PPA MANUFACTURING PROCESS
CARBON BED INLET AND OUTLET STACK
EMISSIONS TEST REPORT
TEST DATES: 8-9 JANUARY 2020

THE CHEMOURS COMPANY
FAYETTEVILLE, NORTH CAROLINA

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THE CHEMOURS COMPANY

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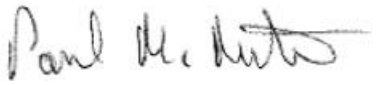
Weston Solutions, Inc. (WESTON®) is a commercial laboratory operating within full accreditation of the Louisiana Environmental Laboratory Accreditation Program under Certificate Number 03024. The qualifications to provide defensible quality data as a certified commercial environmental testing firm as Agency Interest No. 30815 was granted by the Louisiana Department of Environmental Quality under the Louisiana Administrative Code of LAC 33.1 Chapter 45 et al.

I certify that I have personally examined and am familiar with the information contained herein. Based on my information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.



Paul M. Meeter
Weston Solutions, Inc.

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1. INTRODUCTION

1.1 FACILITY AND BACKGROUND INFORMATION

The Chemours Fayetteville Works (Chemours) is located in Bladen County, North Carolina, approximately 10 miles south of the city of Fayetteville. The Chemours operating areas on the site include the Fluoromonomers, IXM and Polymer Processing Aid (PPA) manufacturing areas, Wastewater Treatment, and Powerhouse.

Chemours contracted Weston Solutions, Inc. (Weston) to perform HFPO Dimer Acid emission testing on the PPA process stack (outlet) and PPA carbon bed inlet. The samples were also analyzed for PFOA. Testing was performed on 8-9 January 2020 and generally followed the "Emissions Test Protocol" reviewed and approved by the North Carolina Department of Environmental Quality (NCDEQ). This report provides the results from the emission test program.

1.2 TEST OBJECTIVES

The specific objectives for this test program were as follows:

- Measure the emissions concentrations and mass emissions rates of HFPO Dimer Acid from the PPA process stack and PPA carbon bed inlet which are located in the PPA process area.
- Calculate the carbon bed removal efficiency for HFPO Dimer Acid.
- Analyze the samples for PFOA.
- Monitor and record process data in conjunction with the test program.
- Provide representative emissions data.

1.3 TEST PROGRAM OVERVIEW

During the emissions test program, the concentrations and mass emissions rates of HFPO Dimer Acid were measured on the PPA process stack and the PPA carbon bed inlet. The samples were also analyzed for PFOA.

Tables 1-1 provides a summary of the test locations and the parameters that were measured along with the sampling/analytical procedures that were followed.

Section 2 provides a summary of test results. A description of the processes is provided in Section 3. Section 4 provides a description of the test locations. The sampling and analytical procedures are provided in Section 5. Detailed test results and discussion are provided in Section 6.

Appendix C includes the summary reports for the laboratory analytical results. The full laboratory data packages are provided in electronic format.

Table 1-1
Sampling Plan for PPA Carbon Bed

Sampling Point & Location	**PPA Carbon Bed**				
Number of Tests:	6 (3 inlet, 3 outlet)				
Parameters To Be Tested:	HFPO Dimer Acid (HFPO-DA)	Volumetric Flow Rate and Gas Velocity	Carbon Dioxide	Oxygen	Water Content
Sampling or Monitoring Method	EPA M-0010	EPA M1, M2, M3A, and M4 in conjunction with M-0010 tests	EPA M3A		EPA M4 in conjunction with M-0010 tests
Sample Extraction/ Analysis Method(s):	LC/MS/MS	NA[6]	NA		NA
Sample Size	> 1m^3	NA	NA	NA	NA
Total Number of Samples Collected[1]	6	6	3	3	6
Reagent Blanks (Solvents, Resins)[1]	1 set	0	0	0	0
Field Blank Trains[1]	1 per source	0	0	0	0
Proof Blanks[1]	1 per train	0	0	0	0
Trip Blanks[1,2]	1 set	0	0	0	
Lab Blanks	1 per fraction[3]	0	0	0	0
Laboratory or Batch Control Spike Samples (LCS)	1 per fraction[3]	0	0	0	0
Laboratory or Batch Control Spike Sample Duplicate (LCSD)	1 per fraction[3]	0	0	0	0
Media Blanks	1 set[4]	0	0	0	0
Isotope Dilution Internal Standard Spikes	Each sample	0	0	0	0
Total No. of Samples	10[5]	6	3	3	6

Key:

[1] Sample collected in field.

[2] Trip blanks include one XAD-2 resin module and one methanol sample per sample shipment.

[3] Lab blank and LCS/LCSD includes one set per analytical fraction (front half, back half and condensate).

[4] One set of media blank archived at laboratory at media preparation.

[5] Actual number of samples collected in field.

[6] Not applicable.

2. SUMMARY OF TEST RESULTS

A total of three test runs were performed on the PPA process stack (outlet) and on the PPA carbon bed inlet. Table 2-1 provides a summary of the HFPO Dimer Acid emission test results. Detailed test results summaries are provided in Section 6. The samples were also analyzed for PFOA. Table 2-2 provides a summary of the PFOA emission test results.

It is important to note that emphasis is being placed on the characterization of the emissions based on the stack test results. Research conducted in developing the protocol for stack testing HFPO Dimer Acid Fluoride, HFPO Dimer Acid Ammonium Salt and HFPO Dimer Acid realized that the resulting testing, including collection of the air samples and extraction of the various fraction of the sampling train, would result in all three compounds being expressed as simply the HFPO Dimer Acid. However, it should be understood that the total HFPO Dimer Acid results provided on Table 2-1 and in this report include a percentage of each of the three compounds.

Table 2-1
Summary of HFPO Dimer Acid Test Results

	Inlet		Outlet (Process Stack)		Removal Efficiency
	g/sec	lb/hr	g/sec	lb/hr	%
PPA Carbon Bed					
R1	9.78E-05	7.77E-04	1.25E-05	9.92E-05	87.2
R2	6.83E-05	5.42E-04	4.33E-06	3.44E-05	93.7
R3	1.29E-04	1.03E-03	5.79E-06	4.60E-05	95.5
Average	9.85E-05	7.83E-04	7.54E06	5.99E-05	93.8

Table 2-2
Summary of PFOA Test Results

	Inlet		Outlet (Process Stack)	
	g/sec	lb/hr	g/sec	lb/hr
PPA Carbon Bed				
R1	1.49E-06	1.18E-05	1.11E-07	8.81E-07
R2	2.29E-06	1.82E-05	4.15E-07	3.30E-06
R3	1.77E-06	1.40E-05	3.45E-07	2.74E-06
Average	1.85E-06	1.47E-05	2.90E-07	2.31E-06

3. PROCESS DESCRIPTIONS

The PPA area is included in the scope of this test program.

3.1 POLYMER PROCESSING AID (PPA) AREA

The PPA facility produces surfactants used to produce fluoropolymer products, such as Teflon®, at other Chemours facilities, as well as sales to outside producers of fluoropolymers.

Process streams are vented to a caustic wet scrubber (ACD-A1), carbon bed and vented to a process stack (AEP-A1). The process inside the building is under negative pressure and the building air is vented to the carbon bed and the process stack (AEP-A1).

3.2 PROCESS OPERATIONS AND PARAMETERS

Source	Operation/Product	Batch or Continuous
PPA	AF Column Reboiler/Virgin	Continuous once it starts taking off to feed tank
	Pressure Transfers/Virgin or Purified	Batch (pressure transfers from one vessel to another – every 2 hours)

During the test program, the following parameters were monitored by Chemours and are included in Appendix A.

- PPA Process
  - Caustic Wet Scrubber (ACD-A1)
    - Caustic recirculation flow rate
    - Differential pressure across the packing

4. DESCRIPTION OF TEST LOCATIONS

4.1 PPA PROCESS STACK

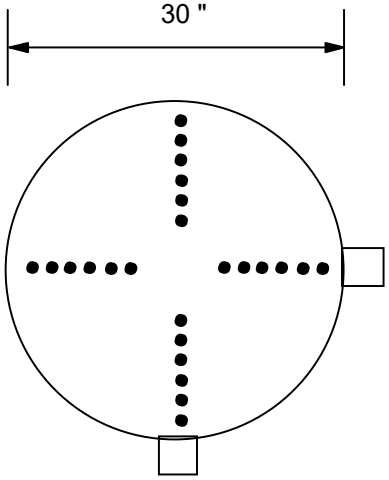
Two 4-inch ID test ports are in place on the 30-inch ID fiberglass stack. The ports are 12 feet (4.8 diameters) from the nearest downstream disturbance (carbon bed outlet) and 32 feet (12.8 diameters) from the nearest upstream disturbance (stack exit).

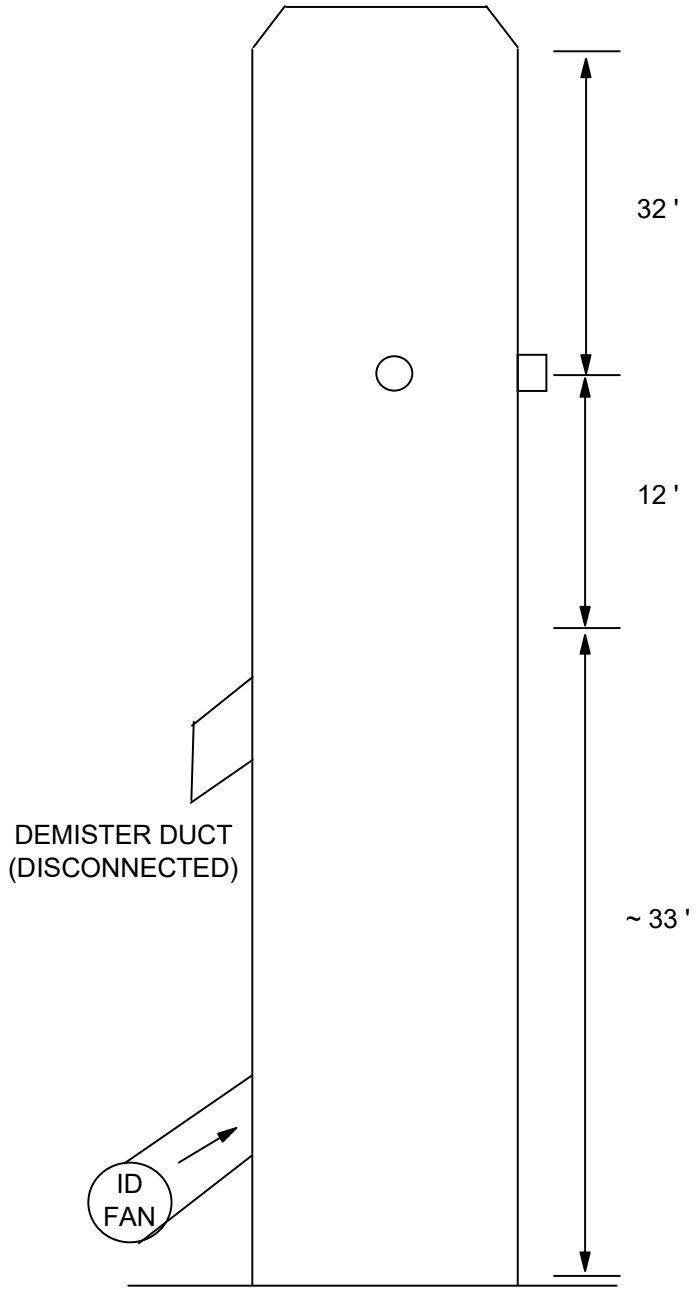
Per EPA Method 1, a total of 24 traverse points (12 per axis) were used for M-0010 isokinetic sampling. See Figure 4-1 for a schematic of the test port and traverse point locations.

Note: All measurements at the test location were confirmed prior to sampling.

4.2 PPA CARBON BED INLET

The fiberglass reinforced plastic (FRP) duct at the inlet of the PPA carbon bed is 34-inch ID. The test ports are located a minimum of 42 inches (> 1.2 duct diameters) from the nearest downstream disturbance and at least 57 inches (> 1.7 diameters) from the nearest upstream disturbance. Based on EPA Method 1, a total of 24 traverse points (12 per port) were used for HFPO Dimer Acid sampling. Figure 4-2 provides a schematic of the test port and traverse port locations.



