in determining emissions and include any non-permitted emission devices.

15. FOR NEW APPLICATIONS OR IF CHANGES ARE MADE – PLEASE INCLUDE:	
☐	A copy of the USGS map, property identified, which shows the facility's location.
☐	A site plan to scale of the facility showing: 1. The locations of all emission points; 2. The dimensions of all buildings and tiers, including roof heights; and 3. The facility's property boundary and any security features (fences, walls, etc.).

16. FOR TITLE V PERMIT APPLICATIONS – PLEASE INCLUDE:[9]		
Included in Application	**Previously Submitted and Unchanged**	
☐	☐	A. Identification and details of limitations on source operation, or any work practice standards affecting emissions for all regulated pollutants.
☐	☐	B. Information required by any other applicable requirement of the Act, including, but not limited to, information related to stack height limitations developed pursuant to section 123 of the federal Clean Air Act (42 U.S.C. §7401).
☐	☐	C. A citation and description of state and federal air pollution control regulations and requirements applicable to each emission unit.
☐	☐	D. A narrative description or reference to test methods used or required for initial compliance demonstration with each applicable regulation.
☐	☐	E. Any additional information required to be provided pursuant to the Act or to determine applicability of any other requirements of the Act.
☐	☐	F. A written explanation of proposed exemptions.
☐	☐	G. Any information required to be provided to the director pursuant to the Act in order to evaluate alternative operating scenarios, or to define permit terms and conditions.
☐	☐	H. A list of all equipment and devices located at the source classified as insignificant activities pursuant to Env-A 600, including appropriate sizing data for equipment and devices which are exempt from permitting requirements based on their process ratings, fuel consumption rate, or both.

16. CONTINUED - FOR TITLE V PERMIT APPLICATIONS – PLEASE INCLUDE:[10]	
Included in Application	
☐	I. Compliance plan information containing: 1. A narrative description of the compliance status of the source with respect to all applicable requirements; 2. A narrative statement of methods used to determine continued compliance, including a description of monitoring, recordkeeping and reporting requirements and test methods; 3. A statement indicating the source's compliance status with an applicable enhanced monitoring and compliance certification requirements specified in Env-A 800; 4. A statement that the source shall continue to comply with all applicable requirements; 5. A statement that the source shall meet all applicable requirements that will become effective during the permit term on a timely basis; 6. A compliance schedule stating all applicable requirements with which the source is not in compliance, consistent with the following: a. The compliance schedule shall incorporate the requirements of and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject; b. Such compliance schedule shall be supplemental to, and not sanction non-compliance with, the applicable requirements on which it is based; and c. The compliance schedule shall include the following statements and schedules: i. A narrative description of how the source shall achieve compliance with such requirements; ii. A schedule of remedial measures, including an enforceable sequence of actions with milestones leading to compliance with any applicable requirements for which the source shall be in non-compliance with at the time of permit issuance; and iii. A schedule for submission of certified progress reports no less frequently than every 6 months. 7. For sources deemed in compliance with all applicable requirements, a certified statement signed by a responsible official stating: "The undersigned certifies that, based on information and belief formed after reasonable inquiry, the source is in compliance with all applicable regulations"; and 8. A schedule for submission of compliance certifications during the permit term, to be submitted annually or more frequently as specified by the underlying applicable requirement.
☐	J. For sources subject to Title IV of the Act, the compliance plan requirements, specified in (I.) above, shall apply to and be included in the acid rain portion of a compliance plan for an affected source, except as specifically superseded by regulations promulgated under Title IV of the Act with regard to the schedule and method(s) the source will use to achieve compliance with the acid rain emission limitations.
☐	K. In addition to the forms required pursuant to Env-A 1700, sources subject to Title IV of the Act shall use the nationally standardized forms for the acid rain portions of the Title V operating permit application, pursuant to 40 CFR 72.30.

This section of the form must be completed and signed by the Responsible Official only.

17. CERTIFICATIONS	
	I certify that the applicant, or the owner or operator the applicant represents, has right, title, or interest in all of the property that is proposed for development or use because the owner or operator owns, leases, or has binding options to purchase all of the property proposed for development or use.
☒	I am authorized to make this submission on behalf of the affected source or affected units for which this submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the information submitted in this document and all of its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

18. RESPONSIBLE OFFICIAL INFORMATION AND SIGNATURE	
RESPONSIBLE OFFICIAL NAME: David Calentine	
TITLE: Plant Manager	
David C	4/24/2023
RESPONSIBLE OFFICIAL'S SIGNATURE	DATE:

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture, Landscape Architecture & Geology, D.P.C.

