PROJECT DESCRIPTION

On February 11, 2020, the New Hampshire Department of Environmental Services (NHDES) issued Temporary Permit TP-0256 to Saint-Gobain Performance Plastics Corporation (SGPP) to install air pollution control equipment as required by RSA 125-C:10-e. TP-0256 authorized SGPP to operate seventeen coating/casting towers, laminators and finishing devices; an antenna fabrication facility; a fire pump engine; an emergency generator and a regenerative thermal oxidizer (RTO). The construction of the RTO was completed, and the device was started up on July 14, 2021, but SGPP had not yet completed stack testing by the original permit expiration date of August 31, 2021. Therefore, pursuant to Env-A 607.09, NHDES reissued TP-0256 on August 5, 2021, with a new expiration date of August 31, 2022.

During the required stack testing that SGPP conducted September 7 through 10, 2021, NHDES observed that the main header associated with conveying all the process exhaust streams to the RTO had been equipped with a bypass stack. Condition IV, Table 4 of TP-0256 does not identify or allow for the installation and use of a bypass stack. Additionally, Condition V, Table 5, Item 5 of TP-0256 required the RTO to operate at all times the coating towers or auxiliary equipment are operating. Therefore, NHDES determined that the bypass stack was not authorized by TP-0256 and issued a Letter of Deficiency (No. ARD 21-010) to SGPP on November 18, 2021. ARD 21-010 requested SGPP to submit, among other information, a permit application for a significant permit amendment to TP-0256 pursuant to Env-A 612 regarding installation and operation of the bypass stack.

- On December 28, 2021, SGPP through its consultant C. T. Male Associates Engineering, Surveying, Architecture, Landscape Architecture & Geology (C.T. Male) submitted Application #21-0198 to NHDES. On January 14, 2022, SGPP through its consultant Barr Engineering (Barr) submitted electronic modeling files related to the application. On January 19, 2022, SGPP submitted an updated ARD-1 form designating a new Responsible Official.
- On January 27, 2022, NHDES sent a letter to SGPP requesting additional information. On February 28, 2022, SGPP submitted an updated air permit application with a more thorough monitoring plan that addressed the RTO and the bypass stack usage, monitoring, recordkeeping and reporting. On April 15, 2022, NHDES sent a letter to SGPP deeming Application #21-0198 complete. On June 16, 2022, NHDES issued a letter approving the monitoring plan submitted on February 28, 2022.
- On June 1, 2022, SGPP submitted Application #22-0092 for the issuance of an initial State Permit to Operate. On June 27, 2022, NHDES sent a letter to SGPP deeming Application #22-0092 complete. Since the application was received 90 days prior to the expiration date of TP-0256, the application shield provisions under Env-A 607.10 apply.
- On April 12, 2023, SGPP submitted information requesting the modification of an existing permitted Emission Unit to operate like other coating equipment at the facility. A signed ARD-1 form related to this request was submitted on April 25, 2023. A revision of the information was submitted to NHDES on May 5, 2023. (See Application #22-0092)

This permit application review summary outlines NHDES' review of all applications submitted and addresses all associated regulatory requirements for the facility which have been incorporated into a draft State Permit to Operate.

FACILITY DESCRIPTION

SGPP primarily manufactures polytetrafluoroethylene (PTFE) coated fabrics and PTFE films. The fabrics are manufactured for a variety of chemical and weather resistant applications.

In the coating towers (EU01 – EU05, EU08, EU12, EU13, EU15 & EU16), the fabric is passed through a coater dip pan filled with a PTFE aqueous dispersion, which can include surfactants, viscosity modifiers and colorants. The fabric then passes through a tower, which is divided into three temperature zones that remove water, volatilize the surfactant, and sinter the resin onto the fabric. The production of film products on the casting towers (EU06 & EU07) includes the same sequence of steps, however, rather than coating a cloth, the PTFE coating is temporarily applied to a reusable carrier belt. The film coating is then removed, and the carrier belts are reused. The fabric and/or film can go through a single or multiple pass process to produce the desired intermediate or final product. SGPP manufactures finished products in which the intermediate coated fabrics and films are laminated and/or cut and assembled into final products. The coating/casting towers emit per and polyfluoroalkyl substances (PFAS), volatile organic compounds (VOCs), regulated toxic air pollutants (RTAPs) and hazardous air pollutants (HAPs). These devices are exhausted to the RTO for control of PFAS specifically.

In addition to the primary coating/casting towers, there are small production activities including several pieces of post-processing equipment utilized at the facility as well as a small research and development coater (EU22). The Chemsil process (EU23) applies and dries coating onto fabric by thermally treating a solid paste without the use of a carrier solvent. The MTM (EU24) and Laminator (EU25) are pieces of equipment that utilize heat to perform operations which laminate or otherwise affix coated fabric and films. Neither piece of equipment currently utilizes the addition of solvents or other chemicals to join the different types of materials. The Heat Clean source (EU26) is an oven used for cleaning by heating, and similarly does not involve the addition of solvents or other chemicals. These pieces of equipment had not previously appeared in the facility's air permit until TP-0256 was issued because they were not expected to result in releases of VOCs, RTAPs or HAPs. However, each of these sources are exhausted to the RTO to minimize the potential for fugitive releases from these smaller units.

Information submitted by SGPP on April 12, 2023, requested that the MTM (EU24) be permitted to be modified by retrofitting it with a dip tray to be able to function like other coating towers at the facility. With the added ability to utilize formulations containing PFAS, VOCs, HAPs and RTAPs on EU24, the MTM would have the functionality to use PFAS/VOC/HAP/RTAP containing formulations or continue to operate as it historically did without the use of such materials. The same formulations currently used at the facility on the coating towers are planned to be used on EU24, and no change to the list of chemicals emitted from the facility will occur because of this modification. EU24 currently discharges to the RTO and no change to the exhaust is being sought under the application.

SGPP is permitted for an antenna cover fabrication area (EU17) as part of the finishing operations. This operation includes manual application of adhesives to the fabric for bonding to other pieces of fabric, ancillary items or to metal frames. This process emits VOCs, RTAPs and HAPs but not PFAS. The antenna cover fabrication area is not exhausted to the RTO. SGPP is permitted for operation of an emergency generator (EU21) and a fire pump engine (EU20). A #2 fuel oil-fired boiler system (for building heat) rated at 1.56 MMBtu/hr is also located at the facility but is below permitting thresholds. The RTO and many of the coating/casting towers combust natural gas and produce criteria pollutants.[1] The burners installed in the RTO were required to be larger than initially proposed in the 2019 permit application because the permitted temperature requirement in TP-0256 was higher than SGPP proposed in the 2019 application. The RTO and coating/casting tower burners are all below permitting thresholds.

SGPP has permit conditions limiting facility wide VOCs to less than the major source threshold of 50 tpy, and HAPs to less than the major source threshold of 10 tpy for any individual HAP and 25 tpy for all HAPs combined. The facility is a synthetic minor source of air pollution for VOCs and HAPs. The Facility does not have the potential to emit criteria pollutants at levels greater than the major source thresholds for these pollutants. Therefore, the facility is a true minor source for PM_{10}, SO_2, NOx, and CO.

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[1] Criteria pollutants which are produced from fuel burning devices include particulate matter (PM_{10}), sulfur dioxide (SO_2), oxides of nitrogen (NOx), and carbon monoxide (CO).

PROCESS/DEVICE DESCRIPTION

Table 1 – Emission Unit Identification										
Process Identification		**Process Parameters**					**Combustion Parameters (if applicable)**			
Emission Unit ID	**Device Name**	**Installation Date**	**Tower Width (in)**	**Max Product Width (in)**	**# of Stages**	**Maximum Production (sq. ft/hr)**	**Number of Heating Zones**	**Temperature Range per Zone (°F)**	**Fuel Type**	**Maximum Heat Input (MMBtu/hr)**
EU01	MA Tower	1994	76	60	1	6,000	3	150 - 750	Natural Gas	3.9
EU02	MB Tower	1998	188	175	1	17,500	3	150 - 750	NG/Electric	7.5
EU03	MC Tower	1998	96	92	1	9,200	3	150 - 750	NG/Electric	4.5
EU04	MR Tower	2002	96	92	1	9,200	3	150 - 750	NG/Electric	4.5
EU05	MD Tower	1999	96	92	2	9,200	3	150 - 750	NG/Electric	9.0
EU06	QX Tower	1989	72	60	5	6,000	15	150 - 750	NG/Electric	7.5
EU07	20" SBC	1986	20	20	6	500	18	200 - 750	Electric	N/A
EU08	20" Coater	1986	20	20	1	500	2	150 - 450	Electric	N/A
EU12	MG Tower	2002	198	175	1	4,375	3	150 - 750	Natural Gas	6.0
EU13	MP Tower	2002	188	175	1	4,375	3	150 - 750	Natural Gas	7.5
EU15	MQ Tower	2002	48	44	1	1,100	3	150 - 750	Natural Gas	4.5
EU16	MS Tower	2002	96	92	1	2,300	3	150 - 750	NG/Electric	4.5
EU17	Antenna Cover Fabrication Area	1993	N/A	N/A	N/A	N/A	None	N/A	None	N/A
EU22	R & D Coater	N/A	34	26	1	2,600	3	150 - 750	Natural Gas	2.0
EU23	Chemsil Coater	N/A	42	38	1	3,800	6	150 - 600	Electric	N/A
EU24	MTM	N/A	52	50	1	5,000	2	150 - 750	Natural Gas	3.0
EU25	Laminator	N/A	60	48	1	4,800	1	650	Electric	N/A
EU26	Heat Clean	N/A	5'x6'x19'	N/A	1	N/A	1	150 - 750	Natural Gas	1.5

In addition to the process equipment listed in Table 1, SGPP also operates the following fuel burning devices that meet permitting applicability:

Table 2 – Summary of Additional Fuel Burning Equipment Rated Above Permitting Thresholds			
Emission Unit ID	**Emission Unit Description**	**Installation Date**	**Maximum Design Capacity & Permitted Fuel Types**[2]
EU20	Clarke fire pump - Model JU4H-UFAD58 John Deere engine - Model 4045 Serial #PE4045L273937	2015	1.20 MMBtu/hr (110 bhp; 82 kW) ULSD – equivalent to 8.7 gal/hr
EU21	Kohler emergency generator set - Model 40REOZJC John Deere engine - Model 4024HF285B Serial #SGM32DG5J	2015	0.47 MMBtu/hr (80 bhp; 60 kW) ULSD – equivalent to 3.4 gal/hr

The following emission units have been removed/decommissioned.