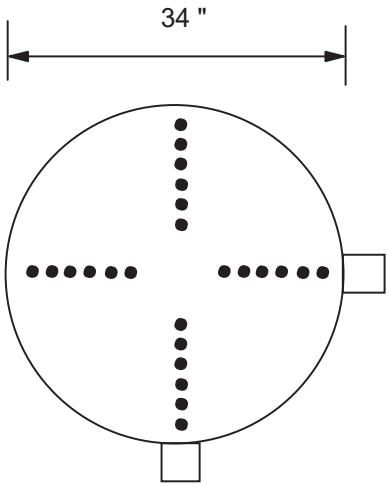


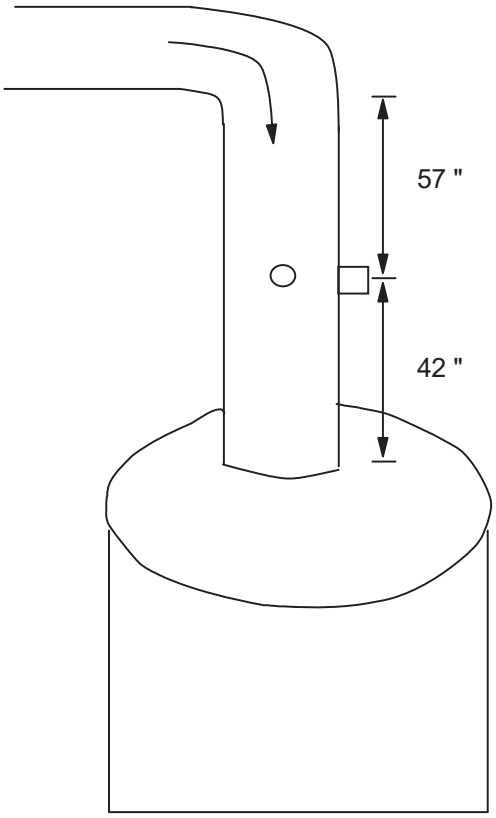
TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1
2	2
3	3 1/2
4	5 3/8
5	7 1/2
6	10 3/4
7	19 3/8
8	22 1/2
9	24 3/4
10	26 1/2
11	28
12	29

DRAWING NOT TO SCALE

FIGURE 4-1
PPA STACK TEST PORT AND
TRAVERSE POINT LOCATION

IASDATA\CHEMOURS\15418.002.020\FIGURE 4-3 PPA STACK





TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	3/4
2	2 1/4
3	4
4	6
5	8 1/2
6	12 1/8
7	21 5/8
8	25 1/2
9	28
10	30
11	31 3/4
12	33 1/4

DRAWING NOT TO SCALE

FIGURE 4-2
PPA PROCESS CARBON BED INLET
TEST PORT AND TRAVERSE POINT LOCATION

IASDATA\CHEMOURS\15418.002.020\FIGURE 4-2 PPA PROCESS SCHEMATIC

5. SAMPLING AND ANALYTICAL METHODS

5.1 STACK GAS SAMPLING PROCEDURES

The purpose of this section is to describe the stack gas emissions sampling train and to provide details of the stack sampling and analytical procedures utilized during the emissions test program.

5.1.1 Pre-Test Determinations

Preliminary test data was obtained at the test location. Stack geometry measurements were measured and recorded, and traverse point distances verified. A preliminary velocity traverse was performed utilizing a calibrated S-type pitot tube and an inclined manometer to determine velocity profiles. Flue gas temperatures were observed with a calibrated direct readout panel meter equipped with a chromel-alumel thermocouple. Preliminary water vapor content was estimated by wet bulb/dry bulb temperature measurements.

A check for the presence or absence of cyclonic flow was previously conducted at the test locations. The cyclonic flow check was negative (< 20°) verifying that the sources were acceptable for testing.

Preliminary test data was used for nozzle sizing and sampling rate determinations for isokinetic sampling procedures.

Calibration of probe nozzles, pitot tubes, metering systems, and temperature measurement devices was performed as specified in Section 5 of EPA Method 5 test procedures.

5.2 STACK PARAMETERS

5.2.1 EPA Method 0010

The sampling train utilized to perform the HFPO Dimer Acid sampling was an EPA Method 0010 train (see Figure 5-1). The Method 0010 consisted of a borosilicate nozzle that attached directly to a heated borosilicate probe. In order to minimize possible thermal degradation of the HFPO Dimer Acid, the probe and particulate filter were heated above stack temperature to minimize water vapor condensation before the filter. The probe was connected directly to a heated borosilicate filter holder containing a solvent extracted glass fiber filter.

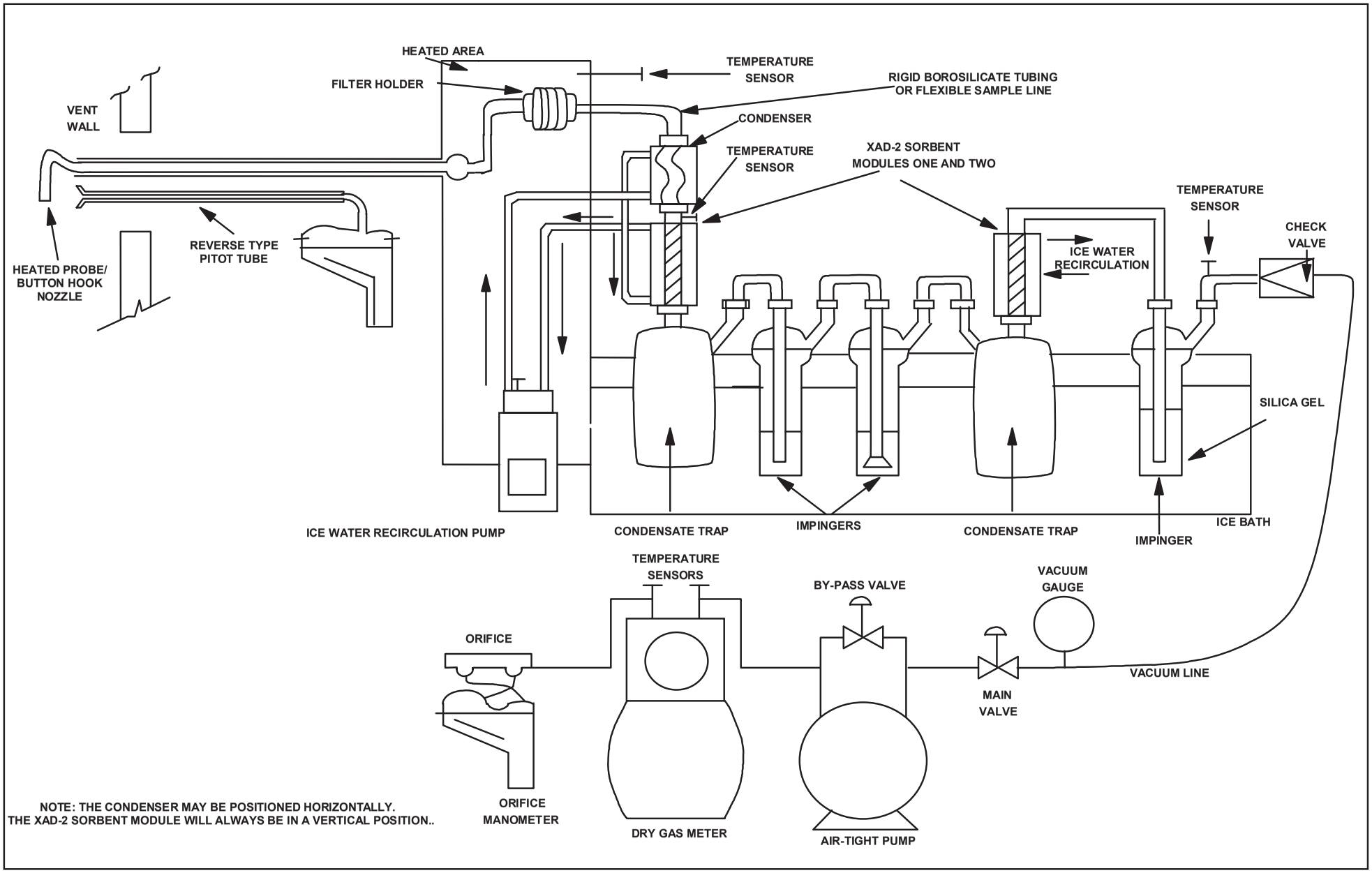


FIGURE 5-1
EPA METHOD 0010 SAMPLING TRAIN

A section of borosilicate glass (or flexible polyethylene tubing) connected the filter holder exit to a Grahm (spiral) type ice water-cooled condenser and an ice water-jacketed sorbent module containing approximately 40 grams of XAD-2 resin. The XAD-2 resin tube was equipped with an inlet temperature sensor. The XAD-2 resin trap was followed by a condensate knockout impinger and a series of two impingers that contained 100 mL of high purity distilled water. The train also included a second XAD-2 resin trap behind the impinger section to evaluate possible sampling train breakthrough. Each XAD-2 resin trap was connected to a 1-L condensate knockout trap. The final impinger contained 300 grams of dry pre-weighed silica gel. All impingers and the condensate traps were maintained in an ice bath. Ice water was continuously circulated in the condenser and the XAD-2 module to maintain method required temperature. A control console with a leakless vacuum pump, a calibrated orifice, and dual inclined manometers was connected to the final impinger via an umbilical cord to complete the sample train.

HFPO Dimer Acid Fluoride (CAS No. 2062-98-8) that is present in the stack gas is expected to be captured in the sampling train along with HFPO Dimer Acid (CAS No. 13252-13-6). HFPO Dimer Acid Fluoride undergoes hydrolysis instantaneously in water in the sampling train and during the sample recovery step and will be converted to HFPO Dimer Acid such that the amount of HFPO Dimer Acid emissions represents a combination of both HFPO Dimer Acid Fluoride and HFPO Dimer Acid.

During sampling, gas stream velocities were measured by attaching a calibrated S-type pitot tube into the gas stream adjacent to the sampling nozzle. The velocity pressure differential was observed immediately after positioning the nozzle at each traverse point, and the sampling rate adjusted to maintain isokineticity at 100% ± 10. Flue gas temperature was monitored at each point with a calibrated panel meter and thermocouple. Isokinetic test data was recorded at each traverse point during all test periods, as appropriate. Leak checks were performed on the sampling apparatus according to reference method instructions, prior to and following each run, component change (if required), or during midpoint port changes.

5.2.2 EPA Method 0010 – Sample Recovery

At the conclusion of each test, the sampling train was dismantled, the openings sealed, and the components transported to the field laboratory trailer for recovery.

A consistent procedure was employed for sample recovery:

1. The two XAD-2 covered (to minimize light degradation) sorbent modules (1 and 2) were sealed and labeled.

2. The glass fiber filter(s) were removed from the holder with tweezers and placed in a polyethylene container along with any loose particulate and filter fragments.

3. The particulate adhering to the internal surfaces of the nozzle, probe and front half of the filter holder were rinsed with a solution of methanol and ammonium hydroxide into a polyethylene container while brushing a minimum of three times until no visible particulate remained. Particulate adhering to the brush was rinsed with methanol/ ammonium hydroxide into the same container. The container was sealed.

4. The volume of liquid collected in the first condensate trap was measured, the value recorded, and the contents poured into a polyethylene container.

5. All train components between the filter exit and the first condensate trap were rinsed with methanol/ammonium hydroxide. The solvent rinse was placed in a separate polyethylene container and sealed.

6. The volume of liquid in impingers one and two, and the second condensate trap, were measured, the values recorded, and the sample was placed in the same container as Step 4 above, then sealed.

7. The two impingers, condensate trap, and connectors were rinsed with methanol/ ammonium hydroxide. The solvent sample was placed in a separate polyethylene container and sealed.

8. The silica gel in the final impinger was weighed and the weight gain value recorded.

9. Site (reagent) blank samples of the methanol/ammonium hydroxide, XAD resin, filter and distilled water were retained for analysis.

Each container was labeled to clearly identify its contents. The height of the fluid level was marked on the container of each liquid sample to provide a reference point for a leakage check during transport. All samples were maintained cool.

During each test campaign, an M-0010 blank train was set up near the test location, leak checked and recovered along with the respective sample train. Following sample recovery, all samples were transported to Eurofins TestAmerica (TestAmerica) for sample extraction and analysis.

See Figure 5-2 for a schematic of the M-0010 sample recovery process.