50 Century Hill Drive, Latham, NY 12110
518.786.7400 FAX 518.786.7299 ctmale@ctmale.com

April 12, 2023
Revised May 4, 2023

Ms. Cathy Beahm
SIP Planning Administrator
NH Department of Environmental Services
Air Resources Division
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095

Re: Saint-Gobain Performance Plastics Merrimack, NH
Significant Permit Amendment – EU24 / MTM
C.T. Male Project No.: 16.6126

Dear Ms. Beahm:

As a follow-up to our April 12, 2023 submission and to provide additional clarification, , please find attached information relative to a requested amendment to the facility's Air Permit relative to modifying an existing permitted Emission Unit in order to operate the equipment similar to other coating equipment at the facility. SGPP most recently submitted an application for State Permit to Operate in May 2022 and this correspondence seeks to modify operation of one (1) Emission Unit contained within the permit.

Due to the completion of RTO and related systems construction including the RTO Bypass stack, and the pending expected issuance of a State Permit to Operate, this amendment includes modification to one (1) emission source, EU24 (referred to as MTM). The Emission Unit will be retrofitted with a dip tray in order to be able to function similar to other Towers at the facility. This piece of equipment was previously used only for laminating and did not use products containing VOC/HAP/RTAP. With the added ability to utilize formulations containing VOC/HAP/RTAP in processing on the Emission Unit, this modification will provide additional manufacturing resiliency to the facility's operations. The MTM would have the functionality to use VOC/HAP/RTAP containing formulations or continue to operate as it historically did without the use of such materials. No new formulations are planned to be used on EU24, and no change to the list of chemicals emitted from the facility will occur as a result of this modification. The EU currently discharges to the facility's RTO and no change to the exhaust is being sought under the application.

In order to minimize the complexity of the application document, only those areas which would be directly updated as a result of this change are being revised/resubmitted. All other attachments to the May 2022 application remain consistent with facility operation. Forms ARD-1 and ARD-3 were previously included as part of the April 12, 2023 submission and remain unchanged from that time relative to the requested modification to the operation of EU24. This change would effectively update the facility description within the permit to include EU24 within the same grouping which currently includes EU01-EU05, EU08, EU12, EU13, EU15 and EU16.

Emission Calculations

Saint-Gobain and C.T. Male previously reviewed Safety Data Sheets for all products currently in the inventory tracking system for products used in Coating Tower operations at the facility (±166 materials). Of these materials, 22 contain RTAP and/or HAP. No changes to these products or concentrations are being sought as part of this modification.

In order to estimate potential annual emissions, a scaling factor was developed to extrapolate full production across all product lines. Details of the scaling factor development were included in Attachment B.7 of the May 2022 application and were used in VOC/HAP/RTAP potential emission estimates. The approach previously used for historic tower operations provided a basis for scaling actual emissions on an annual basis to a maximum potential annual basis. Within this revised submission, RTAP/HAP calculations have been presented with the percentage increase in overall square footage capacity which will occur as a result of EU24 being added as an additional tower capable of running products containing VOC/HAP/RTAP.

RTAP/HAP emissions estimates previously completed demonstrated that each of these compounds were well below their respective AAL. As a result of this modification, the additional production capacity of the facility (i.e., the maximum raw material process rate of the towers) would increase from 72,850 square feet per hour to 77,850 square feet per hour (a ±6.9 percent increase). This amount continues to exclude the capacity of the facility's production equipment routed to the RTO which do not process VOC/HAP/RTAP (i.e., EU23 - Chemsil, EU25 - Step Press and EU26 - Heat Clean).

As this modification would add ±6.9% additional capacity to the towers, the attached RTAP/HAP analysis is increased by the same percentage and continues to demonstrate compliance with the AAL for each of the compounds (see Attachment).

RTO Operation

No change in operation relative to the RTO is needed for this modification. EU24 would continue to exhaust to the RTO in a similar manner as the remaining towers. No changes to the RTO operating parameters are being sought as part of this modification.

EU24 Testing

As part of the proposed modification to EU24, it is anticipated that upon approval by NHDES, the work could be implemented prior to the next emission testing event which includes testing of the RTO and dip pans. EU24 was not previously tested via Method 204 for permanent total enclosure, and would be subject to such testing as part of the next testing regimen.

