Meeting to Discuss Saint Gobain Temporary Air Permit TP-0256 Issued: February 11, 2020 Hydrogen Fluoride & BACT Concerns

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Agenda

- Brief Review of History.
- Review of Permit
- HF Emissions Calculation
- RTO Optimization Concerns

February 2016

- Saint Gobain discovered PFOA in drinking water in New York and Vermont, Saint Gobain
- Collected several water samples of the municipal water supplied by Merrimack Valley District (MVD) for PFAS analysis.
- Saint Gobain self-reported the findings to the NHDES on February 26, 2016.

Groundwater is the source for drinking water provided by MVD to the Towns of Merrimack, Bedford and Amherst.

2016-2018

- Saint Gobain conducted investigations of the groundwater, surface water, and stack emissions to determine both the extent and the cause of the groundwater/surface water contamination.
- Stack Testing was conducted in April 2018.
- Primary cause of PFAS contamination to the Town's land, water, and air came from Saint Gobain's **emissions via its process stacks.**

Standard vs. Groundwater Contamination Levels

Compound	Groundwater Quality Standard Parts per Trillion	Highest Concentration Detected in Groundwater Monitoring well Parts per trillion	Date Detected
PFHxS	18	195	March 2019
PFNA	11	2,960	July 2019
PFOS	15	3,300	March 2019
PFOA	12	**69,500**	March 2019

NH State Law

Pursuant to RSA 125-C:10-e, NHDES determined that devices operated at Saint-Gobain Performance have emitted and continue to emit to the air PFC and precursors that have caused and continue to contribute to an exceedance of ambient groundwater quality standards (AGQS).

NH State Law

- The devices located at SG are subject to the application of best available control technology (BACT) as defined in RSA 125-C:10-b, I(a).
- NHDES required Saint Gobain to comply with the RSA 125-C:10-e and obtain a permit mandating installation of air emission controls within one year- by February 11, 2021.

Temporary Permit

Temporary Permit was issued on February 11, 2020, **4 years** after Saint Gobain initially notified NHDES of elevated levels of contamination in Town resources.

Temporary Permit

- To comply with BACT - install RTO.
- RTO thermally destructs PFAS – 1832 ^{o}F.
- Products of combustion include – Fluoride.
  - Generation of Hydrogen Fluoride.
  - Public Safety Concern.

Draft Permit vs Final Permit

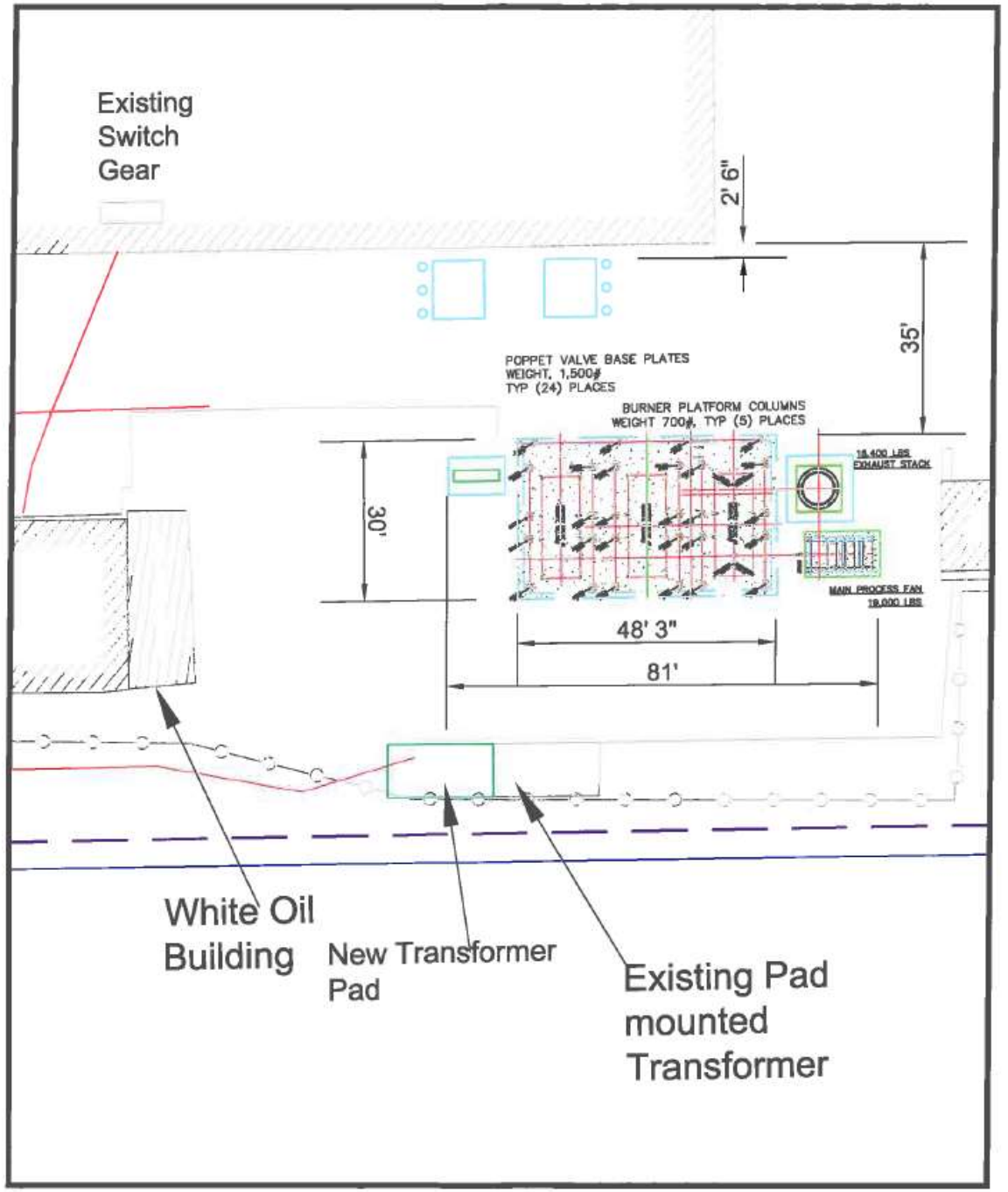
- Draft Permit Language - For the purpose of ensuring that the application of BACT will not cause or contribute to an exceedance of an AGQS or SWQS, the maximum annual controlled PFC emission limits shall be less than or equal to:
  - 0.075 lbs/yr PFOA,
  - 0.048 lbs/yr PFOS,
  - 0.024 lbs/yr PFNA, and
  - 0.015 lbs/yr PFHxS.