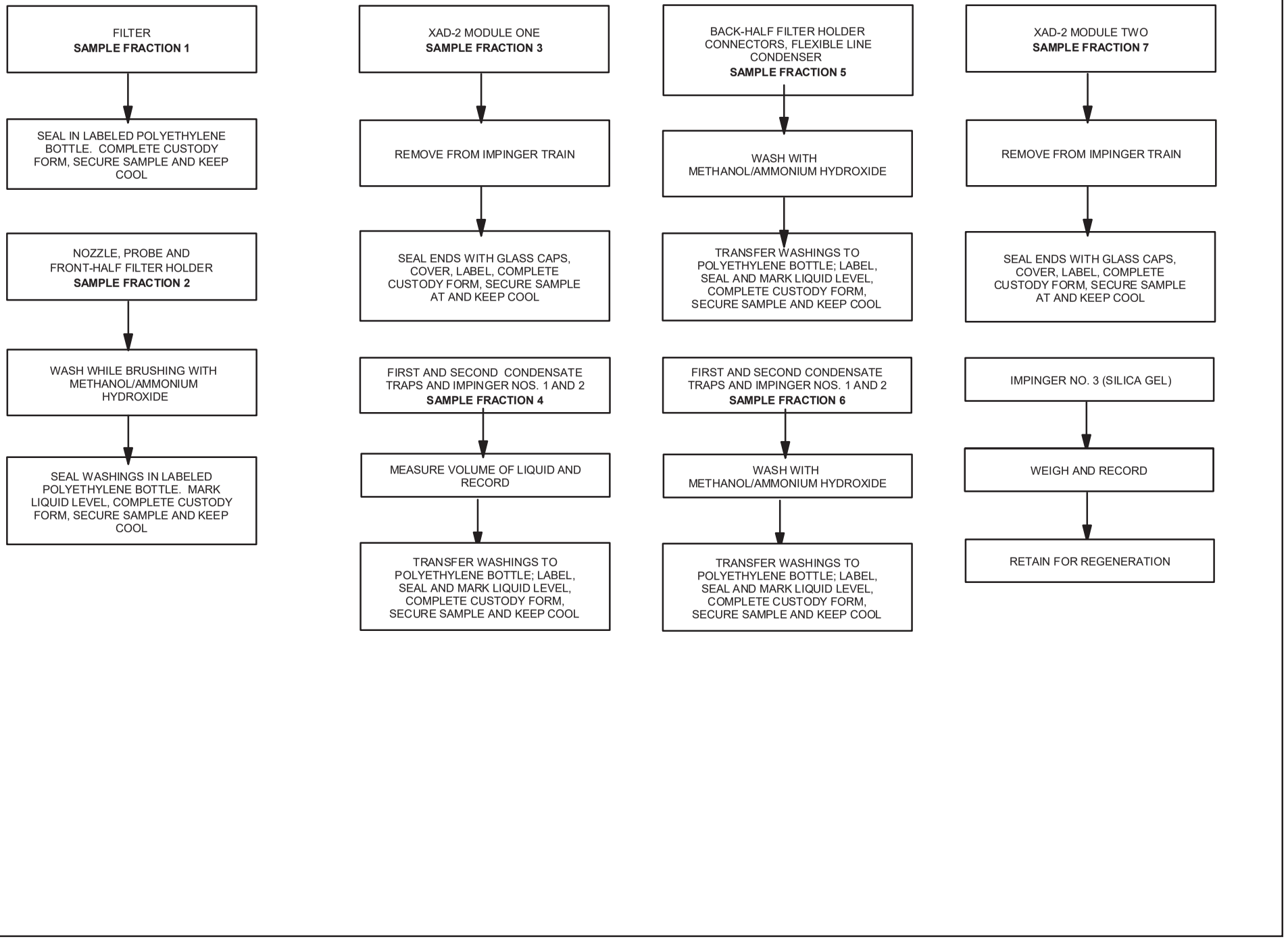


FIGURE 5-2
HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010

IASDATA\CHEMOURS\15418.002.020\FIGURE 5-2 EPA 0010

5.2.3 EPA Method 0010 – Sample Analysis

The Method 0010 sampling trains resulted in four separate analytical fractions for HFPO Dimer Acid analysis according to SW-846 Method 3542:

- Front-Half Composite—comprised of the particulate filter, and the probe, nozzle, and front-half of the filter holder solvent rinses;
- Back-Half Composite—comprised of the first XAD-2 resin material and the back-half of the filter holder with connecting glassware solvent rinses;
- Condensate Composite—comprised of the aqueous condensates and the contents of impingers one and two with solvent rinses;
- Breakthrough XAD-2 Resin Tube—comprised of the resin tube behind the series of impingers.

The second XAD-2 resin material was analyzed separately to evaluate any possible sampling train HFPO-DA breakthrough.

The front-half and back-half composites and the second XAD-2 resin material were placed in polypropylene wide-mouth bottles and tumbled with methanol containing 5% NH_4OH for 18 hours. Portions of the extracts were processed analytically for the HFPO dimer acid by liquid chromatography and duel mass spectroscopy (HPLC/MS/MS). The condensate composite was concentrated onto a solid phase extraction (SPE) cartridge followed by desorption from the cartridge using methanol. Portions of those extracts were also processed analytically by HPLC/MS/MS.

Samples were spiked with isotope dilution internal standard (IDA) at the commencement of their preparation to provide accurate assessments of the analytical recoveries. Final data was corrected for IDA standard recoveries.

TestAmerica developed detailed procedures for the sample extraction and analysis for HFPO Dimer Acid. These procedures were incorporated into the test protocol.

5.3 GAS COMPOSITION

The Weston mobile laboratory equipped with instrumental analyzers was used to measure carbon dioxide (CO_2) and oxygen (O_2) concentrations. A diagram of the Weston sampling system is presented in Figure 5-3.

The sample was collected at the exhaust of the Method 0010 sampling system. At the end of the line, a tee permitted the introduction of calibration gas. The sample was drawn through a heated Teflon® sample line to the sample conditioner. The output from the sampling system was recorded electronically, and one-minute averages were recorded and displayed on a data logger.

Each analyzer was set up and calibrated internally by introduction of calibration gas standards directly to the analyzer from a calibration manifold. The calibration manifold is designed with an atmospheric vent to release excess calibration gas and maintains the calibration at ambient pressure. The direct calibration sequence consisted of alternate injections of zero and mid-range gases with appropriate adjustments until the desired responses were obtained. The high-range standards were then introduced in sequence without further adjustment.

The sample line integrity was verified by performing a bias test before and after each test period. The sampling system bias test consisted of introducing the zero gas and one up-range calibration standard in excess to the valve at the probe end when the system was sampling normally. The excess calibration gas flowed out through the probe to maintain ambient sampling system pressure. Calibration gas supply was regulated to maintain constant sampling rate and pressure. Instrument bias check response was compared to internal calibration responses to ensure sample line integrity and to calculate a bias correction factor after each run using the ratio of the measured concentration of the bias gas certified by the calibration gas supplier.

The oxygen and carbon dioxide content of each stack gas was measured according to EPA Method 3A procedures which incorporate the latest updates of EPA Method 7E. A Servomex Model 4900 analyzer (or equivalent) was used to measure oxygen content. A Servomex Model 4900 analyzer (or equivalent) was used to measure carbon dioxide content of the stack gas. Both analyzers were calibrated with EPA Protocol gases prior to the start of the test program and performance was verified by sample bias checks before and after each test run.

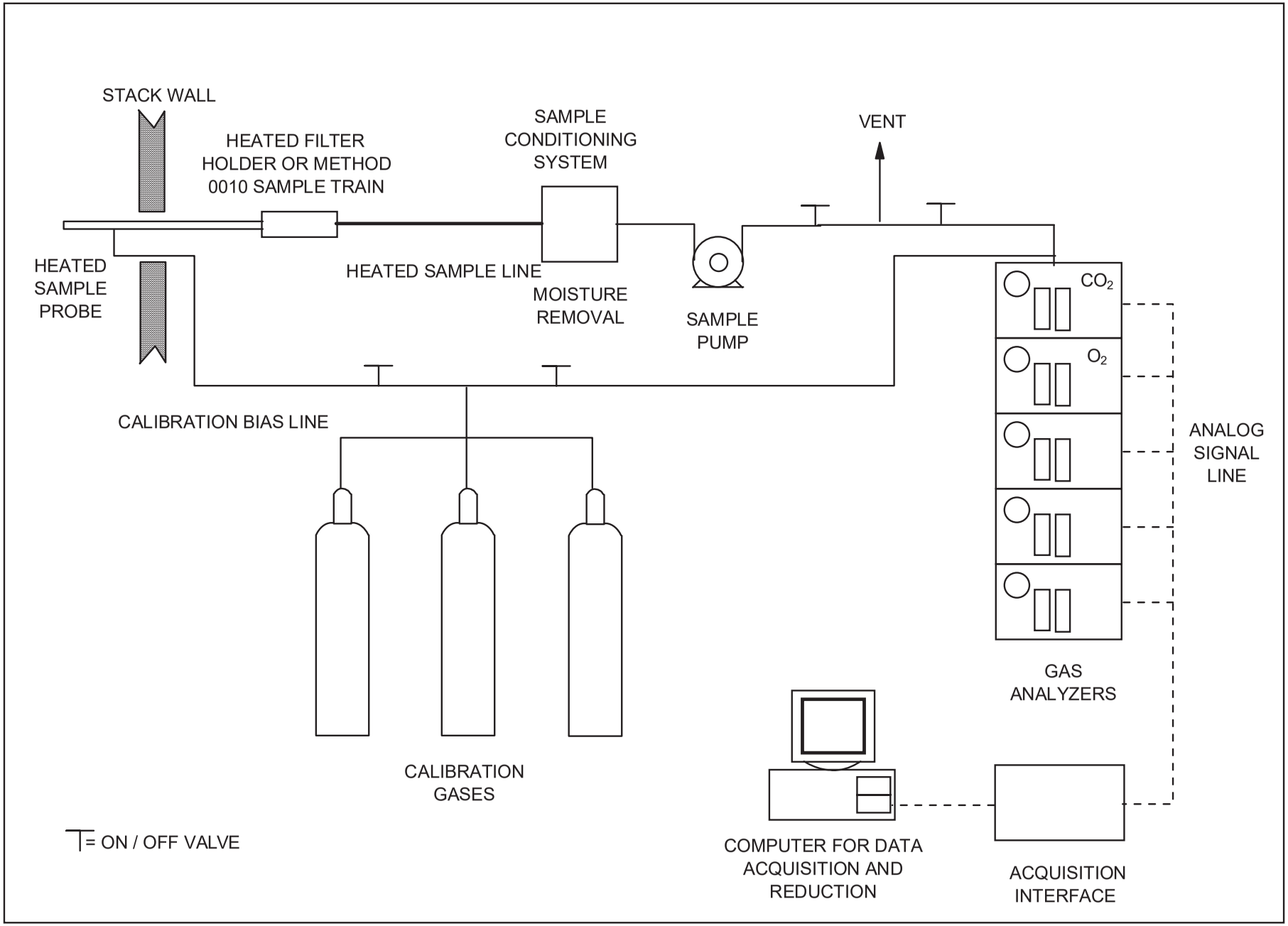


FIGURE 5-3
WESTON SAMPLING SYSTEM

I:\ASDATA\CHEMOURS\15418.002.020\FIGURE 5-3 WESTON SAMPLING SYSTEM

6. DETAILED TEST RESULTS AND DISCUSSION

Each test was a minimum of 96 minutes in duration. A total of three test runs were performed on the PPA process stack and on the PPA carbon bed inlet.

Tables 6-1 and 6-2 provide detailed test data and test results for the PPA carbon bed inlet and PPA process stack, respectively.

The Method 3A sampling at the PPA stack indicated that the O_2 and CO_2 concentrations were at ambient air levels (20.9% O_2, 0% CO_2), therefore, 20.9% O_2 and 0% CO_2 values were used in all calculations.

The carbon bed removal efficiency was calculated based upon the HFPO Dimer Acid inlet and outlet mass emission rates in lb/hr.