Deposition Modeling

PFC and Fluoride estimates previously completed demonstrated that each of these compounds were well below their respective AAL. As a result of this modification, the additional production capacity of the facility (i.e., the maximum raw material process rate of the towers) would increase from 72,850 square feet per hour to 77,850 square feet per hour (a ±6.9 percent increase). This amount continues to exclude the capacity of the facility's production equipment routed to the RTO which do not process VOC/HAP/RTAP (i.e., EU23 - Chemsil, EU25 - Step Press and EU26 - Heat Clean).

As this modification would add ±6.9% additional capacity to the towers, it is anticipated that the results of the previous stack testing could increase by that same percentage for VOC/HAP/RTAP. As such, this modification would not cause exceedances of AAL for any of the emitted compounds.

Capture Efficiency Verification Plan

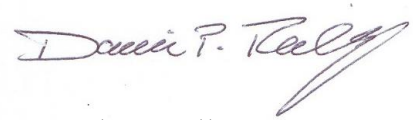
As this modification would include changes to the natural draft opening characteristics of EU24, the MTM would need to be included within SGPP's Capture Efficiency Verification Plans which previously included EU01-EU08, EU12, EU13, EU15, EU16 and EU22.

Permit Changes

Permit changes which would occur based on this modification include citation of EU24 within requirements of Env-A 604.02, 606.02(a)(4), 607.01(g), 607.01(n) and 1200 at the State level and 40 CFR 60.740, NSPS Subpart VVV as EU24 would be permitted to process VOC/HAP/RTAP.

If you have any questions or require additional information please contact me at (518) 786-7625.

Sincerely,
C.T. MALE ASSOCIATES



Daniel P. Reilly, P.E.
Division Manager, Environmental Services

Enclosures

ec: David Calentine, Will Kempskie, Chris Angier (SGPP)
Craig Wright (NHDES)

Updated Attachment B.5
RTAP/HAP Summary

Updated Evaluation of RTAP/HAP associated with Coating Tower Operation (Tower Throughput Increased by 6.9% due to EU24/MTM Addition)

Chemical	Ethylene Glycol	Toluene	Isopropanol	Formaldehyde	Ethanol	1,4-Dioxane	Benzene	Polyethylene Glycol	Chromic Acid (Chromium Compound)	Tetrafluoroethylene
CAS No.:	107-21-1	108-88-3	67-63-0	50-00-0	64-17-5	123-91-1	71-43-2	25322-68-3	7738-94-5	116-14-3
HAP/RTAP Designation:	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP/HAP	RTAP
PTE (lb/hr) from 2022 Application = (based on 8,760 hr/yr)	0.937 lb/hr	0.334 lb/hr	0.0334 lb/hr	0 lb/hr	0.000881 lb/hr	0.00168 lb/hr	0.0000110 lb/hr	0.182 lb/hr	0 lb/hr	0.302 lb/hr
PTE (lb/hr) Scaled by 1.069 = (based on 8,760 hr/yr)	1.002 lb/hr	0.357 lb/hr	0.0357 lb/hr	0 lb/hr	0.000941 lb/hr	0.00179 lb/hr	0.0000118 lb/hr	0.194 lb/hr	0 lb/hr	0.322 lb/hr
RTAP Evaluation										
X (lb/hr) =	1.002 lb/hr	0.357 lb/hr	0.0357 lb/hr	0 lb/hr	0.000941 lb/hr	0.00179 lb/hr	0.0000118 lb/hr	0.194 lb/hr	0 lb/hr	0.322 lb/hr
Y = X / 7.94 =	0.1261	0.0449	0.00449	0	0.0001186	0.000226	0.00000148	0.0245	0	0.0406
Z = Y x 10^6 =	126,145 ug/sec	44,916 ug/sec	4,492 ug/sec	0 ug/sec	118.58 ug/sec	225.8 ug/sec	1.48 ug/sec	24,486 ug/sec	0 ug/sec	40,605 ug/sec
A = Stack Volume (±70,000 CFM)										
B = A / 2119 =	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec
In-Stack Concentration = Z/B	3819 ug/m^3	1360 ug/m^3	136.0 ug/m^3	0 ug/m^3	3.59 ug/m^3	6.84 ug/m^3	0.045 ug/m^3	741.2 ug/m^3	0 ug/m^3	1229.2 ug/m^3
Adj. In-Stack Conc. = (Z/B) / 700	5.46 ug/m^3	1.94 ug/m^3	0.19 ug/m^3	0 ug/m^3	0.0051 ug/m^3	0.0098 ug/m^3	0.000064 ug/m^3	1.06 ug/m^3	0 ug/m^3	1.76 ug/m^3
RTAP Limits Comparison										
24 Hour AAL	503 ug/m^3	5000 ug/m^3	1757 ug/m^3	1.3 ug/m^3	6714 ug/m^3	258 ug/m^3	5.7 ug/m^3	208 ug/m^3	0.036 ug/m^3	171 ug/m^3
Annual AAL	335 ug/m^3	5000 ug/m^3	1171 ug/m^3	0.88 ug/m^3	4476 ug/m^3	30 ug/m^3	3.8 ug/m^3	99 ug/m^3	0.024 ug/m^3	81 ug/m^3
Adj. In-Stack Conc./24 Hour AAL	1.08%	0.039%	0.0111%	0%	0.000076%	0.0038%	0.00113%	0.51%	0%	1.03%
Adj. In-Stack Conc./Annual AAL	1.63%	0.039%	0.017%	0%	0.000115%	0.033%	0.0017%	1.07%	0%	2.17%
In Compliance with AALs?	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	N/A	Yes