Draft Permit vs Final Permit

- For the purpose of ensuring that the application of BACT will not cause or contribute to an exceedance of an AGQS or SWQS, the maximum annual controlled PFC emission limits shall be less than or equal to:
  - 0.45 lbs/yr PFOA and 0.57 lbs/yr PFOS.

Saint Gobain Timeline

- June 4, 2020 – Requests a variance for an extension of the February 11, 2021 deadline.
- October 2020 – NHDES denies the variance request.
- November 2020 – Saint Gobain submitted a 3 page application to install a concrete pad for the RTO.
  - Did not comply with any of International Building Codes or NFPA Codes (i.e. basic building codes applicable across the United States in thousands of municipalities).
  - Not stamped by professional engineer as required.



TOWN OF MERRIMACK

Building Permit Application

BLD - FRM – 001RA (*Revised: (08/08/18)*)

Merrimack Fire Dept.
Building Division
Call (603) 420-1730
For Inspections

Does the proposed construction, renovation or occupancy involve prior approval from the following Departments?

Involve:					
☐ Planning Board/ Site Plan Approval	☒ No	if	☐ YES	Call # 424-3531
☐ Zoning Board Approval	☒ No	if	☐ YES	Call # 424-3531
☐ Community Development Administrative Approval	☒ No	if	☐ YES	Call # 424-3531
☐ NH DES/ Wetlands/ Shoreline Protection Approval	☒ No	if	☐ YES	Call # (603) 271-2147

Prior to submitting this building permit application to the Merrimack Fire Department – Building Division, the proposed work shall comply with all Merrimack zoning and site plan regulations, including all NH State and Federal Regulations, where applicable.

Project Address: 701 Daniel Webster Highway, Merrimack, NH 03054 Map/ Parcel: ____/____

Property Owner: Saint-Gobain Performance Plastics

Applicant: Destefano & Associates Phone: (603) - 721-6188 e-mail: robertf@destefano-associates.com

Applicant Address: 2456 Lafayette Road, Portsmouth, NH 03801 ☐ Same as above

City: Portsmouth *State:* NH *Zip:* 03801

List only the new work associated with the proposed project: ☐ Residential ☒ Commercial

Type of Work: ☐ New ☐ Addition ☒ Renovation ☐ Replacement/ Repair ☐ Tenant Fit-up ☐ Other: _____

General Property Info: Number of Stories: ____ # Bedrooms ____ # Bathrooms ____ ☐ Septic System ☐ Private Well ☐ Town Water

Brief Description of Proposed Work: *(Example: – Construct 24' x 28' - 2 car garage addition with 10' x 10' breezeway and 12' x 12' deck)*

New concrete equipment pad

RECEIVED
NOV 24 2020
MERRIMACK FIRE RESCUE

Total Area (New Only) 30 x 50 Total (1500) SF Total Project Valuation: $ 87,000.00

☒ See Attached Plans and Documents (Required Dollar Value)

Owner:	Address:	Phone:
Contractor: NA	Address:	Phone:
Mechanical: NA	Address:	Phone:
Plumbing: NA	Address:	Phone:
Electrical: By owner	Address:	Phone:
Other:	Address:	Phone:
☐ Separate Electrical, Plumbing & Mechanical Permits Required		

- Certifications-

The undersigned hereby agrees that the proposed work shall be done in accordance with the statements on this permit, and with the plans and specifications submitted, and that the work connected therewith shall conform to the NH State building code, the Town of Merrimack zoning ordinance and regulations. It is the responsibility of the applicant, contractor and or owner to notify the Building Division to schedule inspections of the foundation, frame, gas piping, electrical wiring, plumbing, insulation, etc. and at completion.

I further certify that I am the owner or owners' agent, authorized by the Property Owner to apply for this permit and that there are no deed restrictions that will conflict with the issuance of a building permit on said property.

Applicant's Name Robert Fawcett (Print Name) **Applicant's Signature** _____

☐ OWNER ☒ AGENT **Date** 11/24/20

REQUIREMENTS FOR SUBMITTAL OF APPLICATION ARE AS FOLLOWS:

PLANS: (1) scaled plot plan showing all structures on site, distance to property lines, well, septic, wetland locations, etc.
(1) Full size set *and* (1) 11" x 17" sets of construction plans "to scale" showing floor plan, cross sections and elevations.

RTU Pad Inset

LOCUS MAP
(N.T.S.)

NOTES

PLAN REFERENCES

UTILITY STATEMENTS

LEGEND

FOR DISCUSSION PURPOSES ONLY
NOT FOR CONSTRUCTION

THIS FIGURE IS FOR INFORMATIONAL PURPOSES ONLY AND DOES NOT REPRESENT AN ENGINEERED DESIGN. INFORMATION PRESENTED ON THIS FIGURE IDENTIFIES THE APPROXIMATE LOCATION OF KNOWN SUBSURFACE UTILITIES. UNIDENTIFIED SUBSURFACE UTILITIES MAY EXIST. CONTRACTOR IS RESPONSIBLE FOR CONFIRMATION OF UTILITY LOCATIONS PRIOR TO WORK. GOLDER ASSUMES NO LIABILITY FOR USE OF THIS FIGURE.