TABLE 6-1
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
PPA CARBON BED INLET

Test Data			
Run number	1	2	3
Location	PPA CB Inlet	PPA CB Inlet	PPA CB Inlet
Date	1/8/2020	1/8/2020	1/9/2020
Time period	1015-1210	1335-1538	0839-1033
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.250	0.270	0.270
Cross sectional nozzle area, sq.ft.	0.000341	0.000398	0.000398
Barometric pressure, in. Hg	30.38	30.31	30.65
Avg. orifice press. diff., in H_2O	1.09	1.57	1.56
Avg. dry gas meter temp., deg F	52.5	60.2	44.8
Avg. abs. dry gas meter temp., deg. R	513	520	505
Total liquid collected by train, ml	24.7	18.7	23.7
Std. vol. of H_2O vapor coll., cu.ft.	1.2	0.9	1.1
Dry gas meter calibration factor	0.9972	0.9972	0.9972
Sample vol. at meter cond., dcf	53.290	64.478	63.048
Sample vol. at std. cond., dscf [(1)]	55.714	66.341	67.591
Percent of isokinetic sampling	98.7	99.3	100.2
GAS STREAM COMPOSITION DATA:			
CO_2, % by volume, dry basis	0.0	0.0	0.0
O_2, % by volume, dry basis	20.9	20.9	20.9
N_2, % by volume, dry basis	79.1	79.1	79.1
Molecular wt. of dry gas, lb/lb mole	28.84	28.84	28.84
H_20 vapor in gas stream, prop. by vol.	0.020	0.013	0.016
Mole fraction of dry gas	0.980	0.987	0.984
Molecular wt. of wet gas, lb/lb mole	28.61	28.69	28.66
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-1.70	-1.70	-1.70
Absolute pressure, in. Hg	30.26	30.19	30.53
Avg. temperature, deg. F	64	67	56
Avg. absolute temperature, deg.R	524	527	516
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	28.8	29.3	28.7
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	10914	11080	10873
Avg. gas stream volumetric flow, dscf/min.	10886	11042	11156

[(1)] Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 in Hg (760 mm Hg)

TABLE 6-1 (cont.)
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
PPA CARBON BED INLET

TEST DATA			
Run number	1	2	3
Location	PPA CB Inlet	PPA CB Inlet	PPA CB Inlet
Date	1/8/2020	1/8/2020	1/9/2020
Time period	1015-1210	1335-1538	0839-1033
LABORATORY REPORT DATA, ug.			
Perfluorooctanoic Acid (PFOA)	0.458	0.825	0.642
HFPO Dimer Acid	30.068	24.639	47.096
EMISSION RESULTS, ug/dscm.			
Perfluorooctanoic Acid (PFOA)	0.29	0.44	0.34
HFPO Dimer Acid	19.05	13.11	24.60
EMISSION RESULTS, lb/dscf.			
Perfluorooctanoic Acid (PFOA)	1.81E-11	2.74E-11	2.09E-11
HFPO Dimer Acid	1.19E-09	8.19E-10	1.54E-09
EMISSION RESULTS, lb/hr.			
Perfluorooctanoic Acid (PFOA)	1.18E-05	1.82E-05	1.40E-05
HFPO Dimer Acid	7.77E-04	5.42E-04	1.03E-03
EMISSION RESULTS, g/sec.			
Perfluorooctanoic Acid (PFOA)	1.49E-06	2.29E-06	1.77E-06
HFPO Dimer Acid	9.78E-05	6.83E-05	1.29E-04

TABLE 6-2
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
PPA CARBON BED OUTLET

Test Data			
Run number	1	2	3
Location	PPA Stack	PPA Stack	PPA Stack
Date	1/8/2020	1/8/2020	1/9/2020
Time period	1015-1210	1335-1538	0839-1033
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.190	0.215	0.215
Cross sectional nozzle area, sq.ft.	0.000197	0.000252	0.000252
Barometric pressure, in. Hg	30.28	30.21	30.52
Avg. orifice press. diff., in H_2O	0.82	0.88	0.89
Avg. dry gas meter temp., deg F	47.7	66.3	39.5
Avg. abs. dry gas meter temp., deg. R	508	526	499
Total liquid collected by train, ml	11.9	14.4	14.1
Std. vol. of H_2O vapor coll., cu.ft.	0.56	0.68	0.66
Dry gas meter calibration factor	0.9834	0.9834	0.9834
Sample vol. at meter cond., dcf	48.515	51.590	50.318
Sample vol. at std. cond., dscf [(1)]	50.297	51.477	53.453
Percent of isokinetic sampling	99.2	98.8	98.9
GAS STREAM COMPOSITION DATA:			
CO_2, % by volume, dry basis	0.0	0.0	0.0
O_2, % by volume, dry basis	20.9	20.9	20.9
N_2, % by volume, dry basis	79.1	79.1	79.1
Molecular wt. of dry gas, lb/lb mole	28.84	28.84	28.84
H_20 vapor in gas stream, prop. by vol.	0.011	0.013	0.012
Mole fraction of dry gas	0.989	0.987	0.988
Molecular wt. of wet gas, lb/lb mole	28.72	28.70	28.70
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	1.80	1.80	1.50
Absolute pressure, in. Hg	30.41	30.34	30.63
Avg. temperature, deg. F	61	61	58
Avg. absolute temperature, deg.R	521	521	518
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	43.9	35.4	36.1
Stack/duct cross sectional area, sq.ft.	4.90	4.90	4.90
Avg. gas stream volumetric flow, wacf/min.	12907	10416	10622
Avg. gas stream volumetric flow, dscf/min.	13148	10552	10945

[(1)] Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 in Hg (760 mm Hg)

*Run 3 conducted prior to Run 2

TABLE 6-2 (cont.)
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
PPA CARBON BED OUTLET

TEST DATA			
Run number	1	2	3
Location	PPA Stack	PPA Stack	PPA Stack
Date	1/8/2020	1/8/2020	1/9/2020
Time period	1015-1210	1335-1538	0839-1033
LABORATORY REPORT DATA, ug.			
Perfluorooctanoic Acid (PFOA)	0.0255	0.1217	0.1011
HFPO Dimer Acid	2.8686	1.2683	1.6992
EMISSION RESULTS, ug/dscm.			
Perfluorooctanoic Acid (PFOA)	0.02	0.08	0.07
HFPO Dimer Acid	2.01	0.87	1.12
EMISSION RESULTS, lb/dscf.			
Perfluorooctanoic Acid (PFOA)	1.12E-12	5.21E-12	4.17E-12
HFPO Dimer Acid	1.26E-10	5.43E-11	7.01E-11
EMISSION RESULTS, lb/hr.			
Perfluorooctanoic Acid (PFOA)	8.81E-07	3.30E-06	2.74E-06
Perfluorooctanoic Acid (PFOA) (From Inlet Data)	1.18E-05	1.82E-05	1.40E-05
HFPO Dimer Acid	9.92E-05	3.44E-05	4.60E-05
HFPO Dimer Acid (From Inlet Data)	7.77E-04	5.42E-04	1.03E-03
EMISSION RESULTS, g/sec.			
Perfluorooctanoic Acid (PFOA)	1.11E-07	4.15E-07	3.45E-07
HFPO Dimer Acid	1.25E-05	4.33E-06	5.79E-06
Carbon Bed Removal Efficiency, % (PFOA)	92.6	81.8	80.5
Carbon Bed Removal Efficiency, % (HFPO-DA)	87.2	93.7	95.5

APPENDIX A
PROCESS OPERATIONS DATA

Date: 1/8/2020

Time	900				1000				1100				1200				1300				1400				1500			
Stack Testing						RUN 1 1015-1210													RUN 2 1335-1538										
A/F column Feed Ratev (pounds per hour)						150													150									
Charging water to Hyd - venting																					x	x						
Charging Sulfuric acid - venting																												
Hydrolysis - Wash Tank pressure Transfer to Hydrolysis																										x		
Hydrolysis - Phase Settle						X	X	X	X																			
Vap heels pressure transfer																												
Vap cycle						X	X	X	X	X	X	X	X						x									
Venting after press tran from North/South Acid tank to Hyd																												
DAF tran to Hyd - venting during transfer																												
Hydrolysis - transfer to Waste Acid Trailer													X															
Wash Tk to Vaporizer pressure transfer (new 8-2019)																												
Scrubber Recirculation Flow						38.0 gallons per minute													37.9 gallons per minute									
Scrubber dP						1.05 inwc													1.0 inwc									

Date: 1/9/2020																																
Time	700				800		900				1000				1100				1200				1300									
Stack Testing						RUN 3 0839-1033																										
A/F column Feed Ratev (pounds per hour)						200																										
Charging water to Hyd - venting																																
Charging Sulfuric acid - venting																																
Hydrolysis - Wash Tank pressure Transfer to Hydrolysis																																
Hydrolysis - Phase Settle																																
Vap heels pressure transfer																																
Vap cycle							x	x	x	x	x	x	x	x																		
Venting after press tran from North/South Acid tank to Hyd																																
DAF tran to Hyd - venting during transfer								x	x																							
Hydrolysis - transfer to Waste Acid Trailer																																
Wash Tk to Vaporizer pressure transfer (new 8-2019)																																
Scrubber Recirculation Flow						37.9 gallons per minute																										
Scrubber dP						1.0 inwc																										

APPENDIX B
RAW AND REDUCED TEST DATA

Sample and Velocity Traverse Point Data Sheet - Method 1

Client: Chemours
Location/Plant: Fayetteville NC
Source: P/A Stack

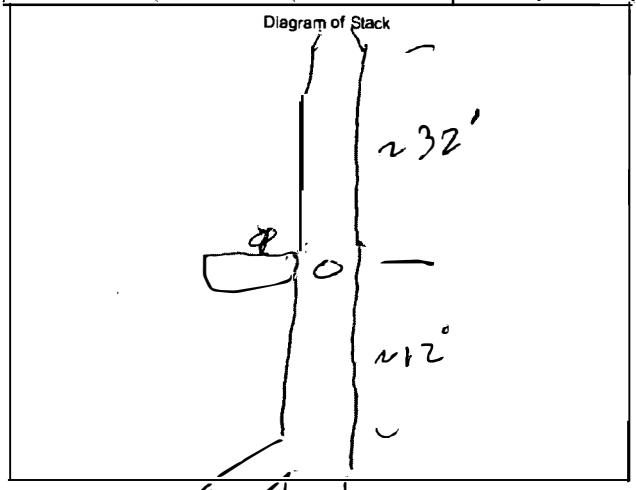
Operator: Paul
Date: 11/8/18
W.O. Number: 15918.002.007

					Indicate appropriate type
Duct Type	☒	Circular	☐	Rectangular Duct	
Traverse Type	☒	Particulate Traverse	☒	Velocity Traverse	☐ CEM Traverse

Distance from far wall to outside of port (in.) = C	45
Port Depth (in.) = D	15
Depth of Duct, diameter (in.) = C-D	30
Area of Duct (ft²)	4.90
Total Traverse Points	24
Total Traverse Points per Port	12
Port Diameter (in.) —(Flange-Threaded-Hole)	4"
Monorail Length	—
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	n/a
Total Ports (rectangular duct only)	n/a
Equivalent Diameter = (2*L*W)/(L+W)	

Flow Disturbances	
Upstream - A (ft)	~32
Downstream - B (ft)	~12
Upstream - A (duct diameters)	~12.8
Downstream - B (duct diameters)	~4.8

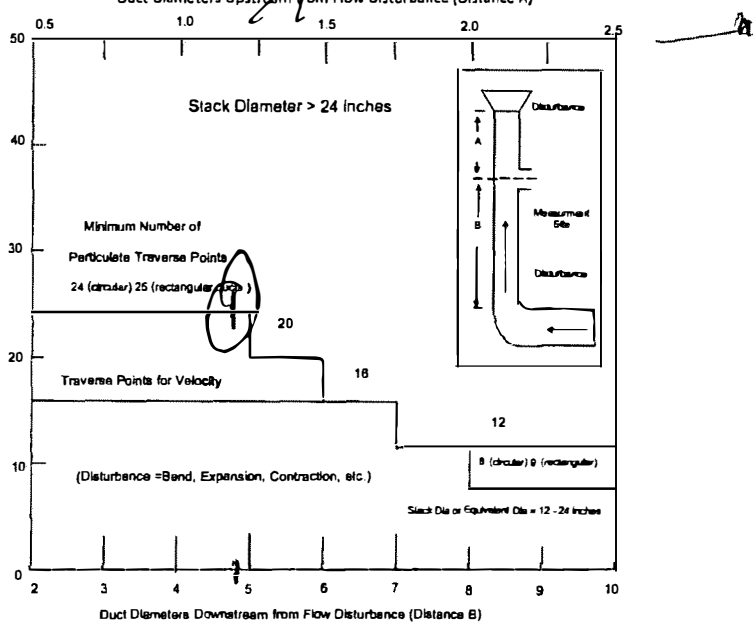
Diagram of Stack



Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	2.1	6.3	16
2	6.7	20.	17
3	10.9	3.5	18 1/2
4	17.7	5.3	20 3/8
5	25	7.5	22 1/2
6	35.6	10.7	7.5 3/4
7	64.4	19.3	34 3/8
8	75	22.5	37 1/2
9	82.3	24.7	39 3/4
10	93.2	26.6	41 1/2
11	93.3	28.0	43
12	97.9	29.4	44
CEM 3 Point(Long Measurment Line) Stratificaton Point Locations			
1	0.167		
2	0.50		
3	0.833		

Note: If stack dia < 12 inch use EPA Method 1A
(Sample port upstream of pitot port)
Note: If stack dia >24" then adjust traverse point to 1 inch from wall
If stack dia <24" then adjust traverse point to 0.5 inch from wall



Traverse Point Location Percent of Stack -Circular

Traverse Point	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

Traverse Point	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2		75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3			83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4				87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5					90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6						91.7	78.6	68.8	61.1	55.0	50.0	45.8
7							92.9	81.3	72.2	65.0	59.1	54.2
8								93.8	83.3	75.0	68.2	62.5
9									94.4	85.0	77.3	70.8
10										95.0	86.4	79.2
11											95.5	87.5
12												95.8