Table 3 – Former Emission Units					
Emission Unit ID	**Emission Unit Description**	**Installation Date**	**Date Unit Taken Out of Service**	**Date Removed from Facility**	**Maximum Design Capacity & Permitted Fuel Types**
EU09	MH Tower	2002	Prior to 2010	April 2013	Curing zone burner 1.0 MMBtu/hr Natural Gas
EU10	MX Tower	2002	Prior to 2010	May 2012	Curing zone burner 1.0 MMBtu/hr Natural Gas
EU11	ME Tower	2002	November 2016	October 2017	Curing zone burner 8.0 MMBtu/hr Natural Gas Operating Speed 5 ft/min & 4,000 ft^2/hr
EU14	MI Tower	2003	March 2017	October 2017	Curing zone burner 3.0 MMBtu/hr Natural Gas Operating Speed 15 ft/min & 3,000 ft^2/hr
EU18	Fire Pump Engine #1 Detroit Diesel Allison Div. GMC Model: 4061AZ Serial No: 4A0174331	1970	Decommissioned 2015	N/A	1.10 MMBtu/hr (160 hp) No 2 fuel oil/diesel – equivalent to 8.0 gal/hr
EU19	Fire Pump Engine #2 Detroit Diesel Allison Div. GMC Model: 4061AZ Serial No: 4A0174803	1970	Decommissioned 2015	N/A	1.10 MMBtu/hr (160 hp) No 2 fuel oil/diesel – equivalent to 8.0 gal/hr
EU25	Step Press	N/A	2022	2022	Step Press was removed; Laminator still in service

[2] The hourly fuel rates presented in Table 2 are set assuming a heating value of 137,000 Btu/gal for ultra-low sulfur diesel (ULSD). The fuel consumption and maximum power ratings for each engine come from their respective engine specification sheets which also state that both engines are US EPA Tier 3 certified.

POLLUTION CONTROL EQUIPMENT

Regenerative Thermal Oxidizer

On July 14, 2021, SGPP completed installation and commenced operation of the RTO that is used to reduce emissions of PFAS and precursors from several existing emission units at the facility. The process exhaust streams are collected and tied into a header system that delivers process exhaust from the emission units at the facility to the RTO. SGPP has removed the stacks that were previously located on the roof because of the installation of the header system and the RTO. The header system has been equipped with an emergency bypass damper located in the duct work above the lower-level roof near the connections of Towers MD (EU05) and MG (EU12). (See Figure 3 of the System Ventilation Roof Upper/Lower Layout diagram as part of Application #21-0198.) The RTO is equipped with two natural gas fired burners (Burner "A" and Burner "B") rated at 8.8 MMBtu/hr (8,627 ft^3/hr of natural gas) each.

Emergency bypass is critical to safe RTO operation. It is a necessary safety feature that will activate under certain conditions to protect the health and safety of individuals in and around the facility, process equipment, and the control device itself. It is common for RTOs to include an emergency bypass to enable safe shutdown of operations upstream of the control device. The process operations upstream of this control device cannot safely stop as quickly as the RTO without the risk of fire or other dangerous conditions, such as exhaust build-up within the plant. The emergency bypass is designed and programmed to operate during emergency conditions to allow process flow to be temporarily diverted from the RTO while process equipment is brought to a safe, controlled stop.

Air Pollution Control Equipment Monitoring Plan

On February 28, 2022, SGPP submitted *Saint-Gobain Air Pollution Control Equipment Monitoring Plan* (PL-EHS-003 Rev. 00 dated 2/28/2022) (the Monitoring Plan) that addressed both the RTO and the emergency bypass stack including all the required elements of Env-A 810. SGPP submitted updates to the Monitoring Plan on January 31, 2023 (Rev 2), March 15, 2023 (Rev 3), and May 1, 2023 (Rev 4). The document fulfills the requirement of TP-0256 Condition VIII. Table 8, Item 10.

RTO and Emergency Bypass Usage: Sections 5.0 through 5.4 of the Monitoring Plan describe the RTO operations and emergency bypass usage. *Table 1: RTO Modes of Operation* describes the eleven (11) modes of operation of the RTO. Many of the RTO modes of operation involve the startup and operational processes for the RTO. Sections 5.6 through 5.8 outline the RTO operating requirements, temperature setpoint and information regarding tower operations. Each tower/auxiliary equipment's drive mechanism is interlocked with the RTO. Towers/auxiliary equipment can only commence operation when the RTO is online and operating at or above the permitted minimum temperature. When the RTO is in the yellow or red state (i.e., below allowable temperature limit), the towers/auxiliary equipment cannot initiate a new run sequence. There are three (3) modes of operation of the RTO that involve the release of untreated emissions to the atmosphere through the emergency bypass if one of the following operational modes occurs during a production run: "Burner Off", "Emergency Shutdown" and "High Inlet Temperature Shutdown". Section 5.9 describes the operation of tower/auxiliary equipment and the RTO and subsequent shutdown of towers/auxiliary equipment during these modes of operation. Section 5.10 discusses RTO cold starts after a period of no production operations.

RTO and Emergency Bypass Monitoring: Section 5.5 of the Monitoring Plan covers monitoring parameters for the RTO operations and the emergency bypass usage. *Table 4: Parameters Monitored Per RTO Run Modes* highlights the operating conditions that will be monitored for each of the RTO modes of operation. *Table 5: RTO Operational Parameters Detail* provides the specifics regarding the location, source, frequency, units of measure, data output, storage alert notification, and data review frequency for each parameter monitored. The key operational parameters monitored for the RTO include temperature (seven thermocouples measuring every minute with hourly block averages calculated)[3], RTO inlet process gas airflow (inline flow meter located between the bypass stack isolation damper and the

[3] In the stack test plan submitted by SGPP prior to the September 2021 stack test, the facility proposed monitoring the hourly block average of the active combustion chamber temperatures from thermocouples 303, 306 and 309 of the RTO. However, during the 2021 stack test, SGPP identified and NHDES concurred that using all seven thermocouples instead would be a better representation of active combustion

RTO process isolation damper which measures inlet process gas airflow to the RTO and is used to determine the length of time a bypass situation occurs), and RTO natural gas flow (measures natural gas flow to RTO every minute with hourly block averages calculated). The key operational parameters monitored for the emergency bypass usage includes RTO inlet process gas airflow and which emission units were running during the bypass mode.[4]

RTO and Emergency Bypass Recordkeeping and Reporting: Sections 5.5.4 and 6.0 of the Monitoring Plan cover the recordkeeping and reporting of RTO operational data and information related to emergency bypass conditions. These sections include location of stored RTO operational data, RTO Compliance Data Log compiled at the facility and RTO Maintenance and RTO Malfunction Reports (Appendices A & B) used to document maintenance and malfunction episodes.

RTO and Duct Work Maintenance Plan: Section 11 covers routine maintenance recommended by the RTO manufacturer. SGPP is conducting and maintaining records of daily, weekly, monthly, quarterly, and annual RTO maintenance. TP-0256 required an annual inspection of the RTO. This requirement in the draft permit has been changed to reference the maintenance requirements contained in the Monitoring Plan.

Additional Information: In addition, SGPP submitted the *Fire Response and Prevention Plan* (PL-EHS-001 dated September 2021). TP-0256 required SGPP to submit information pertaining to the maintenance of the process vent emission streams that are collected and tied into a header system. This information was required to include methods for keeping the vents clear of char material, including but not limited to insulation, cleaning ports, cleaning frequency and methodology, and any proposed operation and maintenance of auxiliary equipment necessary to ensure the process vent emission streams remain clear of char material. PL-EHS-001 fulfills the requirement of TP-0256 Condition VIII, Table 8, Item 10, and the draft permit has been changed to now reference the *Fire Response and Prevention Plan* in place of the previous language. The draft permit also includes a requirement to inspect the bypass stack damper quarterly to ensure it is maintained and not diverting through the bypass stack.

As part of the monitoring plan, SGPP submitted *Capture Efficiency Verification Plans* (Plans) for each tower [EU01 – EU08, EU12, EU13, EU15, EU16, and EU22] as required in TP-0256 Condition VIII, Table 8, Item 10. The purpose of these Plans is to ensure that the natural draft opening characteristics are consistent with the capture efficiency testing conducted during the September 2021 stack test and verified during the August 2022 stack test. The *Capture Efficiency Verification Plans* fulfill the requirement of TP-0256 Condition VIII, Table 8, Item 10, and the draft permit has been changed to required operation of the towers consistent with these Plans.

