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June 1, 2021

SANITIZED VERSION

Mr. Gabriel Caridade, Plant Manager
Saint-Gobain Performance Plastics Corporation
701 Daniel Webster Highway
Merrimack, NH 03054

Re: Saint-Gobain Performance Plastics Merrimack, NH
Material Balance
C.T. Male Project No.: 16.6126

Dear Mr. Caridade:

As requested, C.T. Male Associates Engineering, Surveying, Architecture, Landscape Architecture & Geology, D.P.C. (C.T. Male) has worked in conjunction with Saint-Gobain Performance Plastics Corporation (Saint-Gobain) to develop this document to comply with the requirements of Item 29 – Material Balance within section C of the March 19, 2021 Consent Decree.

Saint-Gobain has completed analyzing each fluorinated raw material using current laboratory methods, EPA Method 537.1. The list of Per- and Polyfluoroalkyl substances (PFAS) analytes was consistent with those generally reported by commercial analytical laboratories as required. For those PFAS analytes for which the analysis indicates the concentration is non-detect, the material balance was completed using the laboratory method detection limit from the commercial laboratory. Using those results for the dispersions and surfactants evaluated, a material balance was completed to determine worst case potential Hydrogen Fluoride ("HF") emissions.

This evaluation included a number of conservative assumptions, including using maximum hourly application rates of the highest PFAS content of each type of coating material on each tower, assuming 24-hour/day and 365-day/year operation and 100% conversion of all PFAS by weight to HF in the RTO. The attached summary includes various supporting documentation (including Confidential Business Information), including a list of current raw materials, PFAS content in each raw material, maximum hourly application rates of coatings on each tower, monthly hours of operation of each tower and usage amounts of each raw material and/or coating since February 2020. Monthly tower operating hours information is summarized in Attachment A, and Monthly Usage Amounts of dispersions and surfactants is included in Attachment B.

Raw Materials Evaluated

For the material balance, a total of [redacted] fluoromaterials utilized at the facility were identified. For these [redacted] materials, 24 select PFC's were analyzed/evaluated according to EPA Method 537.1. These fluoromaterials consists of [redacted]. A summary of the test data is presented in the table below. Additional information relative to analytical data is included in Attachment C.

Saint-Gobain Product Item No.	Product Type	PFAS (PPT)	2020 Consumption (lb)
22916M	[redacted] Dispersion	[redacted]	[redacted]
22917M	[redacted] Dispersion	[redacted]	[redacted]
22887M	[redacted] Dispersion	[redacted]	[redacted]
22943M	[redacted] Dispersion	[redacted]	[redacted]
22839M	[redacted] Dispersion	[redacted]	[redacted]
22907M	[redacted] Dispersion	[redacted]	[redacted]
25550	[redacted] Dispersion	[redacted]	[redacted]
22956	Surfactant	[redacted]	[redacted]
25560M*	Surfactant	[redacted]	[redacted]
11657M	[redacted] Dispersion	[redacted]	[redacted]
Total 2020 Dispersion Usage			[redacted]

[redacted]

Worst Case PFAS Formulation Evaluation

[redacted]

[redacted]

With that in mind in evaluating facility-wide operations on a potential basis, this evaluation has considered three (3) operating scenarios for the facility; (1) facility-wide operation using only [redacted] dispersion (which is the highest PFAS concentration dispersion); (2) operation using only [redacted] dispersion; and (3) operation using a weighted concentration of dispersions corresponding to the previous three year operating period based on the approximate breakdown of [redacted] Dispersions ([redacted]%), [redacted] Dispersions ([redacted]%), [redacted] Dispersions ([redacted]%), [redacted] Dispersions ([redacted]%), [redacted] Dispersions ([redacted]%) and Surfactants ([redacted]%) to demonstrate a more likely case for facility operations.

Using the PFAS concentration information described in the previous item, Saint-Gobain personnel reviewed product formulations (i.e., products that are used on the coating towers which may include dispersions and/or surfactants mixed at a specific ratio) to identify the worst-case scenario relative to PFAS concentration according to each type of material. In the case of the surfactants listed, neither could be utilized on its own in the coating towers as a formulation.