Sample and Velocity Traverse Point Data Sheet - Method 1

Client: Chemours
Loaction/Plant: Fayetteville, NC
Source: PPA Catpoon Bed inlet

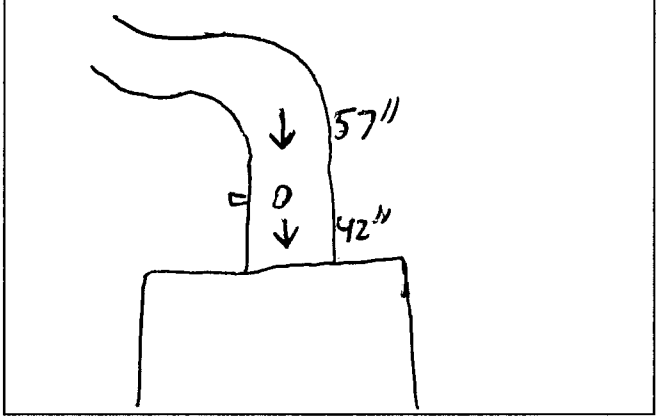
Operator: KS
Date: 6/11/18
W.O. Number:

Duct Type	☒ Circular	☐ Rectangular Duct	Indicate appropriate type	
Traverse Type	☐ Particulate Traverse	☐ Velocity Traverse	☐ CEM Traverse	

Distance from far wall to outside of port (in.) = C	51
Port Depth (in.) = D	~~17~~ 17
Depth of Duct, diameter (in.) = C-D	34
Area of Duct (ft²)	6.305
Total Traverse Points	24
Total Traverse Points per Port	12
Port Diameter (in.) —(Flange-Threaded-Hole)	
Monorail Length	
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	
Equivalent Diameter = (2*L*W)/(L+W)	

Flow Disturbances	
Upstream - A (ft)	3.50
Downstream - B (ft)	4.75
Upstream - A (duct diameters)	1.24
Downstream - B (duct diameters)	1.70

Diagram of Stack



Traverse Point Locations

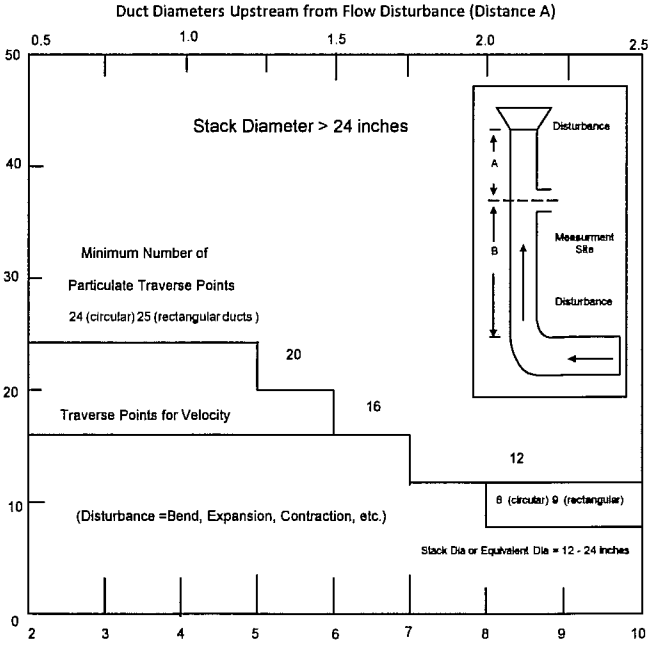
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)	
1	2.1	0.714	17.41	18
2	6.7	2.28	19.28	19 1/3
3	11.8	4.01	21.01	21
4	17.7	6.02	23.02	23
5	25	8.50	25.5	25 1/2
6	35.6	12.10	29.10	29
7	64.4	21.90	38.9	39
8	75	25.5	42.5	42 1/2
9	82.3	27.98	44.98	45
10	88.2	29.98	46.98	47
11	93.3	31.72	48.72	48 3/4
12	97.9	33.30	50.3	50

CEM 3 Point(Long Measurment Line) Stratificaton Point Locations

1	0.167		
2	0.50		
3	0.833		

Note: If stack dia < 12 inch use EPA Method 1A
(Sample port upstream of pitot port)
Note: If stack dia >24" then adjust traverse point to 1 inch from wall
If stack dia <24" then adjust traverse point to 0.5 inch from wall

Duct Diameters Upstream from Flow Disturbance (Distance A)



Duct Diameters Downstream from Flow Disturbance (Distanca B)

Traverse Point Location Percent of Stack -Circular

Traverse Point \ Number of Traverse Points	1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

Traverse Point \ Number of Traverse Points	1	2	3	4	5	6	7	8	9	10	11	12
1		25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2												
3			83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4												
5					90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6												
7							92.9	81.3	72.2	65.0	59.1	54.2
8												
9									94.4	85.0	77.3	70.8
10												
11											95.5	87.5
12												

ISOKINETIC FIELD DATA SHEET

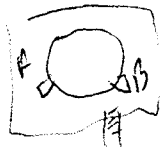
EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions					
Client	Chemours		Assumed	Actual	Meter Box ID	INC 30	
W.O.#	15418.002.020				Meter Box Y	0.9972 ✓	
Project ID	Chemours	% Moisture	2		Meter Box Del H	1.8715	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		13	Probe ID / Length		
Samp. Loc. ID	IN	Silica gel (g)		11.7	Probe Material	Boro	
Run No.ID	1	CO2, % by Vol	0.0		Pitot / Thermocouple ID	P206	
Test Method ID	M0010	O2, % by Vol	20.9		Pitot Coefficient	0.84 ✓	
Date ID	JAN2020	Temperature (°F)			Nozzle ID		
Source/Location	PPA CB Inlet	Meter Temp (°F)	53		Nozzle Measurements	0.250 / 0.251 / 0.250	
Sample Date	01/08/20 ✓	Static Press (in H_2O)	-2	-1.7 ✓	Avg Nozzle Dia (in)	0.250 ✓	
Baro. Press (in Hg)	30.38 ✓				Area of Stack (ft^2)	6.31 ✓	
Operator	Mills / Squire ✓	Ambient Temp (°F)			Sample Time	96 ✓	
					Total Traverse Pts	24 ✓	

	Initial	Mid-Point	Final
K Factor 4.0			
Sample Train (ft^3)	0.012	0.006	0.012
Leak Check @ (in Hg)	15	6	5
Pitot leak check good	(yes) / no	yes / no	yes / no
Pitot Inspection good	(yes) / no	yes / no	yes / no
Method 3 System good	NA yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	57		53
Reference Temp	46		54
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	(yes) / no		(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (cF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1015 ✓			406.686									
A 1	4		0.39	1.56	409.4	62	48	110	110	45	4	39		
2	8		0.39	1.56	412.1	62	48	108	108	39	4	35		
3	12		0.37	1.48	414.7	62	48	103	102	38	4	36		
4	16		0.35	1.40	417.3	63	49	102	101	39	4	36		
5	20		0.35	1.40	419.8	63	49	103	103	41	4	36		
6	24		0.30	1.20	422.3	63	50	102	101	43	3.5	37		
7	28		0.22	0.88	424.3	63	50	103	105	43	3	37		
8	32		0.20	0.80	426.1	63	51	104	105	42	3	37		
9	36		0.18	0.72	427.9	64	51	105	106	42	2.5	37		
10	40		0.15	0.60	429.6	64	52	104	103	42	2.5	38		
11	44		0.13 0.13	0.52 0.60	431.2	63	52	104	106	43	2.5	38		26.084
IV	48	1103	0.13	0.52	432.767	63	52	104	103	43	2.5	38		
	0	1122			432.824									
B 1	4		0.32	1.28	435.3	65	53	104	104	48	4	43		
2	8		0.32	1.28	437.8	65	54	106	104	44	4	42		
3	12		0.30	1.20	440.4	65	54	104	104	42	3.5	42		
4	16		0.28	1.12	442.4	65	54	105	104	43	3	42		
5	20		0.28	1.12	444.6	65	55	104	104	45	3	43		
6	24		0.27	1.08	446.9	65	55	104	104	46	3	43		
7	28		0.27	1.08	449.2	66	55	104	104	46	3	44		
8	32		0.26	1.04	451.3	66	56	105	104	45	3	44		
9	36		0.28	1.12	453.5	66	56	104	104	47	3	45		
10	40		0.28	1.12	455.7	66	56	104	104	49	3	46		
11	44		0.26	1.04	457.9	65	56	104	104	50	3	46		27.204
IV	48	1210 ✓	0.24	0.96	460.038	65	56	104	104	50	3	45		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.271667 ✓	1.08667 ✓	53.290 ✓	64.12 ✓	52.50 ✓	102/110	101/110	50	4	46		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:	64.13 ✓								
			0.515907	1.03181										

EPA Method 0010 from EPA SW-846



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ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

			Stack Conditions	
Client	Chemours		Assumed	Actual
W.O.#	15418.002.020			
Project ID	Chemours	% Moisture	2	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		5
Samp. Loc. ID	IN	Silica gel (g)		13.7
Run No.ID	2	CO2, % by Vol	0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	JAN2020	Temperature (°F)	65	
Source/Location	PPA CB Inlet	Meter Temp (°F)	33	
Sample Date	01/08/20 J	Static Press (in H_2O)	-1.7	-1.7 J
Baro. Press (in Hg)	30.31 J	Ambient Temp (°F)		
Operator	MHS/SG J			

Meter Box ID	MC30		
Meter Box Y	0.9977 J		
Meter Box Del H	1.8715		
Probe ID / Length			
Probe Material	Boro		
Pitot / Thermocouple ID	P706		
Pitot Coefficient	0.84 ✓		
Nozzle ID			
Nozzle Measurements	0.270	0.270	0.270
Avg Nozzle Dia (in)	0.270 J		
Area of Stack (ft^2)	6.31 J		
Sample Time	96 J		
Total Traverse Pts	24 J		

K Factor 5.63

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.005	0.004	0.004
Leak Check @ (in Hg)	14	9	8
Pitot leak check good	yes / no	yes / no	yes / no
Pitot Inspection good	yes / no	yes / no	yes / no
Method 3 System good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	57		61
Reference Temp	57		61
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1335 J			460.190									
B 1	4	03	0.31	1.91	463.2	65	58	105	108	57	5	48		
2	8		0.32	1.80	466.1	66	58	104	107	51	5	38		
3	12		0.31	1.74	469.0	66	58	104	104	47	5	38		
4	16		0.30	1.69	471.8	66	59	104	102	47	5	38		
5	20		0.30	1.69	474.6	66	59	104	103	48	5	39		
6	24		0.29	1.63	477.4	67	59	105	108	48	4.5	40		
7	28		0.28	1.57	480.3	67	59	104	103	48	4.5	40		
8	32		0.27	1.52	482.7	67	60	104	104	49	4	41		
9	36		0.27	1.52	485.4	67	60	105	108	49	4	41		
10	40		0.26	1.46	488.0	67	60	104	102	50	4	42		33.468
11	44		0.29	1.63	490.7	67	60	104	104	50	4.5	43		
12	48	1423	0.27	1.52	493.458	67	60	104	107	50	4	44		
	0	1430	—	—	493.535	—	—	—	—	—	—	—		
A 1	4		0.40	2.25	496.9	68	60	104	103	56	6	52		
2	8		0.39	2.19	500.1	68	60	104	104	54	6	51		
3	12		0.39	2.19	503.4	68	61	103	105	55	6	51		
4	16		0.36	2.02	506.3	68	61	104	103	57	5.5	52		
5	20		0.34	1.91	509.3	68	61	104	104	58	5	53		
6	24		0.31	1.74	512.2	68	61	104	102	59	5	54		
7	28		0.23	1.29	514.7	68	61	104	106	60	4	55		
8	32		0.18	1.01	516.9	68	62	104	104	60	3	55		
9	36		0.17	0.96	519.0	69	62	104	102	61	3	56		
10	40		0.14	0.79	520.9	68	61	104	105	61	3	56		31.210
11	44		0.15	0.84	522.9	68	62	104	108	61	3	56		
12	48	1538 J	0.13	0.73	524.745	68	62	104	105	61		57		
			J Avg Delta P	J Avg Delta H	J Total Volume	J Avg Ts	J Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.27875	1.56667	64.478	67.29	60.16	103/105	102/108	61	6	57		
			J Avg Sqrt Delta P	J Avg Sqrt Del H	Comments:									
			0.522309	1.23827										

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

A-CB

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.020			
Project ID	Chemours	% Moisture	2	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		
Samp. Loc. ID	IN	Silica gel (g)		
Run No.ID	3	CO2, % by Vol	0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	JAN2020	Temperature (°F)	54	
Source/Location	PPA CB Inlet	Meter Temp (°F)	93	
Sample Date	01/09/20 J	Static Press (in H_2O)	-1.7	-1.7 J
Baro. Press (in Hg)	30.65 J			
Operator	Mills / Sowma J	Ambient Temp (°F)		