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temperature at a range of operational flow rates. At the higher end of operational flow rates, the top thermocouples provide a better representative temperature and at normal operational flow rates, the lower thermocouples provide a better representation of active combustion temperature. The permit condition related to monitoring of temperature has been amended to reflect this situation. [See Section 5.5.1 of the Monitoring Plan for further discussion.]

4 SGPP uses the maximum exhaust flow rate (instead of actual measured exhaust flow rate during a bypass event) for each tower in operation during a bypass event along with the length of time in bypass and the individual PFAS emission rates (lbs/dscf) from the most recent stack test to calculate individual PFAS emissions during a bypass event.

EMISSION CALCULATIONS

NHDES has reviewed emission calculations conducted by C.T. Male on behalf of SGPP or calculated emissions as presented in the attached spreadsheets. A summary of the emission information provided by SGPP or calculated by NHDES as well as the methodology is presented below.

Coating Towers – PFAS, VOC and RTAP/HAP Emission Rates

The coating/casting towers emit PFAS, VOCs, and RTAPs/HAPs. In the applications, SGPP used the 2021 stack test results for emissions of regulated PFAS compounds, VOCs, and certain RTAP/HAP emissions. The entire list of 50 PFAS analytes[5] analyzed in the stack gasses collected during the 2021 and 2022 stack tests can be found in the 2021 stack test report and the 2022 stack test report. The results of regulated PFAS, VOC and RTAP/HAP emissions from the coating/casting towers is summarized below.

Table 4 – Stack Test Results for PFAS with AGQS, Total PFAS, VOC and RTAP/HAP[6]

Compound	CAS #	RTO Inlet[7]				RTO Outlet			
		2021		2022		2021		2022	
		lb/hr	lb/yr	lb/hr	lb/yr	lb/hr	lb/yr	lb/hr	lb/yr
PFOA	335-67-1	2.06E-05	0.18	1.1E-05	0.096	1.64E-06	0.014	2.54E-06	0.022
PFOS	1763-23-1	2.77E-07	2.43E-03	1.29E-07	0.00113	6.80E-08	5.96E-04	5.88E-08	0.00052
PFNA	375-95-1	7.26E-06	0.064	6.55E-06	0.057	6.55E-08	0.001	6.66E-07	0.0058
PFHxS	355-46-4	2.23E-08	1.95E-04	3.10E-09	2.7E-05	ND[8]	ND	ND	ND
Total PFAS[9]	N/A	1.97E-03	17.2	1.63E-04	1.42	2.56E-04	2.2	1.32E-05	0.12
Non-methane VOCs[10]	N/A	4.67	20.4 tpy	--	--	1.03	4.5 tpy	--	--
Ammonium perfluorooctanoate (APFO)[11]	3825-26-1	2.14E-05	0.187	1.15E-05	0.10	1.71E-06	0.015	2.64E-06	0.023
Hydrogen fluoride, as F[12] (HF)	7664-39-3	--	--	--	--	0.012	105	--	--

5 EPA's Other Test Method (OTM-45) Measurement of Selected Per- and Polyfluorinated Alkyl Substances from Stationary Sources stack test method is applicable to the collection and quantitative analysis of specific semi-volatile (Boiling point > 100°C) and particulate-bound per- and polyfluorinated alkyl substances (PFAS) in air emissions from stationary sources. Table 45-1 of this method lists the individual target analytes (total of 50) that have been evaluated for measurement by OTM-45.

6 Short-term (lb/hr) PFAS emission values are based on the average of 3 test runs for each stack test. Long-term (lb/yr or tpy) emission values are calculated based on 8,760 hours per year potential operation. SGPP will conduct stack testing after the modification to EU24. However, permit limits for PFAS analytes are not changing as a result of the modification to EU24.

7 The short-term RTO inlet emission rates in Table 4 can be used as emergency bypass stack emissions for evaluation of the bypass stack operations. However, annual RTO inlet emission rates in Table 4 are calculated at 8,760 hours per year and the bypass is proposed to be limited by the draft permit to 175 hours per year. While HF is produced in the RTO, for conservative purposes Barr used the RTO outlet emission rate of 0.012 lb/hr of HF for evaluating compliance and permit applicability for the emergency bypass stack.

8 Stack test method OTM-45 states "12.7.2.1 Emission Data. For each run, report the target compound masses measured for each fraction. Indicate whether reported masses are in the quantitative range, estimated, or non-detect. Report the associated gaseous concentration for that run, based on the sum of detected fractions and the gaseous sample volume collected for that run." For PFHxS, the 3 samples collected for each of the 3 test runs were all below the minimum detection limit and were therefore reported as non-detect.

9 Total PFAS represents 25 PFAS analytes detected in the inlet stream and 19 PFAS analytes detected in the outlet stream for 2021 stack test. Total PFAS represents 26 PFAS analytes detected in the inlet stream and 20 PFAS analytes detected in the outlet stream for 2022 stack test.

10 TP-0256 required stack testing for non-methane VOCs every 5 years and was therefore not conducted during the 2022 stack test.

11 APFO emissions were calculated by converting measured PFOA emissions using molecular weights of each compound. (431 APFO, 414 PFOA).

12 Hydrogen fluoride is formed when PFAS compounds are destroyed in the RTO. Sampling and analysis of stack gas containing HF took place at the outlet of the RTO during the 2021 stack test.

In March 2021, SGPP entered into a Consent Decree (State of New Hampshire, Department of Environmental Services v. Saint-Gobain Performance Plastics Corporation, Inc. Docket No. 226-2021-CV-00077). One requirement of the Consent Decree was for SGPP to complete a material balance to determine worst case potential HF emissions and report the results of the material balance to the State, including the supporting documentation. As required by the Consent Decree, SGPP made a reasonable effort to obtain information about total organic fluoride (TOF) content from its suppliers of current raw materials used in the fabric coating processes and investigated the feasibility and time required to analyze each raw material using current laboratory methods generally available in U.S. commercial laboratories or developed by USEPA, if available and as applicable for TOF. SGPP determined, and NHDES concurred, that currently raw material suppliers cannot provide this information and commercial laboratories cannot feasibly and reliably perform these analyses of TOF content. Therefore, SGPP had the current raw materials used in its fabric coating processes analyzed using modified Method 537.1 to obtain the PFAS content for 24 analytes as allowed for as a second option in the Consent Decree.

On June 1, 2021, SGPP submitted a confidential and redacted material balance. In the SGPP submittal, potential HF emissions were calculated under three operating scenarios and was based on either the measured content of the PFAS compounds contained in each of the current raw materials or the method detection limit for those analytes not detected. The highest calculated potential HF emission rate of the three scenarios was 0.0023 lb/hr. Assuming the facility operated 24-hrs per day and 365 days per year, the potential HF emissions calculated in this manner would be 20 lb/yr. Because Method 537.1 is limited in its ability to identify and quantify all possible fluorinated compounds that might exist in the raw materials and be converted to HF in the RTO, NHDES concurs with SGPP that the HF emission rate obtained during the 2021 stack test (Table 4 above) should be used for compliance demonstration and permit application purposes as opposed to a material balance approach.

Prior to requesting a modification to EU24:

For the remaining RTAP/HAP emissions that were not stack tested, SGPP estimated potential emissions by scaling actual emissions. Attachment B.1. of the applications contains an inventory of products listed in the SGPP inventory tracking system for the Coating Tower operations and the corresponding RTAP/HAP content as listed in the safety data sheets for the products. Of these 166 materials, 22 contain RTAPs/HAPs and 13 of these products were used in 2021. Information contained in Attachments B.1. and B.4. were used to calculate actual emissions of each RTAP/HAP from the Coating Towers for each year from 2012 – 2021 as documented in Attachment B.5. Actual annual emissions are calculated based on actual annual raw materials used and maximum individual RTAP/HAP concentration listed in the safety data sheets for each raw material and assumes 100% gets released to the atmosphere with no control efficiency because of operations of the RTO. NHDES concurs with this methodology for calculating the actual annual RTAP/HAP emissions for compliance demonstration and permit application purposes.

Attachment B.7 of the applications contains the methodology for determining the scaling factor for each year from 2012 – 2021 which is then used to convert actual annual emissions to potential annual emissions. NHDES also concurs with the scaling methodology for determining potential RTAP/HAP emissions for compliance demonstration and permit application purposes. Below are the highest actual and potential RTAP/HAP emissions from the coating towers over the past 10 years. The only two RTAPs/HAPs that have increased since Application #18-0227 are methanol and ammonia. For methanol, the increase in emissions is attributable to an increase in utilization of one raw material that does not contain PFAS. For ammonia, the increase in emissions is attributable to a change in the scaling factor between 2018 and this review since the basis of the emission rate is the 2018 stack test result.