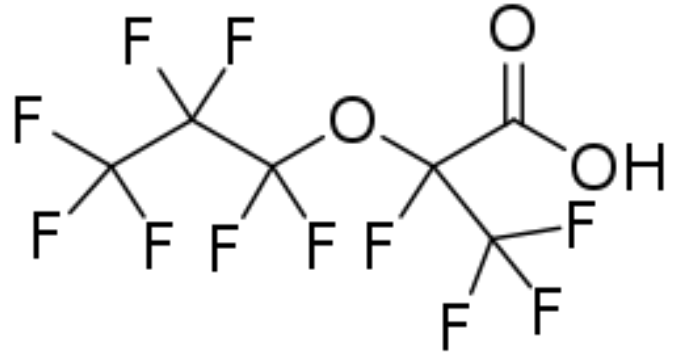
GOLDER

Saint Gobain Timeline

- January 2021 – Notified Town that RTO would not be installed by February 11, 2021 (today).
- February 2021 – Contact NHDES for an update on non-compliance.

HF Compliance Concerns

- HF Ambient Air Limit Compliance Basis:
  - Both PFAS and Gen-X contains fluorine molecules.
  - Gen-X is present in higher concentrations than PFAS in the coating mixtures (dip pan).
- Gen-X Calculation Concerns:
  - Gen-X stack testing issues with XAD Trap.
  - General QA/QC Issues.



Temporary Permit Concerns (cont.)

- Modeling Results Provided in Permit Engineering Summary
  - Maximum predicted 24-hr impact is 83% of 24-hr AAL.

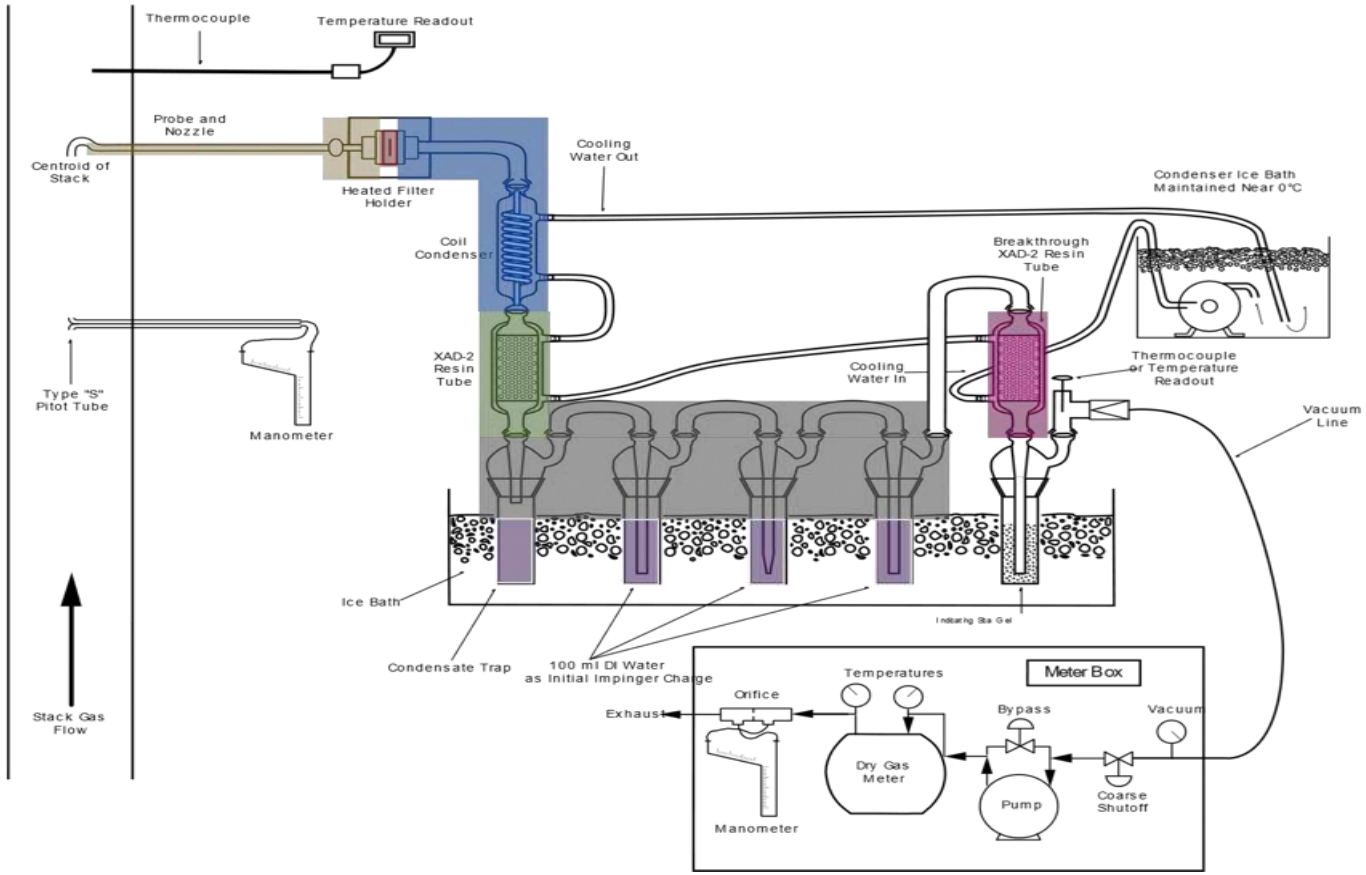
Table 12 – Env-A 1400 RTAP Maximum Predicted Concentration Analysis								
RTAP	CAS #	Emission Rate (lb/hr)	Maximum Predicted Impact (µg/m^3)		Ambient Air Limits (µg/m^3)		Complies with AAL?	
			Annual	24-hr	Annual	24-hr	Annual	24-hr
Hydrogen Fluoride (as F)	7664-39-3	0.24	0.16	1.24	0.98	1.5	Yes	Yes[44]

Question Regarding HF

- How were the HF emissions calculated?
- Do they accurately represent the potential emissions?