Meter Box ID	IRC 30		
Meter Box Y	0.9972 J		
Meter Box Del H	1.871 J		
Probe ID / Length		Sample Train (ft^3)	
Probe Material	Boro	Leak Check @ (in Hg)	
Pitot / Thermocouple ID	P706	Pitot leak check good	yes / no
Pitot Coefficient	0.84 J	Pitot Inspection good	yes / no
Nozzle ID		Method 3 System good	yes / no
Nozzle Measurements	0.200 / 0.270 J / 0.270	**Temp Check**	
Avg Nozzle Dia (in)	0.270	Meter Box Temp	
Area of Stack (ft^2)	6.31 J	Reference Temp	
Sample Time	96 J	Pass/Fail (+/- 2°)	Pass / Fail
Total Traverse Pts	24 J	Temp Change Response ?	yes / no

K Factor 5.63

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.009	0.439	0.868
Leak Check @ (in Hg)	3	8	8
Pitot leak check good	yes / no	yes / no	yes / no
Pitot Inspection good	yes / no	yes / no	yes / no
Method 3 System good	yes / no	yes / no	yes / no
	Pre-Test Set		Post-Test Set
Meter Box Temp	38		45
Reference Temp	30		46
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (start time)	VELOCITY PRESSURE Delta P (in H_2O)	ORIFICE PRESSURE Delta H (in H_2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		
	0	0839 J			524.937									
A 1	4		0.40	2.25	528.2	54	41	104	106	38	5	44		
2	8		0.40	2.25	531.4	59	41	104	104	38	5	38		
3	12		0.38	2.14	534.5	59	41	104	105	39	5	36		
4	16		0.37	2.08	537.5	58	42	102	104	39	5	36		
5	20		0.35	1.97	540.5	58	42	102	105	38	4.5	36		
6	24		0.33	1.86	543.3	58	43	104	104	39	4.5	36		
7	28		0.24	1.35	545.8	57	43	104	106	39	3.5	36		30.711
8	32		0.19	1.07	547.9	56	44	104	105	38	3	36		
9	36		0.17	0.96	550.0	57	44	105	106	38	3	36		
10	40		0.15	0.84	551.9	56	44	105	105	37	2.5	36		
11	44		0.14	0.79	553.8	56	44	102	109	38	2	36		
12	48	0927	0.13	0.73	555.648	56	45	104	104	37	2	36		
	0	0945	—	—	555.715	—	—	—	—	—	—	—		
B 1	4		0.31	1.74	558.6	55	45	104	104	39	4	38		
2	8		0.32	1.80	561.5	56	45	104	102	39	4	38		
3	12		0.33	1.86	564.4	56	45	104	108	38	4	38		
4	16		0.30	1.69	567.2	56	46	104	104	39	4	38		
5	20		0.29	1.63	570.0	56	46	104	106	41	4	39		
6	24		0.29	1.63	572.6	56	47	104	104	41	4	39		
7	28		0.28	1.58	575.2	56	47	103	105	42	4	39		
8	32		0.26	1.46	578.0	56	47	105	108	42	3.5	40		
9	36		0.28	1.58	580.5	55	48	104	105	43	3.5	41		
10	40		0.26	1.46	582.9	55	48	104	104	43	3.5	41		32.737
11	44		0.26	1.46	585.7	55	48	104	105	44	3.5	41		
12	48	1033 J	0.22	1.24	588.052	55	49	104	103	45	3	42		
			J Avg Delta P	Avg Delta H	Total Volume	J Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.270683	1.55916	63.048	56.24	J 44.79	103 / 105	102 / 109	45	5	44		
			J Avg Sqrt Delta P	J Avg Sqrt Del H	Comments:									
			0.520667	1.73495										

EPA Method 0010 from EPA SW-846

WESTON SOLUTIONS

A Q B

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.020
Location/Plant	Fayetteville, NC	Source & Location	PPA CB Inlet

Run No. 1 — Sample Date 1/3/20 — Recovery Date 1/8/20

Sample I.D. Chemours - Carbon Bed - IN - 1 - M0010 - — Analyst [illegible] — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	0	109	106	3					311.7	
Initial	0	100	100	0					300	
Gain	0	9	6	3				18	11.7	47.7

Impinger Color clear — Labeled? ✓ ✓

Silica Gel Condition good — Sealed? ✓

Run No. 2 — Sample Date 1/8/20 — Recovery Date 1/8/20

Sample I.D. Chemours - Carbon Bed - IN - 2 - M0010 - — Analyst [illegible] — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	1	105	97	1					313.7	
Initial	0	100	100	0					300	
Gain	1	5	-3	1				5	13.7	

Impinger Color clear — Labeled? ✓ ✓

Silica Gel Condition good — Sealed? ✓

Run No. 3 — Sample Date 1/9/2020 — Recovery Date 1/9/2020

Sample I.D. Chemours - Carbon Bed - IN - 3 - M0010 - — Analyst — — Filter Number n/a

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	1	102	104	2				209	314.7	
Initial	2	100	100	0				200	300	
Gain	1	2	4	2				9	14.7	

Impinger Color clear — Labeled? ✓ ✓ ✓

Silica Gel Condition good — Sealed?

Check COC for Sample IDs of Media Blanks

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.020			
Project ID	Chemours	% Moisture	≈ 1.5	
Mode/Source ID	PPA	Impinger Vol (ml)		7
Samp. Loc. ID	STK	Silica gel (g)		9.9
Run No.ID	1	CO2, % by Vol	0.1	
Test Method ID	M0010	O2, % by Vol	20.8	
Date ID	JAN2020	Temperature (°F)	60	
Source/Location	PPA Stack	Meter Temp (°F)	≈45	
Sample Date	1/08/2020 ✓	Static Press (in H_2O)	-1.8 ✓	
Baro. Press (in Hg)	30.28 ✓			
Operator	MPW WINKELER ✓	Ambient Temp (°F)	≈47	

Meter Box ID	32		
Meter Box Y	0.9934 ✓		
Meter Box Del H	1.7775		
Probe ID / Length	563	5'	Sample Train (ft³)
Probe Material	Boro		Leak Check @ (in Hg)
Pitot / Thermocouple ID	P563		Pitot leak check good
Pitot Coefficient	0.84 ✓		Pitot Inspection good
Nozzle ID	G190		Method 3 System good
Nozzle Measurements	0.194	0.190	0.196	**Temp Check**
Avg Nozzle Dia (in)	0.190 ✓		Meter Box Temp
Area of Stack (ft²)	4.90 ✓		Reference Temp
Sample Time	96 ✓		Pass/Fail (+/- 2°)
Total Traverse Pts	24 ✓		Temp Change Response ?

K Factor 1.27

	Initial	Mid-Point	Final
Sample Train (ft³)	0.001	0.002	0.001
Leak Check @ (in Hg)	≤15	≤6	≤6
Pitot leak check good	yes / no	yes / no	yes / no
Pitot Inspection good	yes / no	yes / no	yes / no
Method 3 System good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	48		51
Reference Temp	47		52
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1015 ✓			520.035									
A 1	4		0.68	0.869	522.16	60	45	100	100	45	3	42		
2	8		0.75	0.952	524.45	60	45	100	100	45	3	42		
3	12		0.85	1.07	526.65	60	45	100	100	46	3	42		27,335
4	16		0.85	1.07	528.94	60	45	100	100	47	3	40		
5	20		0.90	1.14	531.40	60	47	100	100	47	3	39		
6	24		0.90	1.14	533.70	60	47	100	100	47	3	39		
7	28		0.95	1.20	536.21	60	47	100	100	44	3	38		
8	32		1.00	1.27	538.770	60	47	100	100	44	3	38		
9	36		1.00	1.27	541.20	60	47	100	100	44	3	37		
10	40		0.85	1.07	543.52	60	47	100	100	44	3	34		PROCESS
11	44		0.75	0.952	545.45	60	47	100	100	44	2.8	35		NOZZLE
12	48	1103	0.50	0.635	547.370	60	47	100	100	44	2	35		* PUMP SHUTOFF
B	4	1122 MPW/pdl	0.40	0.508	547.440						*			
1			~~0.75~~	~~0.952~~	549.20	61	47	100	100	49	1	39		
2	8		~~0.75~~ 0.49	0.571	550.65	61	48	100	100	49	1	39		—
3	12	0.635	~~0.75~~ 0.45	~~0.850~~	553.21	61	48	100	100	49	2	39	←	1.89
4	16		0.50	0.635	554.90	61	48	100	100	49	2	40		
5	20		0.52	0.660	556.710	62	48	100	100	49	2	40		
6	24		0.52	0.660	558.30	62	48	100	100	49	2	40		21.120
7	28		0.45	0.571	560.14	62	48	100	100	49	2	40		
8	32		0.50	0.635	561.94	62	50	100	103	48	2	38		
9	36		0.55	0.698	562.95	62	50	100	101	48	2	38		
10	40		0.45	0.571	565.65	62	51	100	100	48	2	39		
11	44		0.35	0.444	567.10	62	51	100	100	48	2	39		
12	48	0.35 1210 ✓	~~0.35~~	0.4441	568.620	62	51	100	100	48	2.1	39		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.629130	0.816917	48.515	61	47.67 48	100	100 / 101	49	3	34 / 42		
			Avg Sqrt Delta P	Avg Sqrt Del H										
			0.791705	0.899269										

Comments: 100.83 * CHANGED NOZZLES OUT POINT CHANGE 0.004 ≤6 547.399 0.002 ≤6

EPA Method 0010 from EPA SW-846

MPW 1/08/2020 MPW 01/08/2020

0.64458 / 0.79161 × 0.45000 = 0.61351

0.81958 / 0.89299 ✓

0.210 MMM

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.020			
Project ID	Chemours	% Moisture	=1.5	
Mode/Source ID	PPA	Impinger Vol (ml)		4 / 10.4
Samp. Loc. ID	STK	Silica gel (g)		
Run No.ID	2	CO2, % by Vol	0.1	
Test Method ID	M0010	O2, % by Vol	20.8	
Date ID	JAN2020	Temperature (°F)	=60	
Source/Location	PPA Stack	Meter Temp (°F)	≈60	
Sample Date	1/09/20 ✓	Static Press (in H_2O)	1.8 ✓	
Baro. Press (in Hg)	~~30.17~~ 30.21 ✓			
Operator	MP WWINKELER ✓	Ambient Temp (°F)	~56	

Meter Box ID	32		
Meter Box Y	0.9834		
Meter Box Del H	1.7175		
Probe ID / Length	563	5'	Sample Train (ft³)
Probe Material	Boro		Leak Check @ (in Hg)
Pitot / Thermocouple ID	0563		Pitot leak check good
Pitot Coefficient	0.84		Pitot Inspection good
Nozzle ID	5215		Method 3 System good
Nozzle Measurements	0.215	0.215 / 0.215	**Temp Check**
Avg Nozzle Dia (in)	0.215 ✓		Meter Box Temp
Area of Stack (ft²)	4.90 ✓		Reference Temp
Sample Time	96 ✓		Pass/Fail (+/- 2°)
Total Traverse Pts	24 ✓		Temp Change Response ?

K Factor 2.15

	Initial	Mid-Point	Final
Sample Train (ft³)	0.001	0.001	0.001
Leak Check @ (in Hg)	✓15	✓5	4
Pitot leak check good	(yes) / no	(yes) / no	(yes) / no
Pitot Inspection good	(yes) / no	(yes) / no	(yes) / no
Method 3 System good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	56		63
Reference Temp	55		62
Pass/Fail (+/- 2°)	(Pass) / Fail		(Pass) / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1335 ✓			569.200									
B 1	4		0.45	0.967	571.40	61	62	100	104	54	2	45		
2	8		0.45	0.967	573.65	61	62	100	101	50	2	42		
3	12		0.45	0.967	575.90	60	62	100	101	49	2	42		25.430
4	16		0.46	0.989	578.18	60	62	100	1095	49	2	40		
5	20		0.46	0.989	580.41	60	63	100	98	49	2	40		
6	24		0.45	0.967	582.72	60	63	100	97	49	2	40		
7	28		0.45	0.967	524.90	61	63	100	97	49	2	40		
8	32		0.38	0.817	586.94	61	63	100	98	49	2	40		
9	36		0.38	0.817	589.04	61	63	100	99	49	2	40		
10	40		0.35	0.752	591.03	62	65	100	99	44	2	39		
11	44		0.30	0.645	592.40	62	65	100	100	49	2	39		
12	48	1423	0.25	0.537	594.630	62	65	100	100	49	2	31		
A		1450			595.100								*	
1	4		0.45	0.967	597.65	62	68	100	100	56	2	38		
2	8		0.45	0.967	599.69	62	68	101	103	51	2	38		26.160
3	12		0.45	0.967	601.92	62	69	101	98	51	2	38		
4	16		0.45	0.967	603.605	62	69	101	97	51	2	38		
5	20		0.46	0.989	606.70	62	69	101	104	49	2	37		
6	24		0.46	0.989	609.33	62	69	101	101	47	2	37		
7	28		0.46	0.989	611.10	62	70	100	100	47	2	37		
8	32		0.45	0.967	613.30	62	70	100	100	47	2	38		
9	36		0.38	0.817	615.44	62	70	100	100	47	2	38		
10	40		0.38	0.817	617.20	62	70	100	100	47	2	38		
11	44		0.30	0.645	619.30	62	71	100	100	48	2	39		
12	48	1539 ✓	0.30	0.645	621.260	62	71	100	100	48	2	39		
			✓ Avg Delta P	✓ Avg Delta H	✓ Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.409167	0.67946	51.590	61 ✓	66	100 / 101	95 / 104	56	2	34 / 45		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:	61.46	66.33							
			0.637496	0.934621										