Table 5a – Coating Towers – RTAP/HAP Emissions (prior to EU24 modification)[13]

RTAP/HAP	CAS #	Highest Actual Emission Rate (2012 – 2021)	Potential Emission Rate	
		(lbs/yr)	(lbs/yr)	(lb/hr) [14]
Ethylene Glycol	107-21-1	3,733	8,208	0.94
Toluene	108-88-3	1,329	2,922	0.33
Isopropanol	67-63-0	132.9	292.2	0.033
Ethanol	64-17-5	3.18	7.7	0.00088
1,4-Dioxane	123-91-1	6.68	14.7	0.0017
Benzene	71-43-2	0.032	0.1	0.000011
Polyethylene Glycol	25322-68-3	724.6	1,593	0.18
Tetrafluoroethylene	116-14-3	1,153	2,642	0.30
Methanol	67-56-1	99.9	327.7	0.037
Methyl Ethyl Ketone	78-93-3	49.60	142.5	0.016
n-Methyl-2-pyrrolidone	872-50-4	43.30	124.4	0.014
Hexane	110-54-3	2.65	7.6	0.00087
Ammonia[15]	7664-41-7	270	885	0.10

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13 All compounds listed in Tables 5a, 5b and 6 are RTAPs. However, HAPs are denoted in *italics*.

14 Hourly RTAP/HAP emissions (lb/hr) were calculated from annual RTAP/HAP emissions (lb/yr) using 8,760 hours/yr conversion except as noted for hydrogen fluoride and ammonia. These values can also be used as emergency bypass stack emissions for evaluation of the bypass stack operations.

15 Ammonia emissions come from the 2018 stack test conducted on Tower MS using Conditional Test Method 027 and applying the results to all the coating/casting towers using applicable flow rates of the towers. The potential emissions listed in this table reflect the 2018 actual ammonia emissions scaled up using the scaling factor provided in Applications 21-0198 and 22-0092 (i.e., 0.305).

After requesting a modification to EU24:

SGPP submitted revised emission estimates for RTAP/HAPs in the April 2023 submittal. Those estimates were based on utilizing the same scaling factor method used in the original applications but recalculated for the inclusion of EU24. NHDES considers the addition of a dip pan to EU24 to be an increase in potential fabric that could be coated with RTAP/HAPs containing materials and therefore should be calculated based on the increased coating capability. On May 5, 2023, SGPP submitted revised calculations based on this approach. The increased fabric coating potential is calculated based on an increased production capacity from 72,850 ft^2/hr to 77,850 ft^2/hr (a ±6.9% increase).[16] This increased coating capability percentage was applied to the emissions of RTAP/HAPs in Table 5a which resulted in new potential RTAP/HAP emission rates at noted in Table 5b.

Table 5b – Coating Towers – RTAP/HAP Emissions (including potential emissions from EU24 modification)

RTAP/HAP	CAS #	Potential Emission Rate (lbs/yr)	Potential Emission Rate (lb/hr)
Ethylene Glycol	107-21-1	8,774	1.00
Toluene	108-88-3	3124	0.36
Isopropanol	67-63-0	312.4	0.036
Ethanol	64-17-5	8.3	0.00094
1,4-Dioxane	123-91-1	15.7	0.0018
Benzene	71-43-2	0.1	0.000012
Polyethylene Glycol	25322-68-3	1,703	0.19
Tetrafluoroethylene	116-14-3	2,824	0.32
Methanol	67-56-1	350	0.04
Methyl Ethyl Ketone	78-93-3	152	0.017
n-Methyl-2-pyrrolidone	872-50-4	133	0.015
Hexane	110-54-3	8.1	0.00093
Ammonia	7664-41-7	946	0.11

Antenna Cover Fabrication Area (EU17) – VOCs and RTAP/HAP Emission Rates

The antenna cover fabrication area emits VOCs and RTAPs/HAPs but not PFAS.

- Attachment B.2. of Application 22-0092 contains the assumptions used in the calculations and a summary of VOCs and RTAP/HAP emissions from the antenna cover fabrication area. Actual emissions are calculated based on actual raw materials used (2012 – 2021), maximum individual RTAP/HAP concentration listed in the safety data sheets for each raw material, VOC content listed in safety data sheets for each raw material and assumes 100% gets released to the atmosphere[17].
- Table 6 below presents the highest actual annual emission of each VOCs and RTAP/HAP during that ten-year period. Four RTAPs/HAPs have increased since Application #18-0227: ethyl acetate, xylene, ethyl benzene, and benzene. The increase in emissions is attributable to an increase in utilization of raw materials that contain these RTAPs/HAPs.
- Potential VOC and RTAP/HAP annual emissions (lbs/yr) were calculated by scaling up the highest actual annual emissions (lbs/yr) from typical operations of one 8-hr shift/day, 5 days/week and 52 weeks/yr (2,080 hrs/yr) to

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16 The production capacity values exclude the capacity of the facility's production equipment routed to the RTO which do no process VOC/HA/RTAP (i.e., EU23, EU25 and EU26).

17 As part of Application #18-0227, C. T. Male submitted a revised Attachment B.2. regarding the conditions under which methylene diphenyl isocyanate (MDI, CAS #101-68-8) would be emitted. Previously, SGPP had assumed that 100% of the MDI contained within the product was emitted in the antenna cover fabrication area. However, given that this compound is applied at room temperature and not at temperatures greater than 100°F per the literature and manufacturer, NHDES has determined that MDI is not liberated from the material in use at SGPP.

24 hr/day and 7 days/week (8,760 hrs/yr).

- NHDES concurs with this methodology for calculating the actual annual VOC and RTAP/HAP emissions as well as with the scaling methodology for determining potential VOC and RTAP/HAP emissions for compliance demonstration and permit application purposes.

Table 6 – Antenna Cover Fabrication Area – VOC and RTAP/HAP Emissions				
RTAP/HAP	CAS #	Highest Actual Emission Rate (2012 – 2021)	Potential Emission Rate	
		(lbs/yr)	(lbs/yr)	(lb/hr) [18]
Ethyl Acetate	141-78-6	15.60	65.7	0.0075
Toluene	108-88-3	1,021.68	4,293	0.49
Xylene	1330-20-7	1.95	8.2	0.00094
Methyl Ethyl Ketone	78-93-3	247.20	1,038.7	0.12
Hexane	110-54-3	31.54	132.5	0.015
Ethyl Benzene	100-41-4	0.39	1.6	0.00019
Benzene	71-43-2	0.04	0.17	0.000019
Volatile Organic Compounds (VOCs)	N/A	1253	5,263	0.60

Facility-wide Hazardous Air Pollutants (HAPs)

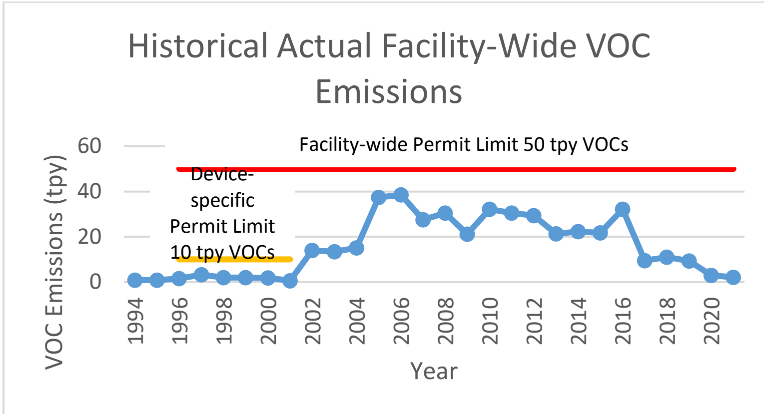
The facility has been limited by permit conditions since the issuance of PO-BP-2607 and PO-BP-2697 on February 6, 1996, to synthetic minor status for hazardous air pollutants (< 10 tons of any one HAP and <25 tons of any combination of HAPs during any consecutive 12-month period). Based on current products used and the 2021 stack test result for HF, the potential facility-wide total HAP emissions are 8 tpy with the highest contribution coming from toluene (3.7 tpy potential; 1.2 tpy actual) and ethylene glycol (4.4 tpy potential; 1.9 tpy actual).

Facility-wide Volatile Organic Compounds (VOCs)

Table 7 – Historical Actual VOC Emissions	
Year	VOC Emissions (tpy)
1994	0.8
1995	0.8
1996	1.5
1997	3.2
1998	2.0
1999	2.0
2000	1.8
2001	0.6
2002	14.0
2003	13.4
2004	15.0
2005	37.3
2006	38.5
2007	27.5

Table 7 – Historical Actual VOC Emissions	
Year	VOC Emissions (tpy)
2008	30.5
2009	21.1
2010	32.1
2011	30.5
2012	29.4
2013	21.3
2014	22.3
2015	21.7
2016	32.2
2017	9.4
2018	11.0
2019	9.3
2020	2.9
2021	2.1

18 Hourly RTAP/HAP and VOC emissions (lb/hr) were calculated from actual annual RTAP/HAP and VOC emissions (lb/yr) using antenna cover fabrication area operating 8 hrs/shift; 1 shift/day; 5 days/week; 52 weeks/yr (2,080 hr/yr) conversion.



Actual facility-wide VOC emissions shown in Table 7 and the graph above are calculated based on a combination of actual formulation usage and average VOC content listed in material safety data sheets. Prior to issuance of PO-BP-2607 and PO-BP-2697 in 1996, the permitted devices had device-specific annual VOC emission limits. Beginning in 1996, the facility was limited by permit conditions to synthetic minor status for VOCs (< 50 tons during any consecutive 12-month period) and has been limited by process to 10 tpy of VOCs for each individual device. The permit limit of 10 tpy of VOCs for each individual device was removed when permit FP-T-0075 was issued in 2001 for installation of 9 additional coating towers, thus subjecting the coatings to VOC RACT limitations. However, the facility-wide VOC emission limit of 50 tpy remained.