Stack Testing April 2018

- The stack test sampling train producing a total of seven samples:
  - Front half filter
  - Methanol rinse,
  - XAD-2 resin trap
  - Impinger 1,
  - Impinger 2,
  - Impinger 3
  - Back half filter



Issues with Stack Test Report

- Barr's Stack Test Plan, included in Appendix G of the Barr Report proscribed the use of detection limits and provides a sample emission calculation using the reporting limits (RL). Instead, Barr used the method detection limit (MDL), rather than the RL.
- The RL is based on the lowest calibration concentration and is considered the more accurate and definitive reporting value.

- Although the analytical lab reported a value for the concentration of Gen-X detected in XAD resin samples,
- Barr deleted the calculated mass of Gen-X from each XAD resin trap by replacing the calculated result with a value of zero.
- As a result, the calculated mass for each run was based on only six of the seven samples that were taken;
- significantly underestimating the Gen-X results for each run.

Issues with Barr Stack Test Report

- The Barr Report contained surrogate recovery issues, which affected analyses of several PFAS in the QX Tower.
- The laboratory was unable to demonstrate that it could perform the analytical method on the XAD resin trap for Gen-X.
- The data quality objectives for the stack testing program were not properly identified.

Scope of Data Review

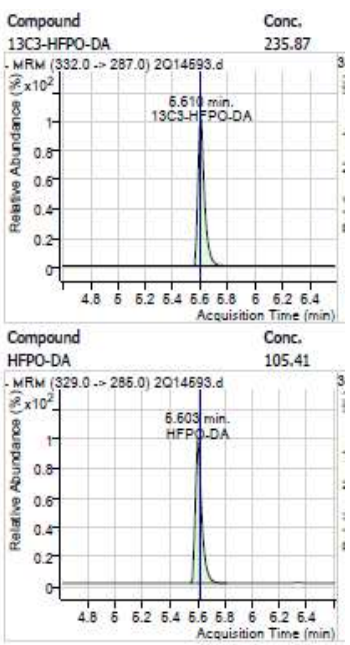
- Holding times and sample preservation.
- Initial and continuing calibrations.
- Blanks.
- Isotopically labeled surrogate results.
- Laboratory control sample (LCS) results.
- Internal standards.
- Sample results and target compound identification.

The focus of the review was to determine if the laboratory generated valid data for perfluoroalkyl acid (PFAA) and hexafluoropropylene oxide dimer acid (HFPO-DA or Gen-X) results, and to confirm that results were properly quantified and identified.

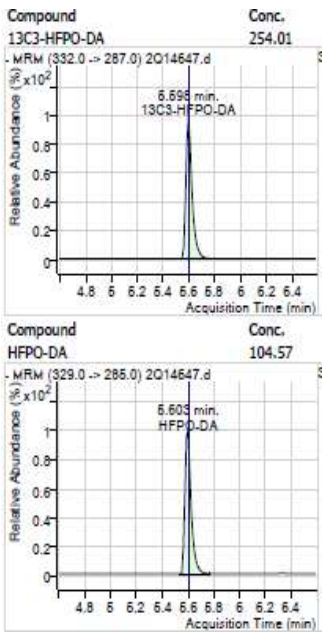
Several significant data quality issues identified.

HFPO-DA (Gen-X) in XAD

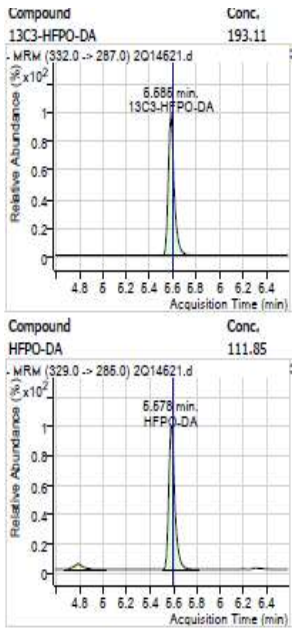
- Inability of laboratory to generate valid Gen-X data in the XAD matrix in both field samples and lab QC samples