Coating Tower Maximum Operations

Information relative to operation of the coating towers included factoring in the maximum speed, maximum width of product, number of dips associated with the tower, and the pickup per yard per dip based on the maximum product width. Utilizing this information, Saint-Gobain process engineers calculated the maximum amount of formulation that could be consumed per tower on an hourly basis as well as the maximum amount that could be consumed if all towers were running simultaneously (a conservative estimate as the facility does not currently run all towers simultaneously). The maximum possible hourly amount of formulation running across all lines is [redacted] pounds per hour as shown in Attachment D.

For the purpose of this evaluation, it was assumed that Saint-Gobain could run any formulation on each of the towers at their maximum operating speed and coating width simultaneously. This assumption provides a conservative evaluation, as the materials are not currently used by Saint-Gobain on all of the coating towers, and certain formulations are specific to a limited number of operations. The calculations are also inherently conservative in that they account for continuous coating for 24 hours per day/365 days per year, which is not possible due to bottlenecking associated with changing out rolls and other production steps necessary to operate the coating operations. An additional conservative assumption is that all of the PFAS in the formulations would be discharged to the RTO during production without any of the fluoromaterials remaining on the film.

Maximum Annual PFAS Usage and Hydrogen Fluoride Generation

Hydrogen Fluoride calculations are based on using the maximum PFAS concentration of the dispersion and the maximum hourly dispersion consumption calculated within each scenario as detailed in Attachment E. The calculations assume that the PFAS consists only of fluorine, and that all fluorine is converted into Hydrogen Fluoride (HF) within the RTO (both being conservative assumptions).

For each scenario, based on the calculated theoretical amount of HF generated on an hourly basis and the design exhaust flow from the RTO of 70,000 CFM, the NHDES Adjusted In-Stack Concentration Method of Env-A 1405.05 was used to evaluate compliance with the 24-Hour and Annual AAL for HF as detailed in Attachment E.

Theoretical Scenario #1 – [redacted] Dispersion Usage

Saint-Gobain identified that the [redacted] dispersion (item #22907M) has the highest PFAS concentration of all dispersions utilized . This dispersion is utilized as one ingredient of a formulation that is used in one step of a multi-step process to create a finished product. There is not a coating formulation that consists of 100% [redacted] dispersion, and there is not a finished product manufactured at the facility that consists of only [redacted] dispersion as the applied coating. Therefore, this scenario is theoretical. However, this scenario provides a theoretical worst-case condition of utilizing nothing but the highest PFAS containing dispersion simultaneously on all towers at maximum operation for 24 hours per day, 365 days per year.

Scenario #2 – [redacted] Dispersion Usage

Saint-Gobain identified that the formulation with the highest concentration of [redacted] material uses [redacted]% within the formulation (item #22839M). For the purpose of this

evaluation, it was assumed that Saint-Gobain could run the formulation which incorporates [redacted]% 22839M as a formulation on each of the towers at their maximum operating speed and coating width simultaneously (this formulation is not currently used by Saint-Gobain on all of the coating towers, and is specific to a limited number of operations).

Scenario #3 – Weighted Summary of Dispersion Types

Saint-Gobain has identified that over the previous three years, the breakdown of dispersions and surfactants was as outlined in Attachment E. Using these percentages within the formulations and surfactants and applying the maximum PFAS concentration in each class of material ([redacted] Dispersion, [redacted] Dispersion, Surfactant, etc.) the sum of these operations was used to generate emissions associated with maximum operations.

For the purpose of this evaluation, the combined [redacted] pounds per hour maximum application rate of formulations across all coating lines was divided among the various classes to assign maximum hourly application rates (i.e., [redacted] dispersions accounted for [redacted]% of consumption over three years and for this evaluation [redacted]% of the total [redacted] pound hourly maximum is represented as [redacted] pounds per hour [redacted] dispersions). The hourly maximum application rate was then used along with the maximum PFAS concentration of that class of material to calculate hourly maximum PFAS emissions assuming that Saint-Gobain could run the materials across all towers at maximum operating speed and coating width simultaneously.

Adjusted In-Stack Concentration Method Results Summary

As shown in Attachment F, the adjusted In-Stack Concentration Method analysis as described in Env-A 1405.05 for each scenario are summarized below and demonstrate compliance with the 24-hour and Annual AALs for HF.