Criteria Pollutants (incl. VOCs) from Emergency Generator, Fire Pump Engine, Boiler, RTO and Process Equipment Burners

Attachment B.3. of the applications contain the summary of criteria pollutant emissions, emission factors and calculations for the fire pump and emergency generator. NHDES also included the process burners, RTO burners and boiler in the facility-wide criteria pollutant emission calculations attached and summarized in Table 8 below.

Table 8 – Facility Emission Summary (Potential to Emit)										
Combustion Sources	**NOx**		**SO_2**		**CO**		**PM**		**VOC**	
	(lb/hr)	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**
Process Equipment Burners[19]	6.46	28.3	0.04	0.2	5.43	23.8	0.49	2.2	0.36	1.6
RTO Burners	1.73	7.6	0.01	0.05	1.45	6.3	0.13	0.6	0.09	0.4
Clarke Fire Pump (EU20)	1.13	0.3	1.8E-03	4.5E-04	1.41	0.4	0.08	0.02	1.13	0.3
Kohler Emergency Generator (EU21)	0.51	0.1	0.0007	1.7E-04	0.55	0.1	0.04	0.01	0.51	0.1
#2 Fuel Oil-fired Boiler	0.22	1.0	0.0024	0.01	0.056	0.2	0.022	0.10	0.0048	0.02
TOTAL		37.3		0.26		30.8		2.9		2.4
Process Sources	**NOx**		**SO_2**		**CO**		**PM**		**VOC[20]**	
	(lb/hr)	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**
Process Equipment[21]										20.4
Antenna Cover Fabrication Area (EU17)										2.6
Facility Annual PTE		37.3		0.26		30.8		2.9		25.4
Title V Threshold		50		100		100		100		50

19 EU01-EU06, EU12, EU13, EU15, EU16, EU22, EU24 & EU26

20 Considering the assumptions and use of scaling factors, VOC emission calculations are close enough to 50 tpy that NHDES considers VOC PTE to be greater than 50 tpy for purposes of comparing to air regulation thresholds.

21 EU01-EU08, EU12, EU13, EU15-EU16, EU22-EU26. VOC emissions for process equipment listed in Table 8 is potential to emit at inlet to RTO.

MODELING

Air deposition and dispersion modeling was conducted by Barr and submitted as part of these applications.[22] The purpose of the air deposition modeling was to address the requirements of NH Statute RSA 125-C:10-e, *Requirements for Air Emissions of Per and Polyfluoroalkyl Substances Impacting Soil and Water*. The purpose of the air dispersion model was to address the requirements of NH Statute RSA 125-I, *Air Toxics Control Act* and the corresponding Administrative Rule Env-A 1400, *Regulated Toxic Air Pollutants* which was adopted pursuant to the statute and sets ambient air limits for inhalation exposure for specific RTAPs.

The air deposition and dispersion modeling of the as-built RTO stack and the emergency bypass stack conducted by Barr was reviewed by NHDES and summarized in a NHDES modeling memo dated February 2, 2023. As a result of the request for modification of EU24, these results were scaled up by a factor of 6.9% as noted in the Emission Calculation section above. The following summarizes the regulatory requirements associated with the RTO and the bypass stack utilizing the modeling results.

RSA 125-C:10-e *Requirements for Air Emissions of Per and Polyfluoroalkyl Substances Impacting Soil and Water*

RSA 125-C:10-e has a two-part requirement related to PFAS emissions for sources that are subject to the statute. First, the facility must install the best available control technology (BACT). Second, the application of BACT cannot do three things:

- Result in emission of any air contaminant that would exceed the emissions allowed by any applicable standard under RSA 125-C or RSA 125-I or rules adopted pursuant to either chapter.
- Result in emissions of any air contaminant in an amount disproportionate to the emissions of such air contaminant from other similar air pollution control devices for that air contaminant at facilities using similar technology.
- 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) as a result of the deposition of the contaminant from the air.

The following outlines SGPP's requirements associated with this statute:

1. Upon issuance of TP-0256 in 2020, NHDES established that a three-chamber RTO is BACT for the control of PFAS from the facility. Condition V. Table 5 Item 5 outlines the required RTO parameters: minimum temperature of 1832°F (1000°C), minimum gas residence time of 1 second and maximum inlet flow rate of 70,000 scfm. Since safe operation of the RTO requires the use of an emergency bypass, NHDES is proposing to authorize as BACT the use of the emergency bypass for a limited amount of time per calendar year and only for the operational modes identified in the *Saint-Gobain Air Pollution Control Equipment Monitoring Plan* (PL-EHS-003 Rev. 00 dated 2/28/2022). The draft permit contains a limit of 175 hours per year to restrict operation of the emergency bypass.

2. To address Bullet 1 above, a compliance demonstration for RTAP emissions and Env-A 1400 ambient air limits was conducted as outlined in the *RSA 125-I, Air Toxics Control Act and Env-A 1400, Regulated Toxic Air Pollutants Compliance Demonstration* section below. In addition, emissions of non-PFAS compounds (criteria pollutants including VOCs) were evaluated for compliance with applicable requirements as outlined in the *Review of Regulations and Statutes* section.

3. With regard to Bullet 2 above, at this time, there are no other similar air pollution control devices for PFAS at facilities using similar technology.

[22] On November 22, 2022, SGPP through its consultant Barr submitted an updated air deposition modeling analysis associated with the results of the 2022 stack test for the RTO (Stack #3) only.

4. To address Bullet 3 above, TP-0256 contained limits on maximum annual emissions of PFOA and PFOS as measured at the outlet of the RTO to prevent emissions from the application of BACT from contributing to an existing AGQS exceedance. PFOA and PFOS were the only two PFAS for which an AGQS existed at the time of initial permit issuance in February 2020. Since issuance of TP-0256, HB 1264 was signed into law establishing PFAS maximum contaminant levels (MCLs) for PFOA, PFOS, PFNA, and PFHxS. Under NH law, AGQSs are required to be the same value as any MCL established. NHDES is proposing new annual emission limitations for all four PFAS analytes.

   In addition, the utilization of the emergency bypass stack was not part of the evaluation of annual emission limitations during the issuance of TP-0256. Because BACT is the combined use of the RTO and the emergency bypass stack for limited purposes and time, the annual emission limitations in the draft permit represent a combined emission limitation from both the main stack for the RTO (Stack #3) and the emergency bypass stack (Stack #6) for each PFAS analyte for which an AGQS has been established in NH. The following outlines the methodology for establishing the new emission limitations:

   - The current permitted annual emission limits for PFOA and PFOS were established to ensure that the maximum concentration of each PFAS analyte (MC_{PFAS}) that would result from emissions from the RTO, deposited on the soil and infiltrate into the groundwater would be less than the lowest concentration minimum reporting limits (LCMRL) for lab analysis based on EPA Method 533 for PFAS in drinking water published in 2019[23]. This will remain the case for the new emission limitations.
   - Applying analysis from previous modeling studies, NHDES estimated that 21 inches/year (0.53 m/yr)[24] infiltrates the ground in each m^2 area.
   - The maximum deposition rate (MDR_{PFAS}) allowed per year can be calculated from the precipitation infiltration rate (IR) per year and the MC_{PFAS} using the following formula:

$$MDR_{PFAS}\ ((\mu g/m^2\ )/yr) < \ MC_{PFAS}(\mu g/m^3\ or\ ppt) * IR\ (m/yr)$$

   - The 2021 Barr modeling submittal evaluated two deposition modeling methods: Method 1 and Method 2. However, beginning with version 19191 of AERMOD[25], Method 2 particle deposition and gas deposition were rated as ALPHA[26] options which means these options have not been rigorously tested and evaluated since their inclusion in AERMOD's initial promulgation. EPA made Method 2 an ALPHA option while these particle deposition and gas deposition methods are further evaluated while Method 1 deposition option remained unaffected. While Method 2 was used to set emission limitations in TP-0256, NHDES is using the deposition model results from the Method 1 analysis for the establishment of emission limitations in the draft State Permit to Operate.
   - Since the main stack for the RTO (Stack #3) and the emergency bypass stack (Stack #6) are not utilized at the same time, the deposition model of emissions from each individual stack can be used to determine the unit impact rate (UIR) from each stack[27]. A UIR is the amount of a given material expected to deposit

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23 Calculation of emission limitations for both TP-0256 and the draft State Permit to Operate assumed all the modeled deposition of each PFAS analyte contributed to the PFAS concentration of infiltrated groundwater without any consideration of PFAS being retained in the soil, leaching rates or subsurface modeling, nor did it include contributions from PFAS in rainwater or multiple year deposition rates.

24 Infiltration rate is based on USGS Soil Water Balance model discussed in *Preliminary Air Soil and Water Modeling Technical Memorandum June 2017 – Revised September 2018* Prepared by Barr Engineering Company available: S:\ARD-Stationary Source\3301100165\III Permit Information\18-0227\Modeling

25 EPA-454/B-22-007, User's Guide for the AMS/EPA Regulatory Model (AERMOD) dated June 2022.

26 ALPHA is defined as non-regulatory option flag that allows the input control file to include research/experimental options for review and evaluation by the user community. ALPHA options are considered experimental and not available for regulatory use. BETA is defined as non-regulatory option flag that allows the input control file to include options that have been vetted through the scientific community and are waiting to be promulgated as regulatory options.