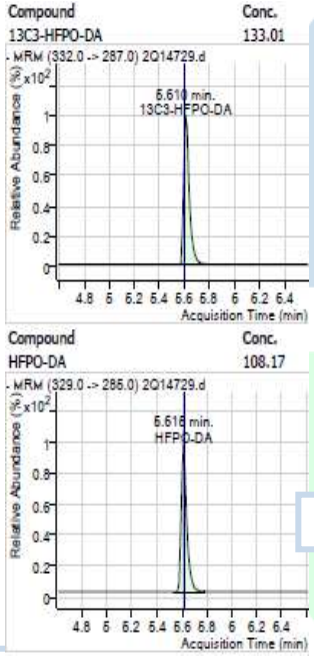
DI Water LCS



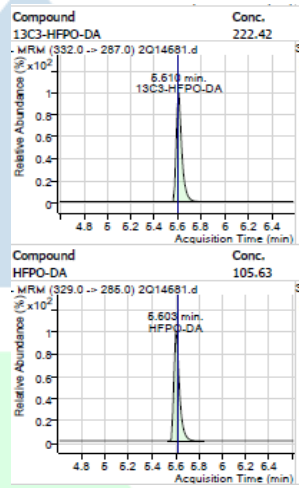
Sodium Borate LCS



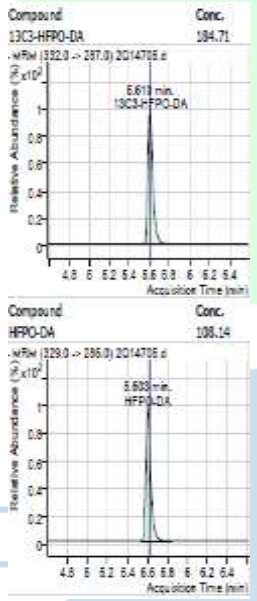
Sodium Hydroxide LCS



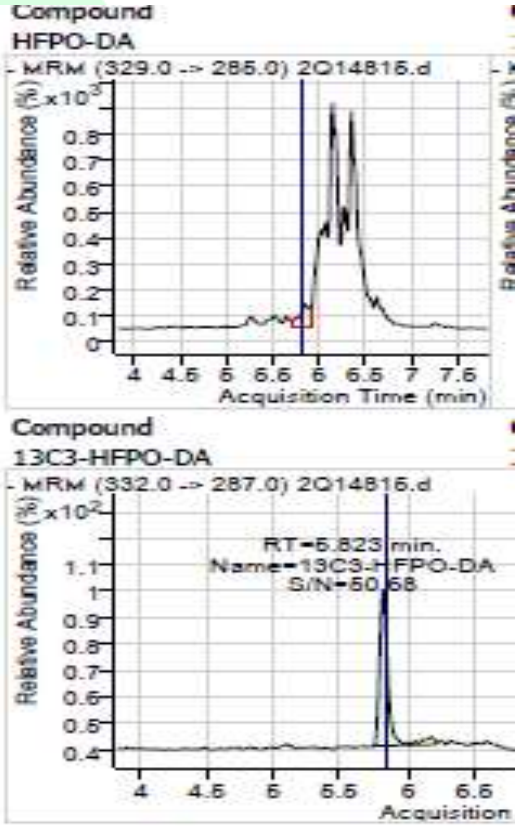
Methanol LCS



Front Half Filter



Back Half Filter LCS



XAD Trap LCS

Significant chromatography interferences and peak shape irregularities

Laboratory unable to perform method with adequate accuracy & precision on clean matrix (LCS)

Other Issues for HFPO-DA (Gen-X) in XAD

- Lab re-extracted XAD and combined with original extraction:
  - Method blanks associated with re-analyses contained HFPO-DA at high concentrations (846/786 µg/kg).
- Recoveries of labeled surrogate $^{13}C_3$-HFPO-DA below acceptance criteria in most analyses with many significantly low (<10%).
- LCSs associated with HFPO-DA analyses exhibited elevated recoveries.
- Poor chromatography and interferences seen on previous slide.
- Emissions calculated using "zero" for Gen-X in XAD based on poor performance of method.
- Instead of "zero", TRC recommends using concentration of HFPO-DA from original analyses; although same chromatography and interference issues, original analyses associated with clean method blanks and less uncertainty from combining extracts with different concentrations of labeled isotopes.
- Recalculated concentrations from original analyses lower than re-analyses but higher than "zero".
- Concentrations of HFPO-DA can be used as reporting limit (RL), meaning that data user can likely state HFPO-DA is not present at level of interference detected. This may result in higher than normal RLs but more appropriate than using "zero" for HFPO-DA in emissions

Stack Testing Laboratory Analysis Issues

XAD Resin samples were extracted in OP70203 and OP70203A. The following isotopes were added as pre-sampling surrogates: 13C3-PFPeA, 13C2-PFOA, and 13C4-PFOS. 13C2-PFDA was inadvertently not added to the pre-sampling surrogate mix. The XAD resins were spiked with isotope dilution standard prior to extracting. Methanol was added to each sample. Samples were extracted via shaker table for 18 hours and then sonicated for 30 minutes. Methanol was drawn off and XAD resin rinsed and concentrated to 1ml. After extraction, the XAD resins were stored in the 4oz HDPE jars that they were extracted in. This Isotope Dilution standards for PFAS and GenX in the XAD resins was spiked at 10ppb and 125ppb instead of 20ppb and 250ppb. There was insufficient sample volume for analysis of MS or DUP.

Initial analysis showed poor recovery for PFAS and GenX and caused major instrumentation issues. The XAD resins were spiked with an additional aliquot of isotope dilution mix, then extracted two additional times with ammonia methanol in an ultrasonic bath. Solvent was drawn off and the original extracts were combined with the additional extracts and concentrated to 4ml. Extracts were then run through a SDVB SPE for cleanup. Extracts were analyzed for PFAS and GenX. A value of "1" was used for concentration calculations.

Recoveries for PFAS were generally acceptable. There was an interference detected in the MB and samples for PFBA around 40 "ug/kg". Samples with similar levels were B flagged. Several samples were diluted due to high levels of PFAS including PFBA. Those hits were not due to the interference.

Recoveries and results for GenX and its' isotope in the XAD resins were poor. There was significant interference in the chromatograms at the retention time were GenX eluted. Peak shape was extremely poor. High result values were caused by the low isotope recoveries. On the instrument side, the XAD resin samples cause the CCVs to fail. Both analysis for GenX resulted in the analytical column needing to be replaced. Values are reported for informational purposes only.

Reliability of HFPO-DA results for the XAD traps highly suspect

Use of "non-zero" concentrations for HFPO-DA will cause increase in potential emissions.

PFAA Results Reported from High Dilutions (≥ 50-fold)

- Labeled surrogate diluted out, making quantification of associated PFAA impossible.
- Lab spiked additional aliquot of labeled surrogate into diluted extract.
- Recoveries of newly-spiked surrogates typically very good (90-110%) because had not gone through prep steps and added just prior to analysis.
- FAA should be quantitated using recovery of labeled surrogate before dilution performed: more accurately reflects how associated PFAA behaved in sample.

Re-calculation of PFAA Results with Significant Dilutions

Sample ID	Matrix		Units	PFBA	PFPeA	PFHxA	PFHpA
314	Front Half Filter	Original Result	µg/L	-	31.5	46.1	-
		Re-calculated Result	µg/L	-	54.2	85.7	-
315	Methanol Rinse	Original Result	µg/L	8.89	15.1	22.1	3.51
		Re-calculated Result	µg/L	15.2	28.3	55.5	9.15
316	XAD	Original Result	µg/kg	14,200	30,300	78,700	16,000
		Re-calculated Result	µg/kg	15,500	71,800	223,000	32,300

Affects PFBA, PFPeA, PFHxA, and/or PFHpA in 314-317 (QX Tower/Test 3 Run 1) and 329-331 (QX Tower/Test 3 Run 3)

Use of properly calculated results will cause increase in potential emissions.

Use of MDLs in Emission Calculations

- **Stack Test Plan: Appendix G of report: example provided uses Reporting Limit (RL) for ng/m³ calculation.**
- **MDLs statistically derived values; no measure of accuracy.**
- **RLs based on lowest concentration in lab calibration curve: most accurate value.**

Use of more accurate RLs will cause increase in potential emissions.