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

A CURVED NOZZLES & PITOT TUBE ARE IN COMPLIANCE
MP 1/07/2020

0.443750
0.665876

MD

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Page 1 of 1

		Stack Conditions					
Client	Chemours		Assumed	Actual	Meter Box ID	32	
W.O.#	15418.002.020				Meter Box Y	0.9834 ✓	
Project ID	Chemours	% Moisture	1.1		Meter Box Del H	1.7175	
Mode/Source ID	PPA	Impinger Vol (ml)		4	Probe ID / Length	563 / 7'	Sample Train (ft^3)
Samp. Loc. ID	STK	Silica gel (g)		10.1	Probe Material	Boro	Leak Check @ (in Hg)
Run No.ID	3	CO2, % by Vol	0.1		Pitot / Thermocouple ID	P563	Pitot leak check good
Test Method ID	M0010	O2, % by Vol	20.9		Pitot Coefficient	0.84 ✓	Pitot Inspection good
Date ID	JAN2020	Temperature (°F)	≈60		Nozzle ID	S215 ✓	Method 3 System good
Source/Location	PPA Stack	Meter Temp (°F)	045		Nozzle Measurements	0.215 / 0.215 / 0.215	**Temp Check**
Sample Date	1/09/20 ✓	Static Press (in H_2O)	-0.25	1.5 ✓	Avg Nozzle Dia (in)	0.215 ✓	Meter Box Temp
Baro. Press (in Hg)	30.52 ✓				Area of Stack (ft^2)	MW 4.90 4.90 ✓	Reference Temp
Operator	MW WENKELER ✓	Ambient Temp (°F)	≈34		Sample Time	96 ✓	Pass/Fail (+/- 2°)
					Total Traverse Pts	24 ✓	Temp Change Response ?

K Factor	2.08		
	Initial	Mid-Point	Final
Sample Train (ft^3)	0.000	0.001	0.00
Leak Check @ (in Hg)	≤.15	≤4	≤4
Pitot leak check good	yes / no	yes / no	yes / no
Pitot Inspection good	yes / no	yes / no	yes / no
Method 3 System good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Se
Meter Box Temp	32		MW 38 37
Reference Temp	3		
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	0939 ✓			621.465									
A 1	4		0.40	0.832	623.40	58	35	100	101	35	1	32		
2	8		0.45	0.936	625.47	58	35	100	100	35	1	32		
3	12		0.45	0.936	627.60	58	35	100	100	35	1	32		24.785
4	16		0.47	0.977	629.81	59	36	100	100	36	1	33		
5	20		0.48	0.998	632.23	59	36	100	100	36	1/2	33		
6	24		0.48	0.998	634.26	58	37	100	100	36	1/2	33		
7	28		0.48	0.998	636.37	58	37	100	100	36	2	33		
8	32		0.45	0.936	638.74	57	37	100	100	36	2	33		
9	36		0.40	0.832	640.35	57	37	100	100	37	2	33		
10	40		0.35	0.728	643.52	57	37	100	100	37	2	33		
11	44		0.30	0.624	644.72	57	37	100	100	37	2	33		
12	48	0927	0.30	0.624	646.250	57	37	100	100	37	2	33		
		0945			646.302									
B 1	4		0.45	0.936	648.44	58	41	100	100	39	2	36		25.533
2	8		0.45	0.936	650.50	58	41	100	100	39	2	36		
3	12		0.45	0.936	653.45	58	41	100	100	39	2	36		
4	16		0.48	0.998	654.99	58	42	100	100	37	2	35		
5	20		0.49	1.01	657.20	58	43	100	99	37	2	35		
6	24		0.49	1.01	659.55	58	43	100	99	37	2	35		
7	28		0.49	1.01	661.74	58	43	100	99	37	2	35		
8	32		0.45	0.936	663.81	58	43	100	99	37	2	35		
9	36		0.45	0.936	665.74	58	43	100	99	37	2	35		
10	40		0.40	0.832	667.01	58	43	100	99	38	2	36		
11	44		0.48	0.932	670.00	58	44	100	101	38	2	36		
12	48	1033 ✓	0.35	0.624	671.835	59	44	100	100	38	2	36		
			✓ Avg Delta P	✓ Avg Delta H	✓ Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.431667	0.892242	50.318	58 ✓	39 ✓	100/100	99/101	39	2	32/36		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:	57.92	39.46					EPA Method 0010 from EPA SW-846		
		✓	0.655496	0.942115										

WESTON SOLUTIONS

AMA

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.020
Location/Plant	Fayetteville, NC	Source & Location	PPA Stack

Run No. 1 — Sample Date 1/8/20 — Recovery Date 1/8/20

Sample I.D. Chemours - PPA - STK - 1 - M0010 - — Analyst Nm — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	1	100	100	1				202	309.9	
Initial	0	100	100	0				200	300	
Gain	1	0	0	1				2 ✓	9.9 ✓	

Impinger Color Clear — Labeled? ✓

Silica Gel Condition Good — Sealed? ✓

Run No. 2 — Sample Date 1/8/20 — Recovery Date 1/8/20

Sample I.D. Chemours - PPA - STK - 2 - M0010 - — Analyst OK — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	1	100	102	1				204	310.4	
Initial	0	100	100	0				200	300	
Gain	1	0	2	1				4 ✓	10.4 ✓	

Impinger Color Clear — Labeled? ✓

Silica Gel Condition Good — Sealed? ✓

Run No. 3 — Sample Date 1/9/20 — Recovery Date 1/9/20

Sample I.D. Chemours - PPA - STK - 3 - M0010 - — Analyst — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	1	102	100	1				204	310.1	
Initial	0	100	100	0				200	300	
Gain	1	2	0	1		✓		4 ✓	10.1 ✓	

Impinger Color Clear — Labeled? ✓

Silica Gel Condition good — Sealed? ✓

Check COC for Sample IDs of Media Blanks

SAMPLE RECOVERY FIELD DATA

Client: Chemours | W.O. #: 15418.002.~~019~~ 020
Location/Plant: Fayetteville, NC | Source & Location: Blank Train - PDA

Run No. BT | Sample Date 1/8/20 | Recovery Date 1/9/20
Sample I.D. _____ | Analyst DWM | Filter Number N/A

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents									Silica Gel	
Final	0	100	100	0					330	
Initial	0	100	100	0					300	
Gain	0	0	0	0					30	

Impinger Color: clear | Labeled? ✓
Silica Gel Condition: Good | Sealed? ✓

Run No. ___ | Sample Date _____ | Recovery Date _____
Sample I.D. _____ | Analyst _____ | Filter Number _____

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents									Silica Gel	
Final										
Initial										
Gain										

Impinger Color _____ | Labeled? _____
Silica Gel Condition _____ | Sealed? _____

Run No. ___ | Sample Date _____ | Recovery Date _____
Sample I.D. _____ | Analyst _____ | Filter Number _____

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents									Silica Gel	
Final										
Initial										
Gain										

Impinger Color _____ | Labeled? _____
Silica Gel Condition _____ | Sealed? _____

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

File: C:\DATA\Chemours\January\010820PPA.cem
Program Version: 2.1, built 19 May 2017 **File Version:** 2.02
Computer: WSWCAIRSERVICES **Trailer:** 27
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.3**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**20.0**
Span Concentration, %	**17.1**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Start Time: 07:58

O_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	**Cylinder ID**
12.0	ALM056900
21.3	ALM047628

Calibration Results

Zero	2 mv
Span, 21.3 %	8103 mv

Curve Coefficients

Slope	**Intercept**
381.2	2

CO_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	**Cylinder ID**
8.9	ALM056900
17.1	ALM047628

Calibration Results

Zero	7 mv
Span, 17.1 %	8531 mv

Curve Coefficients

Slope	**Intercept**
499.9	7

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.020.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **PPA** | Calibration **1** | Date: **8 Jan 2020**

Start Time: 07:58

O_2
Method: EPA 3A
Span Conc. 21.3 %
Slope 381.2 **Intercept** 2.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.0	0.0	0.0	Pass
21.2	21.2	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %
Slope 499.9 **Intercept** 7.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.9	8.8	-0.1	-0.6	Pass
17.0	17.0	0.0	0.0	Pass

BIAS

Number 1

Client:	**Chemours**	Project Number:	**15418.002.020.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**PPA**	Calibration **1**	Date: **8 Jan 2020**

Start Time: 08:49

O_2

Method: EPA 3A

Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	12.0	12.0	0.0	0.0	Pass

CO_2

Method: EPA 3A

Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	1.2	Pass
Span	8.8	8.7	-0.1	-0.6	Pass

RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
10:15	20.9	0.0
10:16	20.9	0.0
10:17	20.9	0.0
10:18	20.9	0.0
10:19	20.9	0.0
10:20	20.9	0.0
10:21	20.9	0.0
10:22	20.9	0.0
10:23	20.9	0.0
10:24	20.9	0.0
10:25	20.9	0.0
10:26	20.9	0.0
10:27	20.9	0.0
10:28	20.9	0.0
10:29	20.9	0.0
10:30	20.9	0.0
10:31	20.9	0.0
10:32	20.9	0.0
10:33	20.9	0.0
10:34	20.9	0.0
10:35	20.9	0.0
10:36	20.9	0.0
10:37	20.9	0.0
10:38	20.9	0.0
10:39	20.9	0.0
10:40	20.9	0.0
10:41	20.9	0.0
10:42	20.9	0.0
10:43	20.9	0.0
10:44	20.9	0.0
10:45	20.9	0.0
10:46	20.9	0.0
10:47	20.9	0.0
10:48	20.9	0.0
10:49	20.9	0.0
10:50	20.9	0.0
10:51	20.9	0.0
10:52	20.9	0.0
10:53	20.9	0.0
10:54	20.9	0.0

RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
10:55	20.9	0.0
10:56	20.9	0.0
10:57	20.9	0.0
10:58	20.9	0.0
10:59	20.9	0.0
11:00	20.9	0.0
11:01	20.9	0.0
11:02	20.9	0.0
11:03	20.9	0.0
11:04	20.9	0.0
11:05	20.9	0.0
11:06	20.9	0.0
11:07	20.9	0.0
11:08	20.9	0.0
11:09	20.9	0.0
11:10	20.9	0.0
11:11	20.9	0.0
11:12	20.9	0.0
11:13	20.9	0.0
11:14	20.9	0.0
11:15	20.9	0.0
11:16	20.9	0.0
11:17	20.9	0.0
11:18	20.9	0.0
11:19	20.9	0.0
11:20	20.9	0.0
11:21	20.9	0.0
11:22	20.9	0.0
11:23	20.9	0.0
11:24	20.9	0.0
11:25	20.9	0.0
11:26	20.9	0.0
11:27	20.9	0.0
11:28	20.9	0.0
11:29	20.9	0.0
11:30	20.9	0.0
11:31	20.9	0.0
11:32	20.9	0.0
11:33	20.9	0.0
11:34	20.9	0.0

RUN DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.020.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **PPA** | Calibration **1** | Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
11:35	20.9	0.0
11:36	20.9	0.0
11:37	20.9	0.0
11:38	20.9	0.0
11:39	20.9	0.0
11:40	20.9	0.0
11:41	20.9	0.0
11:42	20.9	0.0
11:43	20.9	0.0
11:44	20.9	0.0
11:45	20.9	0.0
11:46	20.9	0.0
11:47	20.9	0.0
11:48	20.9	0.0
11:49	20.9	0.0
11:50	20.9	0.0
11:51	20.9	0.0
11:52	20.9	0.0
11:53	20.9	0.0
11:54	20.9	0.0
11:55	20.9	0.0
11:56	20.9	0.0
11:57	20.9	0.0
11:58	20.9	0.0
11:59	20.9	0.0
12:00	20.9	0.0
12:01	20.9	0.0
12:02	20.9	0.0
12:03	20.9	0.0
12:04	20.9	0.0
12:05	20.9	0.0
12:06	20.9	0.0
12:07	20.9	0.0
12:08	20.9	0.0
12:09	20.9	0.0
12:10	20.9	0.0
Avgs	**20.9**	**0.0**

RUN SUMMARY

Number 1

Client:	**Chemours**	Project Number:	**15418.002.020.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**PPA**	Calibration **1**	Date: **8 Jan 2020**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 10:14 to 12:10