27 While the receptor for the highest deposition rate from the RTO stack (Stack #3) and the emergency bypass stack (Stack #6) are not the same, NHDES is assuming the combined impact from both stacks will infiltrate into the same aquafer and therefore evaluated a combined impact

in a given area over the course of a year per single unit emission rate emitted from the device. The UIR for the RTO (Stack #3) is 178,000 µg/m²/yr per g/s.[28]

- The maximum allowable emission rate is calculated from the UIR to ensure that the concentration of water infiltrating the ground is less than the MDR_{PFAS} using the following formula:

$$Maximum\ Allowable\ Emission\ Rate_{PFAS}\ \left(\frac{g}{s}\right) < \frac{MDR_{PFAS}\ ((\mu g/m^2)/yr)}{UIR\ ((\mu g/m^2)/yr\ per\ g/s)}$$

- NHDES calculated the maximum allowable emission rates of the four PFAS analytes from the RTO under two scenarios:
  A. The RTO operating 100% of the time (8,760 hours per year); and
  B. The RTO operating 8,585 hours per year assuming the emergency bypass stack operated at the maximum allowable hours per year (175 hours per year).
- NHDES used the same methodology to calculate the maximum allowable emission rates of the four PFAS analytes predicted to result from operation of the emergency bypass at 175 hours per year using the UIR for the emergency bypass (Stack #6) of 906,000 µg/m²/yr per g/s.[29]
- The draft permit contains the following annual emission limits: 0.69 lbs per calendar year for PFOA, 0.90 lbs per calendar year for PFOS, 0.98 lbs per calendar year for PFNA and 0.75 lbs per calendar year for PFHxS. These emission limitations were based on operating Scenario B in which the RTO (Stack #3) operates at 8,585 hours per year and the emergency bypass stack (Stack #6) operates at 175 hours per year because operation of the bypass stack has a slight impact on the allowable emissions due to the higher UIR from the bypass stack.
- SGPP shall use the stack test results and the following formula to calculate actual emissions of each regulated PFAS analyte to demonstrate compliance with the annual emission limits in the draft permit:

$$Outlet\ Emissions_{PFAS}\ (lb/hr) * 8{,}585\ (hr/yr) + Inlet\ Emissions_{PFAS}\ (lb/hr) * 175\ (hr/yr) < Emission\ Limit_{PFAS}\ (lbs/calendar\ year)$$

- The following table compares 2021 and 2022 stack test results to these permit limitations:

Table 9 – Stack Test Results for PFAS Compared to Draft State Permit to Operate Emission Limitations

Compound	CAS #	2021 Stack Test			Draft SPO Emission Limitations	2022 Stack Test			Draft SPO Emission Limitations
		RTO Inlet	RTO Outlet	Calculated Emissions		RTO Inlet	RTO Outlet	Calculated Emissions	
		lb/hr	lb/hr	lb/yr	lb/yr	lb/hr	lb/hr	lb/yr	lb/yr
PFOA	335-67-1	2.06E-05	1.64E-06	0.017	0.69	1.1E-05	2.54E-06	0.023	0.69
PFOS	1763-23-1	2.77E-07	6.80E-08	0.0006	0.90	1.29E-07	5.88E-08	0.0005	0.90
PFNA	375-95-1	7.26E-06	6.55E-08	0.0018	0.98	6.55E-06	6.66E-07	0.0069	0.98
PFHxS	355-46-4	2.23E-08	ND	3.90E-06	0.75	3.10E-09	ND	5.42E-07	0.75

from both stacks for this analysis.

28 The UIR used in this permit application review summary is the result of NHDES modeling (see modeling memo). The 2021 Barr modeling listed the UIR for the RTO (Stack #3) as 121,000 µg/m²/yr per g/s and the 2022 Barr modeling listed the UIR as 100,000 µg/m²/yr per g/s. These results were based on more accurate particle size distribution and different years of meteorology.

29 The 2021 Barr modeling listed the UIR for the emergency bypass (Stack #6) as 423,000 µg/m²/yr per g/s.

RSA 125-I, *Air Toxics Control Act* and Env-A 1400, *Regulated Toxic Air Pollutants* Compliance Demonstration

- TP-0256, Condition VIII. Table 8, Item 5 required an Env-A 1400 compliance demonstration and an updated air dispersion model based on final as-built RTO stack parameters.
- RTAP emissions that are common between the RTO stack and the bypass stack and any other devices at the facility (antenna cover fabrication area EU17) were evaluated.
- NHDES determined that SGPP has demonstrated compliance with Env-A 1400. In addition, NHDES has confirmed that SGPP will continue to be in compliance with Env-A 1400 ambient air limits even after adding additional coating capabilities to EU24. (See last tab of Emission Calculations spreadsheet.)
- The draft permit language has been updated in the permit in Table 7, Item 10.

Hydrogen Fluoride (as F) Emitted from RTO

- An Env-A 1400 compliance demonstration for hydrogen fluoride (HF) was conducted in 2020 for application #18-0227. An Env-A 1400 compliance demonstration for HF was conducted as part of the material balance required by the March 2021 Consent Decree.
- During the September 2021 stack test, SGPP measured HF emissions at the outlet of the RTO using Method 26A and an Env-A 1400 compliance demonstration included modeling of final as-built RTO emission parameters and the results of the 2021 stack test was submitted as part of these applications.
- The following table outlines the three Env-A 1400 compliance demonstrations. Based on these analyses, SGPP is not required to install or operate a HF scrubber after the RTO pursuant to Env-A 1400. Also, because HF emissions derived from the 2021 stack test result in maximum predicted impacts of less than 25% of the AAL, stack test requirements for HF have been removed from the draft permit.

Table 10 – Env-A 1400 Compliance Demonstration for Hydrogen Fluoride (as F)

Analysis	Compliance Method	Estimated or Measured HF Emission Rate (lb/hr)	Maximum Predicted Impact (µg/m^3)		Ambient Air Limits (µg/m^3)		Complies with AAL?	
			Annual	24-hr	Annual	24-hr	Annual	24-hr
2020 Evaluation[30]	Modeling	0.24	0.16	1.24	0.98	1.5	Yes	Yes
2021 Material Balance[31]	Adjusted In-Stack	0.0023	0.013	0.013	0.98	1.5	Yes	Yes
2021 Stack Test	Adjusted In-Stack	0.012	0.13	0.13	0.98	1.5	Yes	Yes
	Modeling	0.012	0.003	0.03	0.98	1.5	Yes	Yes

Perfluoroisobutene, Tetrafluoroethylene, Hexafluoropropylene and Carbonyl Fluoride

- During the public comment period for application #18-0227 a commenter submitted a paper summarizing a scientific literature search regarding thermal stability and decomposition products of PTFE for temperatures between 400°C and 600°C (752°F to 1112°F), the temperature range where PTFE and most other fluoro-polymers start to degrade. Based on this paper, the commenter requested NHDES require stack testing of perfluoroisobutene (PFIB). Upon review of the literature, NHDES added a requirement to TP-0256 requiring

30 In the March 26, 2019, Application #18-0227, SGPP through its consultant C. T. Male predicted the HF emission rate to be 0.0635 lb/hr. See Permit Application Review Summary for Application #18-0227 for NHDES' calculations which predicted a potential HF emission rate of 0.24 lb/hr listed in Table 10 above.

31 In SGPP's letter submitted June 1, 2021, SGPP demonstrated compliance with the HF AALs under three operating scenarios. The information in Table 10 reflects the highest emission rate of the three scenarios.

SGPP to test for tetrafluoroethylene (CAS #116-14-3), hexafluoropropylene (CAS #116-15-4), and carbonyl fluoride (CAS #353-50-4) in addition to perfluoroisobutene (CAS #382-21-8) as requested in the comment as all were listed regulated toxic air pollutants in Env-A 1400.

- During planning for the 2021 stack test, SGPP submitted a confidential document which included a report from Eurofins Test America concluding that there are no validated or promulgated EPA or State sampling and analysis methods for sampling the 4 RTAPs listed above. In addition, SGPP submitted a report from their Research and Development Director concluding that PTFE does not degrade at the Merrimack facility's standard operating temperatures and residence time in the towers. To verify this conclusion, a separate report from Jordi Labs, an independent third-party laboratory conducted tests and concluded that the 4 RTAPs listed above were not released while PTFE is heated to 800°F for ten minutes (800°F is greater than the maximum tower temperature seen during the 2021 stack test). Both scientific analyses used a thermogravimetric analysis technique and gradually increased temperature on the PTFE over an extended period.
- NHDES reviewed the technical information submitted and concurred with SGPP's and Jordi Labs' analysis that these compounds are not emitted from the facility. As a result, NHDES approved SGPP's request to not conduct the stack testing as required in TP-0256, Condition VI. Table 6, Item 14(b) during the 2021 and 2022 stack tests and this requirement has not been included in the draft permit.

EMISSION TESTING

The March 2021 Consent Decree required SGPP to conduct additional stack testing of the RTO beyond what was required in TP-0256. Specifically, it stated that SGPP conduct inlet and outlet measurements for the targeted PFAS analytes to determine destruction efficiency. Information on inlet RTO emissions provides information on PFAS emissions that could be released from the emergency bypass stack. Therefore, inlet RTO emission testing has been added to the draft permit.