STACK TEST PLAN

SAINT GOBAIN PERFORMANCE PLASTICS CORPORATION
MERRIMACK, NEW HAMPSHIRE

Date test plan created/revised/finalized:	March 1, 2018 / April 2, 2018 / April 11, 2018
Scheduled test date(s):	April 26-27 and April 30-May 2, 2018

PFAS Detection Limits

SGS Accutest provided information regarding current detection limits for the compounds targeted in this project. For most compounds, method detection limits (MDLs) are 0.0025 µg/l and reporting limits (RLs) are 0.010 µg/l. With that, a simple case of a 100 ml liquid sample fraction from an impinger sample with a typical air sample volume of 60 ft^3 in a two hour test run would have a detection limit of 0.59 ng/m^3 at the RL. Of course, the answer to the detection limit question becomes more complicated under the chosen sampling and analytical methodology. Each test run will generate seven sample fractions that are analyzed separately. For each test run, the reported total mass of a compound and resulting calculated air concentration and mass emission rate for that compound is the sum of the values determined for each sample fraction. The commonly accepted reporting convention is to add the values of all sample fractions with a detectable quantity of the compound plus the value at the detection limit for fractions that are non-detect and to qualify the calculated sum with a "<" designation.

Stack Test Plan Issues

- Use of Detection Limits inconsistent with Stack Test Plan.
  - Use of more accurate RLs will cause increase in potential emissions.
- Handling of Gen-X in XAD inconsistent with Stack Test Plan:
  - Results from XAD effectively set to zero.
  - Chemours found most Gen-X in XAD trap.
- Correction of PFAA data performed at high dilutions (≥ 50-fold) using inappropriately labeled surrogate recovery.

Laboratory Results Summary
Saint-Gobain Performance Plastics
Merrimack, New Hampshire

Test												
Run												
Location	114-FH Filter			115-Methanol Rinse			116-XAD Trap			117-DI Water		
Lab Sample ID	FA54033-1			FA54033-2			FA54033-3			FA54033-4		
Date	4/26/2018			4/26/2018			4/26/2018			4/26/2018		
Unit	ug/l	Init. Volume (L)	Mass (ug)	ug/l	Init. Volume (L)	Mass (ug)	ug/kg	Init. Volume (L)	Mass (ug)	ug/l	Init. Volume (L)	Mass (ug)
Perfluorobutanoic acid (PFBA)	< 0.033	0.015	< 0.0005	0.00917	0.25	0.0023	41.8 b	0.004	0.1672 b	0.100	0.11	0.0110
Perfluoropentanoic acid (PFPeA)	0.0335 jb	0.015	0.0005 b	0.00830 b	0.25	0.0021 b	32.5 j	0.004	0.1300	0.0696	0.11	0.0077
Perfluorohexanoic acid (PFHxA)	0.0370 jb	0.015	0.0006 b	0.0112 b	0.25	0.0028 b	56.5 b	0.004	0.2260 b	0.0238	0.11	0.0026
Perfluoroheptanoic acid (PFHpA)	0.0301 j	0.015	0.0005	0.00683	0.25	0.0017	23.3 j	0.004	0.0932	0.00374 j	0.11	0.0004
Perfluorooctanoic acid (PFOA)	0.103	0.015	0.0015	0.0897	0.25	0.0224	77.5	0.004	0.3100	0.00705 j	0.11	0.0008
Perfluorononanoic acid (PFNA)	0.0261 j	0.015	0.0004	0.00606	0.25	0.0015	12.3 j	0.004	0.0492	< 0.0023	0.11	< 0.0003
Perfluorobutane sulfonate (PFBS)	< 0.017	0.015	< 0.0003	< 0.0010	0.25	< 0.0003	< 10	0.004	< 0.0400	< 0.0023	0.11	< 0.0003
Perfluorohexane sulfonate (PFHxS)	< 0.017	0.015	< 0.0003	< 0.0010	0.25	< 0.0003	< 10	0.004	< 0.0400	< 0.0023	0.11	< 0.0003
Perfluorooctanesulfonate (PFOS)	< 0.025	0.015	< 0.0004	< 0.0015	0.25	< 0.0004	< 10	0.004	< 0.0400	< 0.0034	0.11	< 0.0004
HFPO-DA[1]	0.479	0.015	0.0072	0.242	0.25	0.0605	1170 **			0.323	0.11	0.0355

Stack Testing Laboratory Analysis & Stack Test Issues –

- Summary of Laboratory Significant Issues:
  - Reliability of Gen-X results for the XAD traps highly suspect;
  - Use of “zero” concentrations for Gen-X from XAD Trap will cause an increase in emissions.
  - Use of more accurate RLs will cause increase in potential emissions.
- Correction of PFAA data performed at high dilutions (≥ 50-fold) using inappropriately labeled surrogate recovery.
- Testing done at “Representative” operation.
  - Issues related to Dip Pan.

Impacts of failure to follow

- These issues with the laboratory were not resolved therefore accurate data was not reported.
- Issues with Gen-X testing and how the data would be handled should have been discussed with NHDES.
- Omission of the Gen-X results from the air emissions calculations results in a significant underreporting bias in their air emissions calculations.
- Testing done at “Representative” operation.
  - Issues related to Dip Pan.