Updated Evaluation of RTAP/HAP associated with Coating Tower Operation (Tower Throughput Increased by 6.9% due to EU24/MTM Addition)

Chemical	Methanol	Acetaldehyde	Ethylene Oxide	Propylene Oxide	Methyl Ethyl Ketone	2-Pyrrolidinone, 1-methyl-	Hexane
CAS No.:	67-56-1	75-07-0	75-21-8	75-56-9	78-93-3	872-50-4	110-54-3
HAP/RTAP Designation:	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP/HAP	RTAP	RTAP	RTAP/HAP
PTE (lb/hr) from 2022 Application = (based on 8,760 hr/yr)	0.0374 lb/hr	0 lb/hr	0 lb/hr	0 lb/hr	0.0163 lb/hr	0.0142 lb/hr	0.000869 lb/hr
PTE (lb/hr) Scaled by 1.069 = (based on 8,760 hr/yr)	0.0400 lb/hr	0 lb/hr	0 lb/hr	0 lb/hr	0.0174 lb/hr	0.0152 lb/hr	0.000929 lb/hr
RTAP Evaluation							
X (lb/hr) =	0.0400 lb/hr	0 lb/hr	0 lb/hr	0 lb/hr	0.0174 lb/hr	0.0152 lb/hr	0.000929 lb/hr
Y = X / 7.94 =	0.00504	0	0	0	0.00219	0.00191	0.0001170
Z = Y x 10^6 =	5,037 ug/sec	0 ug/sec	0 ug/sec	0 ug/sec	2,191 ug/sec	1,912 ug/sec	117.04 ug/sec
A = Stack Volume (±70,000 CFM)							
B = A / 2119 =	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec	33.034 m^3/sec
In-Stack Concentration = Z/B	152.47 ug/m^3	0 ug/m^3	0 ug/m^3	0 ug/m^3	66.32 ug/m^3	57.89 ug/m^3	3.54 ug/m^3
Adj. In-Stack Conc. = (Z/B) / 700	0.218 ug/m^3	0 ug/m^3	0 ug/m^3	0 ug/m^3	0.095 ug/m^3	0.083 ug/m^3	0.0051 ug/m^3
RTAP Limits Comparison							
24 Hour AAL	20000 ug/m^3	161 ug/m^3	6.4 ug/m^3	17 ug/m^3	5000 ug/m^3	1429 ug/m^3	885 ug/m^3
Annual AAL	20000 ug/m^3	9 ug/m^3	4.3 ug/m^3	11 ug/m^3	5000 ug/m^3	952 ug/m^3	700 ug/m^3
Adj. In-Stack Conc./24 Hour AAL	0.00109%	0%	0%	0%	0.0019%	0.0058%	0.00057%
Adj. In-Stack Conc./Annual AAL	0.00109%	0%	0%	0%	0.0019%	0.0087%	0.00072%
In Compliance with AALs?	Yes	N/A	N/A	N/A	Yes	Yes	Yes