At the time of the initial issuance of TP-0256, OTM-45 had not been published. The draft permit specifically identifies OTM-45 stack testing methodologies as appropriate in the permit while retaining the language regarding future stack test methods development given that the stack testing methodologies are ever evolving.[32] The draft permit requires SGPP to analyze the stack test samples for all PFAS analytes identified in the stack test method(s). This ensures in part that should additional PFAS AGQS be developed, and new emission limits added to the permit, the information is available to determine compliance with the new emission limits.

To ensure that the coating/casting lines are properly designed and operated to capture fugitive emissions, SGPP was required by TP-0256 to conduct capture efficiency testing during annual stack tests. During the 2021 stack test, SGPP conducted Method 204 for permanent total enclosure for EU01 – EU06, EU08, EU12, EU13, EU15, EU16, and EU22 to demonstrate that the devices were capturing fugitive emissions. The Chemsil process (EU23), MTM (EU24), Laminator (EU25) and Heat Clean source (EU26) are pieces of equipment that are used less than 2% of the overall annual hours of operation of all emission units at the facility. Therefore, during planning for the 2021 and 2022 stack tests, NHDES allowed SGPP to not conduct Method 204 for these devices and in the draft permit this requirement has not been included for EU23, EU25 and EU26. Since SGPP is requesting the modification of EU24 to accommodate utilization of coating formulations, and since this unit was not previously tested via Method 204 for permanent total enclosure, a requirement to include this device in the next Method 204 test and the submittal of a *Capture Efficiency Verification Plan* for this emission unit by SGPP has been added to the draft permit.

The draft permit contains a requirement to conduct Method 204 annually but no more than 13 months after previous test. In lieu of conducting annual capture efficiency testing, a condition has been added to the draft permit that allows SGPP to choose to install, operate, and maintain gauges to monitor the static pressure of each opening on each emission unit (EU01 – EU06, EU12, EU13, EU15, EU16 and EU24) to assure that each emission unit is operated under negative

[32] EPA is currently developing other air testing methods including OTM-50 for non-polar, volatile PFAS with guidance on tentatively identified compounds (TIC) and OTM-55 for non-polar, semi-volatile PFAS.

pressure and on the 20" coater and 20" caster room (EU07 and EU08) and the R&D room (EU22) to assure that the rooms are maintained as a permanent total enclosure for the capture of PFAS emissions. The static pressure of each emission unit or room shall be less than or equal to negative 0.007 inches of water.

If SGPP installs gauges, the permit contains conditions for monitoring and recordkeeping of static pressure readings, maintenance of the gauges, corrective actions, and a requirement to update the *Capture Efficiency Verification Plans* accordingly. Method 204 capture efficiency testing is still required to be conducted. However, the frequency of conducting Method 204 testing will be dependent upon which option SGPP chooses for monitoring capture efficiency.

The draft permit contains requirements for performance testing of the RTO for a minimum of 2 consecutive performance tests conducted during the permit term of the state permit to operate. If emissions for all PFAS analytes are at or below 75% of the emission limits specified in the draft permit for at least 2 consecutive performance tests conducted during this permit term and there are no process changes that may increase emissions, the performance test frequency requirement may be reduced to no more than 37 months after the previous test. However, the performance test frequency shall return to annual testing if subsequent performance test results show emissions of any PFAS analyte exceeds 75% of the emission limits specified in the state permit to operate. SGPP will be required under the draft permit to conduct subsequent performance testing annually until at least 2 consecutive performance tests show emissions for all PFAS analytes are at or below 75% of the emission limits specified in the state permit to operate before returning to the less frequent testing schedule.

COMPLIANCE STATUS

Emission Testing

Past stack tests have been conducted at the facility on the following dates for the following towers:

Table 11 – Stack Testing Events

Stack Test #	Test Date(s)	Device(s)	Test Description	Documents
07-21	April 26, 2007	MA Tower	PFOA Testing	Report dated July 2007
16-0038	May 4, 2016	MA Tower	PFOA Testing	Report dated July 2016
16-0075	August 10-11 & October 5, 2016	MA Tower	PFOA Method MM5	Report dated December 2016
18-0040 18-0041 18-0042	April 26 – May 2, 2018	MA, MS & QX Towers	PFOA Method MM5	Report dated September 2018 Revised May 2019
21-0047	September 7-10, 2021	Inlet & Outlet of RTO	PFAS OTM-45 HF Method 26A NMVOC Method 18 & Method 25A Permanent Total Enclosure Method 204 Dip Pan Samples for PFAS Method 537.1	Report dated November 2021 Revision 1 January 2022 Revision 2 March 2022[33]
22-0048	August 24-25, 2021	Inlet & Outlet of RTO	PFAS OTM-45 Permanent Total Enclosure Method 204 Dip Pan Samples PFAS Method 537.1	Report dated October 2022[34]

33 On May 6, 2022, NHDES sent a letter to SGPP accepting the results of the September 7-10, 2021 stack test.

34 On February 10, 2023, NHDES sent a letter to SGPP accepting the results of the August 23 – 25, 2022 stack test.

Inspections

A Partial Compliance Evaluation was conducted on January 6, 2022. The PCE report was issued June 20, 2022. The deficiencies noted included SGPP failure to submit timely notification to NHDES of permit deviations associated with bypass operation and operating of the RTO below the minimum temperature of 1832°F (1000°C). NHDES issued a letter clarifying permit deviation requirements on October 31, 2022. As a result, SGPP has revised their process of submitting permit deviations to comply with permit and rule requirements.

Reports

In the past 5 years, SGPP as submitted NOx and VOC Emission Statements Reports and Annual Emission Reports on time for all years but 2017 (2 days late). The NSPS reporting requirements have not been triggered to date. SGPP notified NHDES of the startup of PCE01 in accordance with Table 8, Item 9 of TP-0256 and therefore, that requirement is being removed from the draft permit.

Fees

The facility is up to date with emission-based fees.

REVIEW OF REGULATIONS & STATUTES

NH Statute

RSA 125-C:10-e Requirements for Air Emissions of Per and Polyfluoroalkyl Substances Impacting Soil and Water – Applicable (EU01-EU08, EU12, EU13, EU15, EU16 and EU22-EU26) – A device that emits to the air any PFAS or precursors that have caused or contributed to an exceedance of an ambient groundwater quality standard or surface water quality standard as a result of the deposition of any such PFAS or precursors from the air, shall be subject to the determination and application of best available control technology.

State Regulations

Env-A 100 – Organizational Rules

103.11 – Applicable (EU20 & EU21) – Definition of emergency generator.
1302.17 – Applicable (EU20 & EU21) – Definition of emergency as it relates to emergency generator definition.

Env-A 600 – Statewide Permit System

604.02 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU20-EU22 and EU24) – The facility is synthetic minor for VOCs and HAPs.
606.02(a)(4) – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU22 and EU24) – The facility is using air dispersion modeling as the compliance demonstration method specified in Env-A 1405.02.
606.02(b) – Applicable (EU01-EU08, EU12, EU13, EU15-EU16 and EU22-EU26) – The facility is updating the modeling due to as-built stack parameters and for inclusion of a bypass stack.
607.01(a) – NOT Applicable – Boiler is < 10 MMBtu/hr combusting #2 fuel oil; burners on towers and other process equipment are each < 10 MMBtu/hr combusting natural gas.
607.01(d)(1) – Applicable (EU20 & EU21) – Fire pump (EU20) and emergency generator engine (EU21) combust liquid fuel (ULSD) and are each > 0.15 MMBtu/hr and total >1.5 MMBtu/hr.
607.01(g) – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU20-EU22 and EU24) – Total actual VOCs > 10 tpy.
607.01(n) – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU20-EU22 and EU24) – The facility has taken a 50 tpy VOC limit and a 10/25 tpy HAP limit for synthetic minor status.
607.01(t) – NOT Applicable – Compliance with Env-A 1400 was demonstrated without restrictions.
607.01(u) – NOT Applicable – The facility is subject to 40 CFR Part 63 subparts. However, these rules do not require a title V permit.
607.01(v) – NOT Applicable – The facility's theoretical potential to emit for NOx is < 50 tpy.

607.01(y) – NOT Applicable – The facility is a synthetic minor HAP source.
609.01 – NOT Applicable – The facility is not any of the source types in Env-A 609.01(a).

Env-A 700 – Permit Fee System – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU20-EU26)

705.02 – Applicable – The annual emission fee is comprised of an emission-based fee and a baseline emission fee.
705.05 – Applicable – Payment of the emission fee is due by May 15 of each year.
705.07(a) – Applicable – Each source that emits VOCs or RTAPs that are subject to Env-A 1400 from non-combustion processes shall pay a $750 annual baseline fee for the first VOC or RTAP emission unit, and a $500 annual fee for each additional non-combustion VOC or RTAP emission unit, up to a maximum of 10 non-combustion VOC or RTAP emission units. The facility has 15 VOC emissions units (EU01-EU08, EU12, EU13, EU15, EU16, EU17, EU22 and EU24) so the annual baseline emission fee is $5,250.

Env-A 800 – Testing and Monitoring Procedures[35]

802 – Applicable – Compliance stack testing procedures for stationary sources.
804.03 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24) – SDS information for VOC content of coatings.
804.04 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24) – Use of Method 24 to determine VOC content of coatings.