Dip Pan
Paul Murphy – CAAssociates

Saint Gobain
Performance Plastics
Merrimack, NH

Barr Engineering Co.
May 4, 2019

TABLE 8

Dispersion Analysis Results

Location		MA Tower			MS Tower			QX Tower Pass 1		QX Tower Pass 2	QX Tower Pass 1	
Sample Run ID		Test 1 Run 1	Test 1 Run 2	Test 1 Run 3	Test 2 Run 1	Test 2 Run 2	Test 2 Run 3	Dip Pan 1 Test 3 Run 1	Dip Pan 2 Test 3 Run 1	Dip Pan 1 Test 3 Run 2	Dip Pan 1 Test 3 Run 3	Dip Pan 2 Test 3 Run 3
Date		4/26/2018	4/26/2018	4/27/2018	4/27/2018	4/27/2018	4/27/2018	4/30/2018	4/30/2018	4/30/2018	5/01/2018	5/01/2018
Parameter	Units											
Per- and Polyfluoroalkyl Substances												
Perfluorobutanoic acid (PFBA)	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	55.8	< 5.0	< 5.0	45.5	< 5.0
Perfluoropentanoic acid (PFPeA)	ug/l	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	286	< 3.8	4.72 j	215	< 3.8
Perfluorohexanoic acid (PFHxA)	ug/l	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	19.8	3.46 j	< 2.5	15.4	2.99 j
Perfluoroheptanoic acid (PFHpA)	ug/l	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	56.8	< 2.5	< 2.5	44.0	< 2.5
Perfluorooctanoic acid (PFOA)	ug/l	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	25.6 *	< 2.5	< 2.5	21.1 *	< 2.5
Perfluorononanoic acid (PFNA)	ug/l	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	160	< 2.5	2.70 j	128	< 2.5
Perfluorobutane sulfonate (PFBS)	ug/l	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Perfluorohexane sulfonate (PFHxS	ug/l	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Perfluorooctanesulfonate (PFOS)	ug/l	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8
(HFPO-DA)	ug/l	1580	1420	1410	31.9 j	34.3 j	48.0 j	591	< 25	952	910	< 25

j Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.
* Estimated value, QA/QC criteria not met.

Parameter	MA Tower			MS Tower			QX (Uncontrolled)		
Location	116-XAD Trap	123-XAD Trap	130-XAD Trap	216-XAD Trap	223-XAD Trap	230-XAD Trap	316-XAD Trap	323-XAD Trap	330-XAD Trap
Sample ID	FA54033-3	FA54033-10	FA54033-17	FA54033-24	FA54033-31	FA54033-38	FA54033-45	FA54033-52	FA54033-59
Initial V (L)	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Gen-X Results in XAD-2 Resin Samples - as Reported (µg/Kg)									
Perfluorobutanoic acid (PFBA)	41.8	37	38.1	29.1	31.2	39.0	14200	143	15900
Perfluoropentanoic acid (PFPeA)	32.5	28.1	32.2	22.6	25.7	33.2	30300	161	30200
Perfluorohexanoic acid (PFHxA)	56.5	45.2	71.4	53.0	334	272	78700	1360	78000
Perfluoroheptanoic acid (PFHpA)	23.3	21.5	27.3	13.6	13.0	18.2	16000	57.5	16300
Perfluorooctanoic acid (PFOA)	77.5	74.1	576	37.0	20.0	15.6	124	20	120
Perfluorononanoic acid (PFNA)	12.3	11.6	10	10	10	10	229	20	343
Perfluorobutanesulfonic acid (PFBS)	10	10	10	10	10	10	20	20	20
Perfluorohexanesulfonic acid (PFHxS)	10	10	10	10	10	10	20	20	20
Perfluorooctanesulfonic acid (PFOS)	10	10	10	10	10	10	20	20	20
Gen-X	0	0	0	0	0	0	0	0	0
Reported µg									
Perfluorobutanoic acid (PFBA)	0.1672	0.1480	0.1524	0.1164	0.1248	0.1560	56.8000	0.5720	63.6000
Perfluoropentanoic acid (PFPeA)	0.1300	0.1124	0.1288	0.0904	0.1028	0.1328	121.2000	0.6440	120.8000
Perfluorohexanoic acid (PGHxA)	0.2260	0.1808	0.2856	0.2120	1.3360	1.0880	314.8000	5.4400	312.0000
Perfluoroheptanoic acid (PFHpA)	0.0932	0.0860	0.1092	0.0544	0.0520	0.0728	64.0000	0.2300	65.20000
Perfluorooctanoic acid (PFOA)	0.3100	0.2964	2.3040	0.1480	0.0800	0.0624	0.4960	0.0800	0.4800
Perfluorononanoic acid (PFNA)	0.0492	0.0464	0.0400	0.0400	0.0400	0.0400	0.9160	0.0800	1.3720
Perfluorobutanesulfonic acid (PFBS)	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0800	0.0800	0.0800
Perfluorohexanesulfonic acid (PFHxS)	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0800	0.0800	0.0800
Perfluorooctanesulfonic acid (PFOS)	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0800	0.0800	0.0800
Gen-X	0	0	0	0	0	0	0	0	0
Total Gen-X Sample Train Mass Reported	(Total Gen-X for all 7 sample segments for their respective runs in Tables 1 through 3 in the main Barr report)								
	0.11	0.069	0.078	0.019	0.020	0.015	0.037	1.3	0.34