Scenario	HF Adjusted In-Stack Concentration (ug/m³)	HF 24-Hour AAL Comparison		HF Annual AAL Comparison	
1	0.013	1.5 ug/m³	0.85% of AAL	0.98 ug/m³	1.30% of AAL
2	0.0019	1.5 ug/m³	0.13% of AAL	0.98 ug/m³	0.19% of AAL
3	0.0012	1.5 ug/m³	0.08% of AAL	0.98 ug/m³	0.12% of AAL

Conclusion

This assessment demonstrates that operation of the facility including the use of an RTO to control PFAS emissions under each of the three scenarios reviewed will not result in

an exceedance of the NHDES promulgated 24-hour and Annual AAL established for Hydrogen Fluoride. The assessment was conducted utilizing theoretical worst-case operations (i.e., the highest PFAS containing formulation run simultaneously on all coating towers for 24 hours per day 365 days per year with all PFAS being captured and exhausted to the RTO and all PFAS being considered as fluorine with full conversion of all fluorine to HF).

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

Attachments:

A – Summary of Monthly Coating Tower Operations February 2020-April 2021

B – Summary of Monthly Consumption February 2020-April 2021

C – PFAS Analysis by Part Number

D – Summary of Maximum Hourly Application Rate

E – Summary of HF Generation – Scenarios 1 – 3

F – Summary of Adjusted In-Stack Concentration Analysis by Scenario

ec: W.Kempskie, C.Angier, M.Collette, B.Slensky, G.Smith, A.Dumville

Sanitized Version - Confidential Business Information Removed

Attachment A
Summary of Monthly Coating Tower Operations February 2020-April 2021

Sanitized Version - Confidential Business Information Removed

Attachment B
Summary of Monthly Consumption
February 2020-April 2021

Sanitized Version - Confidential Business Information Removed

Attachment C
PFAS Analysis by Part Number

Attachment D
Summary of Maximum Hourly Application Rate

Attachment E
Summary of HF Generation - Scenarios 1 -3

Attachment F
Summary of Adjusted In-Stack Concentration Analysis by Scenario

SCENARIO 1 Mass Balance

Hourly HF 0.002346 lb/hr HF

RTAP Evaluation

X (lb/hr) = 0.002346
Y = X / 7.94 = 0.000295
Z= Y x 10^6 = 295.5 ug/sec
A = Stack Volume - 70,000 CFM
B = A / 2119 = 33.034 m3/sec

In-Stack Concentration = Z/B

8.945 ug/m3

Adj. In-Stack Concentration = In-Stack Conc. / 700

0.013 ug/m3

Estimated AAL (ug/m3)	0.013
HF 24 Hour AAL (ug/m3)	1.5
HF Annual AAL (ug/m3)	0.98

% of 24-Hour AAL	0.85%
% of Annual AAL	1.30%

SCENARIO 2 Mass Balance

Hourly HF 0.000346 lb/hr HF

RTAP Evaluation

X (lb/hr) = 0.000346
Y = X / 7.94 = 4.36E-05
Z= Y x 10^6 = 43.6 ug/sec
A = Stack Volume - 70,000 CFM
B = A / 2119 = 33.034 m3/sec

In-Stack Concentration = Z/B

1.320 ug/m3

Adj. In-Stack Concentration = In-Stack Conc. / 700

0.0019 ug/m3

Estimated AAL (ug/m3)	0.0019
HF 24 Hour AAL (ug/m3)	1.5
HF Annual AAL (ug/m3)	0.98

% of 24-Hour AAL	0.13%
% of Annual AAL	0.19%

SCENARIO 3 Mass Balance

Hourly HF 0.000219 lb/hr HF

RTAP Evaluation

X (lb/hr) = 0.000219
Y = X / 7.94 = 2.75E-05
Z= Y x 10^6 = 27.5 ug/sec
A = Stack Volume - 70,000 CFM
B = A / 2119 = 33.034 m3/sec

In-Stack Concentration = Z/B

0.834 ug/m3

Adj. In-Stack Concentration = In-Stack Conc. / 700

0.0012 ug/m3

Estimated AAL (ug/m3)	0.0012
HF 24 Hour AAL (ug/m3)	1.5
HF Annual AAL (ug/m3)	0.98

% of 24-Hour AAL	0.08%
% of Annual AAL	0.12%