EPA Method 24 gives the following:

Volatile matter content, W_s = lbs volatiles/lb coating
Water content, W_w = lbs water/lb coating
Exempt solvents, W_e = lbs exempt solvents/lb coating
Coating density, d = lbs coating/gal coating
Volume of solids, V_s = gal solids/gal coating

From this information, one can calculate weight of VOCs:

$W_{VOC} = W_s - W_w - W_e$ = lbs VOC/lb coating

or wt of solids:

$W_p = 100 - Ws$ = lbs solids/lb coating

and

W_{VOC}/W_P= lb VOC/lb solids

804.05 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24)– Calculation of VOC Content of a Coating Formulation
804.06 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24)– Calculation of Daily Weighted Average for a Coating Line Using Multiple Coatings
804.07 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24)– Calculation of Emission Standard for Sources Complying with VOC RACT Using Either a Bubble or Add-On Controls (same as Env-A 1205.01)
804.08 – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24)– Calculation of Daily-Weighted Average for Coating Lines with Bubble or Control Device[36]
810 – Applicable – Monitoring Plans for Air Pollution Control Equipment

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35 In Application #18-0227, SGPP requested that the facility have the flexibility to use the control device for compliance with Env-A 1200, Volatile Organic Compounds (VOCs) Reasonably Available Control Technology (RACT). Env-A 1207.03(c) requires a minimum VOC control efficiency of 90%. SGPP conducted VOC testing during the 2021 stack test. The control efficiency of the RTO for VOC emissions was determined to be 77%. Since the raw materials SGPP currently uses meet the VOC content limits of Env-A 1207, SGPP is not required at this time to meet the requirements of Env-A 1207.03(c) and corresponding Env-A 800 requirements for purposed of compliance with VOC RACT.

36 Current version of Env-A 804.07 and Env-A 804.08 contains calculations for sources subject to the Env-A 1207.03 (b) VOC limitations in units of lb VOC/gal of coating as applied. However, after January 1, 2016, the facility became subject to Env-A 1207.03(c) VOC limitations in units of lb VOC/lb solids or lb VOC/lb coating and the corresponding calculations in Env-A 804 have not been updated to reflect this change. Therefore, the permit contains the correct calculation methodology for daily weighted average coatings. (Table 6, Items 6 and 7).

Env-A 900, Owner or Operator Recordkeeping and Reporting Obligations – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU20-EU26)

902 – Availability of records
903 – General recordkeeping requirements
904 – VOC Emission Statements recordkeeping requirements
905 – NOx Emission Statements recordkeeping requirements
906 – Additional recordkeeping requirements
907 – General reporting requirements
908 – VOC Emission Statements reporting requirements
909 – NOx Emission Statements reporting requirements
910 – Additional reporting requirements
911.02(b) – Additional recordkeeping and reporting specific to non-title V sources

Env- A 1200 – Volatile Organic Compounds (VOCs) Reasonable Available Control Technology (RACT) – Applicable (EU01-EU08, EU12, EU13, EU15-EU17, EU24)[37]

1202.21 – “Bubble” means a technique of aggregating certain emissions so as to impose controls that are more stringent than RACT-level on certain emissions units at a particular source, while simultaneously imposing controls that are less stringent than RACT-level on other emissions units, including the option of no controls on such units.
1205.01 – Applicable – The determination of actual emissions using a bubble to achieve compliance.
1207, *Paper, fabric, film and foil substrates coating* – Applicable – The facility is subject to the requirements of Env-A 1207 because the combined actual VOC emissions are greater than 3 tons per consecutive 12-month period.
1207.02 – Applicable – work practice standards
1207.03(c) – Applicable – TPE >25 tpy; emission limits [0.40 lb VOC/lb solids or 0.08 lb VOC/lb coating]
1220, *Miscellaneous Industrial Adhesives* – NOT Applicable – The facility is not subject to the requirements of Env-A 1220 because sources who use industrial adhesives associated with fabric coating are exempt pursuant to Env-A1220.01(b).
1222, *Miscellaneous and Multicategory Stationary VOC Sources* – NOT Applicable

Env-A 1300 – Nitrogen Oxide (NOx) Reasonable Available Control Technology (RACT) – NOT Applicable

1301.03 – The facility has either had theoretical potential emissions less than 50 tons during any consecutive 12-month period or a permit limit which exempts the source from Env-A 1300.

Env-A 1400 - Regulated Toxic Air Pollutants

The facility has shown compliance using uncontrolled, potential emissions.

Env-A 1600 – Fuel Specifications

1602.01 – Applicable to small boiler that is not above the permitting threshold – #2 fuel oil is a listed fuel
1603.03(a) – Applicable – #2 fuel oil sulfur limit of 0.0015% by weight – Since the small boiler is not rated above the permitting threshold of Env-A 607.01(a) and not included in the permit, the requirements of Env-A 1603.03(a) are also not included in the permit. In addition, this fuel sulfur limit applies to all #2 fuel oil imported and distributed in the state of NH.

[37] EU22 is exempt from VOC RACT pursuant to Env-A 1201.04(d), “Testing and research activities performed at coating, printing, or miscellaneous sources shall be exempt from the provisions of this chapter provided that the combined VOC emissions from such activities do not exceed 5 tons per consecutive 12-month period.”

Env-A 2000 – Fuel Burning Devices

2001.02 – Applicable – any stationary fuel burning device that is a source of particulate matter or visible emissions
2002.02 – Applicable (EU20, EU21 & PCE01 and small boiler) – all fuel burning devices at facility were installed after May 13, 1970; opacity limit (< 20%)
2003.03 – Applicable (EU20, EU21 & PCE01 and small boiler) – particulate matter emission limitation (0.30 lb/MMBtu)

Env-A 2100 – Particulate Matter and Visible Emissions Standards

2101, 2102 and 2103 – Applicable (EU01 – EU08, EU12, EU13, EU15-EU17 and EU22 – EU26) – any stationary device not specifically regulated pursuant to any other chapter, part, or section of the air regulations that operates in NH and is a source of particulate matter discharged to the ambient air through a stack or through an exhaust and ventilation system or any device that is a source of visible emissions
2103.02 – Applicable – opacity limit (<20%)

Federal Regulations

40 CFR Part 60 – New Source Performance Standards

Subpart Dc – Industrial-Commercial-Institutional Steam Generating Units

§60.40c – NOT Applicable – Boiler < 10MMBtu/hr

Subpart VVV – Polymeric Coating of Supporting Substrates

§60.740 – Applicable – (EU01-EU05, EU12, EU13, EU15, EU16 and EU24) – Affected facility is each coating operation and any onsite coating mix preparation equipment used to prepare coatings for the polymeric coating of supporting substrates. Any affected facility for which the amount of VOC used is less than 95 Mg per 12-month period is subject only to the requirements of §§60.744(b), 60.747(b), and 60.747(c). This subpart applies to any affected facility for which construction, modification, or reconstruction begins after April 30, 1987, except for coating mix preparation equipment or coating operations during those times they are used to prepare or apply waterborne coatings so long as the VOC content of the coating does not exceed 9% by wt of the volatile fraction. Since EU07 and EU08 were installed in 1986 and EU06 and EU07 coat plastic film, this regulation does not apply to these devices. The regulation applies to the onsite coating mix preparation equipment, but this equipment does not have an emission unit associated with it.

§60.741 – Polymeric coating of supporting substrates means a web coating process that applies elastomers, polymers, or prepolymers to a supporting web other than paper, plastic film, metallic foil, or metal coil.

§60.744(b) – Each owner or operator of an affected facility that uses less than 95 Mg of VOC per year shall make semiannual estimates of the projected annual amount of VOC to be used for the manufacture of polymeric coated substrate at the affected coating operation in that year and maintain records of actual VOC use.

§60.747(b) – Applies only to the first year of operation.

§60.747(c) – Each owner or operator of an affected facility initially using less than 95 Mg of VOC per year shall:

(1) Record semiannual estimates of projected VOC use and actual 12-month VOC use;
(2) Report the first semiannual estimate in which projected annual VOC use exceeds the applicable cutoff; and
(3) Report the first 12-month period in which the actual VOC use exceeds the applicable cutoff.

Subpart IIII – Stationary Compression Ignition Internal Combustion Engines

§60.4200(a) – Applicable – EU20 Clarke fire pump manufactured after July 1, 2006; EU21 Kohler emergency generator set manufactured after April 1, 2006

§60.4202(a)(2) – Applicable (EU21)

§60.4202(d) – Applicable (EU20)

40 CFR Part 61 – National Emissions Standards for Hazardous Air Pollutants – No applicable subparts

40 CFR Part 63 – National Emissions Standards for Hazardous Air Pollutants at Stationary Sources

Subpart JJJJ – Paper and Other Web Coating

§63.3290 – NOT Applicable – Facility is a synthetic minor HAP source

Subpart OOOO – Printing, Coating and Dyeing of Fabrics and Other Textiles

§63.4281(b) – NOT Applicable – Facility is a synthetic minor HAP source

Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines

§63.6585 – NOT Applicable – EU18 and EU19 were decommissioned in 2015

Subpart DDDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters

§63.7485 – NOT Applicable – Facility is a synthetic minor HAP source

Subpart HHHHHH – Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources

§63.11170 – NOT Applicable – Facility does not spray coat metal or plastic parts

Subpart JJJJJJ – Industrial, Commercial and Institutional Boilers at Area Sources

§63.11193 – Applicable – Boiler is located at an area HAP source – initial notification received 08/29/2011. Since NHDES does not have delegation for this rule for devices below permitting thresholds, the requirements are not included in the permit. Existing boilers (<5 MMBtu/hr) are subject to a tune-up every 5 years.