SGS XAD Trap Lab Results - Corrected (All values in RED are corrected values)									
Initial Mass (kg)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Corrected µg/Kg									
Perfluorobutanoic acid (PFBA)	41.8	37	38.1	29.1	31.2	39.0	15500	143	31400
Perfluoropentanoic acid (PFPeA)	32.5	28.1	32.2	22.6	25.7	33.2	71800	161	77300
Perfluorohexanoic acid (PFHxA)	56.5	45.2	71.4	53	334	272.0	223000	1360	254000
Perfluoroheptanoic acid (PFHpA)	23.3	21.5	27.3	13.6	13	18.2	32300	57.5	37500
Perfluorooctanoic acid (PFOA)	77.5	74.1	576	37	20	15.6	124	80	120
Perfluorononanoic acid (PFNA)	12.3	11.6	40	40	40	40	229	80	343
Perfluorobutanesulfonic acid (PFBS)	40	40	40	40	40	40	80	80	80
Perfluorohexanesulfonic acid (PFHxS)	40	40	40	40	40	40	80	80	80
Perfluorooctanesulfonic acid (PFOS)	40	40	40	40	40	40	80	80	80
Gen-X	557	1020	616	100	100	578	100	674	428
Corrected µg									
Perfluorobutanoic acid (PFBA)	0.0418	0.037	0.0381	0.0291	0.0312	0.039	15.5	0.143	31.4
Perfluoropentanoic acid (PFPeA)	0.0325	0.0281	0.0322	0.0226	0.0257	0.0332	71.8	0.161	77.3
Perfluorohexanoic acid (PGHxA)	0.0565	0.0452	0.0714	0.053	0.334	0.272	223	1.36	254
Perfluoroheptanoic acid (PFHpA)	0.0233	0.0215	0.0273	0.0136	0.013	0.0182	32.3	0.0575	37.5
Perfluorooctanoic acid (PFOA)	0.0775	0.0741	0.576	0.037	0.02	0.0156	0.124	0.08	0.12
Perfluorononanoic acid (PFNA)	0.0123	0.0116	0.04	0.04	0.04	0.04	0.229	0.08	0.343
Perfluorobutanesulfonic acid (PFBS)	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.08	0.08
Perfluorohexanesulfonic acid (PFHxS)	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.08	0.08
Perfluorooctanesulfonic acid (PFOS)	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.08	0.08
Gen-X	0.557	1.02	0.616	0.1	0.1	0.6	0.1	0.674	0.428
Total Corrected Gen-X	(Corrected total Gen-X for all 7 sample segments for their respective runs using non-zero XAD-2 Gen-X values)								
Sample Train Mass	0.667	1.089	0.694	0.119	0.120	0.593	0.137	1.944	0.766

NHDES Comments on Barr Report Evaluation

- NHDES did not rely on the Barr Report to calculate the emissions for HF. They relied on the EPA ORD Report #6.
- NHDES developed regression. It is not clear how the regression of the EPA ORD results was established as NHDES did not provide the formula.
- EPA ORD analysis was non-targeted, uncalibrated response that only provided relative abundance.

EPA ORD Report #6

- EPA ORD only analyzed the filters and the XAD trap because that was believed to be the location of “the bulk the PFAS to be captured.” EPA ORD did not analyze the contents of the impingers or the methanol rinse. Due to this omission, only three of the seven sample train components were analyzed.

EPA ORD Report #6

- The EPA ORD Report “detected and tentatively identified 190 different PFAS. Of those, we have high confidence in the tentative identification of 89 compounds, which we report by formula, chemical compound name and CAS number where available, and monoisotopic mass…”
- Only 34 of the 89 compounds that had a non-zero concentration were used to calculate HF emissions.

EPA ORD Report #6

- Of the 190 compounds identified in the EPA ORD Report, 156 PFAS were reported as non-detect, but no detection level was provided because the analysis was semi-quantitative in nature. NHDES assigned zero values or ignored these non-dectect results.
- In the NHDES spreadsheet, Non-Detect results are not treated as MDL or RL – they are treated as zero

EPA ORD Report #6

- NHDES used the results from the MA Tower to calculate the emissions from the other process stacks.
- The issue regarding ND's is compounded as NHDES applied zero substitutions to 7 other process stacks and the R&D lab.

MB Tower, MC Tower, MR Tower, MD Tower, MG Tower, MP Tower, MQ Tower.

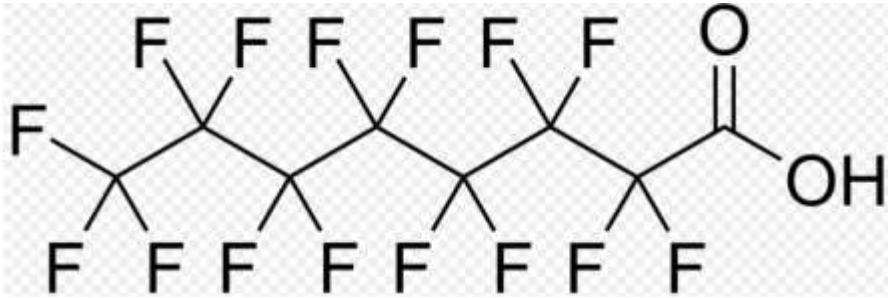
EPA ORD Report #6

- The EPA ORD Report of non-targeted compounds did not include all the compounds on the targeted list in the Barr report. That means that those compounds which primarily contribute to the generation of fluoride - such as PFOA (identified as “0”), PFHpA, PFBS, PFHxS, PFOS, and Gen-X - are not considered in the NHDES calculation.
- Line item 87 of the EPA ORD Report Table 3 lists PFOA, but the PFOA concentration was reported as “ND”. PFOA is identified as having the highest concentration in Run 1 of the MA Tower in the Barr Report. NHDES used “0.”

Conclusion

- Neither Barr or EPA ORD Report #6 contains a complete set of data sufficient to demonstrate that the concentration of uncontrolled emissions of HF is equal to or below the AAL.
- The flawed and limited underestimate of emissions was at 83% of the 24-hr AAL.
- This triggers either the need to install control technology or complete modeling consistent with ENV-A 1405.02.

Best Available Control Technology (BACT) Discussion



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CAAssociates

BACT

- What is BACT
  - BACT is an emission limitation based on the maximum degree of reduction of each pollutant from the Pollution Control Device.
  - Takes into account energy, environmental, public health, and economic impacts and other costs.
  - Environmental considerations do not reduce the efficiency.
  - BACT - Chemours evaluation – 99.99% Destruction Efficiency.
  - Application identified RTO taking into account all factors.

TYPICAL BACT ANALYSIS

- Typical BACT Analysis
  - Limitation based on **maximum degree of reduction**
  - Can be no less stringent than RACT, NSPS, etc.
- In this case, BACT Analysis also needed to include:
  - Cannot exceed AGQS.
  - AAL concerns.

BACT

- BACT Compliance Requirements In TP-0256
  - BACT vs AAL.
  - BACT vs RACT – Attachment B.10 not available for public review.
  - BACT seems to be the result of a compromise between the HF AAL and RACT.
- Efficiency as a measure of Compliance
  - Relying on Temperature only is not indicative of the performance of the RTO.
  - RTO Efficiency provide a diagnostic evaluation of RTO performance.

Questions