Run Averages

20.9	0.0

Pre-run Bias at 08:49

Zero Bias	0.1	0.2
Span Bias	12.0	8.7
Span Gas	12.0	8.9

Post-run Bias at 12:14

Zero Bias	0.1	0.1
Span Bias	12.0	8.6
Span Gas	12.0	8.9

Run averages corrected for the average of the pre-run and post-run bias

21.0	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client:	**Chemours**	Project Number:	**15418.002.020.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**PPA**	Calibration **1**	Date: **8 Jan 2020**

Start Time: 12:14

O_2

Method: EPA 3A

Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	12.0	12.0	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.1	0.0	0.0	Pass
Span	12.0	12.0	0.0	0.0	Pass

*Bias No. 1

CO_2

Method: EPA 3A

Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.8	8.6	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.2	0.1	-0.1	-0.6	Pass
Span	8.7	8.6	-0.1	-0.6	Pass

*Bias No. 1

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
13:35	20.9	0.0
13:36	20.9	0.0
13:37	20.9	0.0
13:38	20.9	0.0
13:39	20.9	0.0
13:40	20.9	0.0
13:41	20.9	0.0
13:42	20.9	0.0
13:43	20.9	0.0
13:44	20.9	0.0
13:45	20.9	0.0
13:46	20.9	0.0
13:47	20.9	0.0
13:48	20.9	0.0
13:49	20.9	0.0
13:50	20.9	0.0
13:51	20.9	0.0
13:52	20.9	0.0
13:53	20.9	0.0
13:54	20.9	0.0
13:55	20.9	0.0
13:56	20.9	0.0
13:57	20.9	0.0
13:58	20.9	0.0
13:59	20.9	0.0
14:00	20.9	0.0
14:01	20.9	0.0
14:02	20.9	0.0
14:03	20.9	0.0
14:04	20.9	0.0
14:05	20.9	0.0
14:06	20.9	0.0
14:07	20.9	0.0
14:08	20.9	0.0
14:09	20.9	0.0
14:10	20.9	0.0
14:11	20.9	0.0
14:12	20.9	0.0
14:13	20.9	0.0
14:14	20.9	0.0

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
14:15	20.9	0.0
14:16	20.9	0.0
14:17	20.9	0.0
14:18	20.9	0.0
14:19	20.9	0.0
14:20	20.9	0.0
14:21	20.9	0.0
14:22	20.9	0.0
14:23	20.9	0.0
14:24	20.9	0.0
14:25	20.9	0.0
14:26	20.9	0.0
14:27	20.9	0.0
14:28	20.9	0.0
14:29	20.9	0.0
14:30	20.9	0.0
14:31	20.9	0.0
14:32	20.9	0.0
14:33	20.9	0.0
14:34	20.9	0.0
14:35	20.9	0.0
14:36	20.9	0.0
14:37	20.9	0.0
14:38	20.9	0.0
14:39	20.9	0.0
14:40	20.9	0.0
14:41	20.9	0.0
14:42	20.9	0.0
14:43	20.9	0.0
14:44	20.9	0.0
14:45	20.9	0.0
14:46	20.9	0.0
14:47	20.9	0.0
14:48	20.9	0.0
14:49	20.9	0.0
14:50	20.9	0.0
14:51	20.9	0.0
14:52	20.9	0.0
14:53	20.9	0.0
14:54	20.9	0.0

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
14:55	20.9	0.0
14:56	20.9	0.0
14:57	20.9	0.0
14:58	20.9	0.0
14:59	20.9	0.0
15:00	20.9	0.0
15:01	20.9	0.0
15:02	20.9	0.0
15:03	20.9	0.0
15:04	20.9	0.0
15:05	20.9	0.0
15:06	20.9	0.0
15:07	20.9	0.0
15:08	20.9	0.0
15:09	20.9	0.0
15:10	20.9	0.0
15:11	20.9	0.0
15:12	20.9	0.0
15:13	20.9	0.0
15:14	20.9	0.0
15:15	20.9	0.0
15:16	20.9	0.0
15:17	21.0	0.0
15:18	21.0	0.0
15:19	21.0	0.0
15:20	21.0	0.0
15:21	21.0	0.0
15:22	21.0	0.0
15:23	21.0	0.0
15:24	21.0	0.0
15:25	21.0	0.0
15:26	21.0	0.0
15:27	21.0	0.0
15:28	21.0	0.0
15:29	21.0	0.0
15:30	21.0	0.0
15:31	21.0	0.0
15:32	21.0	0.0
15:33	21.0	0.0
15:34	21.0	0.0

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **8 Jan 2020**

Time	O_2 %	CO_2 %
15:35	21.0	0.0
15:36	21.0	0.0
15:37	21.0	0.0
15:38	21.0	0.0
Avgs	**20.9**	**0.0**

RUN SUMMARY

Number 2

Client:	**Chemours**	Project Number:	**15418.002.020.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**PPA**	Calibration **1**	Date: **8 Jan 2020**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 13:34 to 15:38

Run Averages

20.9	0.0

Pre-run Bias at 12:14

Zero Bias	0.1	0.1
Span Bias	12.0	8.6
Span Gas	12.0	8.9

Post-run Bias at 15:41

Zero Bias	0.1	0.0
Span Bias	12.1	8.6
Span Gas	12.0	8.9

Run averages corrected for the average of the pre-run and post-run bias

20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours** | Project Number: **15418.002.020.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **PPA** | Calibration **1** | Date: **8 Jan 2020**

Start Time: 15:41

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	12.0	12.1	0.1	0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.1	0.0	0.0	Pass
Span	12.0	12.1	0.1	0.5	Pass

*Bias No. 2

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.8	8.6	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.0	-0.1	-0.6	Pass
Span	8.6	8.6	0.0	0.0	Pass

*Bias No. 2

METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **9 Jan 2020**

File: C:\DATA\Chemours\January\010920PPA.cem
Program Version: 2.1, built 19 May 2017 **File Version:** 2.02
Computer: WSWCAIRSERVICES **Trailer:** 27
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.3**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**20.0**
Span Concentration, %	**17.1**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **9 Jan 2020**

Start Time: 07:32

O_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	**Cylinder ID**
12.0	ALM056900
21.3	ALM047628

Calibration Results

Zero	12 mv
Span, 21.3 %	8118 mv

Curve Coefficients

Slope	**Intercept**
381.5	12

CO_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	**Cylinder ID**
8.9	ALM056900
17.1	ALM047628

Calibration Results

Zero	3 mv
Span, 17.1 %	8536 mv

Curve Coefficients

Slope	**Intercept**
500.5	3

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.020.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **PPA** | Calibration **1** | Date: **9 Jan 2020**

Start Time: 07:38

O_2
Method: EPA 3A
Span Conc. 21.3 %
Slope 381.5 **Intercept** 12.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.0	0.0	0.0	Pass
21.2	21.2	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %
Slope 500.5 **Intercept** 3.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.9	8.7	-0.2	-1.2	Pass
17.0	17.0	0.0	0.0	Pass

BIAS

Number 1

Client: **Chemours** | Project Number: **15418.002.020.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **PPA** | Calibration **1** | Date: **9 Jan 2020**

Start Time: 07:44

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	12.0	-0.1	-0.5	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.7	8.6	-0.1	-0.6	Pass

RUN DATA

Number 3

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **9 Jan 2020**

Time	O_2 %	CO_2 %
08:39	20.9	0.0
08:40	20.9	0.0
08:41	20.9	0.0
08:42	20.9	0.0
08:43	20.9	0.0
08:44	20.9	0.0
08:45	20.9	0.0
08:46	20.9	0.0
08:47	20.9	0.0
08:48	20.9	0.0
08:49	20.9	0.0
08:50	20.9	0.0
08:51	20.9	0.0
08:52	20.9	0.0
08:53	20.9	0.0
08:54	20.9	0.0
08:55	20.9	0.0
08:56	20.9	0.0
08:57	20.9	0.0
08:58	20.9	0.0
08:59	20.9	0.0
09:00	20.9	0.0
09:01	20.9	0.0
09:02	20.9	0.0
09:03	20.9	0.0
09:04	20.9	0.0
09:05	20.9	0.0
09:06	20.9	0.0
09:07	20.9	0.0
09:08	20.9	0.0
09:09	20.9	0.0
09:10	20.9	0.0
09:11	20.9	0.0
09:12	20.9	0.0
09:13	20.9	0.0
09:14	20.9	0.0
09:15	20.9	0.0
09:16	20.9	0.0
09:17	20.9	0.0
09:18	20.9	0.0

RUN DATA

Number 3

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **9 Jan 2020**

Time	O_2 %	CO_2 %
09:19	20.9	0.0
09:20	20.9	0.0
09:21	20.9	0.0
09:22	20.9	0.0
09:23	20.9	0.0
09:24	20.9	0.0
09:25	20.9	0.0
09:26	20.9	0.0
09:27	20.9	0.0
09:28	20.9	0.0
09:29	20.9	0.0
09:30	20.9	0.0
09:31	20.9	0.0
09:32	20.9	0.0
09:33	20.9	0.0
09:34	20.9	0.0
09:35	20.9	0.0
09:36	20.9	0.0
09:37	20.9	0.0
09:38	20.9	0.0
09:39	20.9	0.0
09:40	20.9	0.0
09:41	20.9	0.0
09:42	20.9	0.0
09:43	20.9	0.0
09:44	20.9	0.0
09:45	20.9	0.0
09:46	20.9	0.0
09:47	20.9	0.0
09:48	20.9	0.0
09:49	20.9	0.0
09:50	20.9	0.0
09:51	20.9	0.0
09:52	20.9	0.0
09:53	20.9	0.0
09:54	20.9	0.0
09:55	20.9	0.0
09:56	20.9	0.0
09:57	20.9	0.0
09:58	20.9	0.0

RUN DATA

Number 3

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA**

Calibration **1**

Project Number: **15418.002.020.0001**
Operator: **KS**
Date: **9 Jan 2020**

Time	O_2 %	CO_2 %
09:59	20.9	0.0
10:00	20.9	0.0
10:01	20.9	0.0
10:02	20.9	0.0
10:03	20.9	0.0
10:04	20.9	0.0
10:05	20.9	0.0
10:06	20.9	0.0
10:07	20.9	0.0
10:08	20.9	0.0
10:09	20.9	0.0
10:10	20.9	0.0
10:11	20.9	0.0
10:12	20.9	0.0
10:13	20.9	0.0
10:14	20.9	0.0
10:15	20.9	0.0
10:16	20.9	0.0
10:17	20.9	0.0
10:18	20.9	0.0
10:19	20.9	0.0
10:20	20.9	0.0
10:21	20.9	0.0
10:22	20.9	0.0
10:23	20.9	0.0
10:24	20.9	0.0
10:25	20.9	0.0
10:26	20.9	0.0
10:27	20.9	0.0
10:28	20.9	0.0
10:29	20.9	0.0
10:30	20.9	0.0
10:31	20.9	0.0
10:32	20.9	0.0
10:33	20.9	0.0
Avgs	**20.9**	**0.0**

RUN SUMMARY

Number 3

Client:	**Chemours**	Project Number:	**15418.002.020.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**PPA**	Calibration **1**	Date: **9 Jan 2020**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 08:38 to 10:33

Run Averages

20.9	0.0

Pre-run Bias at 07:44

Zero Bias	0.0	0.0
Span Bias	12.0	8.6
Span Gas	12.0	8.9

Post-run Bias at 10:35

Zero Bias	0.1	0.0
Span Bias	12.0	8.6
Span Gas	12.0	8.9

Run averages corrected for the average of the pre-run and post-run bias

20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number: **15418.002.020.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **PPA** | Calibration **1** | Date: **9 Jan 2020**

Start Time: 10:35

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	12.1	12.0	-0.1	-0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	12.0	12.0	0.0	0.0	Pass

*Bias No. 1

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.7	8.6	-0.1	-0.6	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.6	0.0	0.0	Pass

*Bias No. 1

APPENDIX C
LABORATORY ANALYTICAL REPORT

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Job Number: 140-17922-1

Job Description: PPA CB Inlet - M0010

Contract Number: LBIO-67048

For:
The Chemours Company FC, LLC
c/o AECOM
Sabre Building, Suite 300
4051 Ogletown Road
Newark, DE 19713

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager II
2/10/2020 7:48 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
02/10/2020

Table of Contents

Table of Contents

Definitions/Glossary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Inlet - M0010

Job ID: 140-17922-1

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Inlet - M0010

Job ID: 140-17922-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
Dilution	Dilution and Re-fortification of Standards	None	TAL SAC
None	Leaching Procedure	TAL SOP	TAL SAC
None	Leaching Procedure for Condensate	TAL SOP	TAL SAC
None	Leaching Procedure for XAD	TAL SOP	TAL SAC
Preparation	Dilution	None	TAL SAC
Split	Source Air Split	None	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Inlet - M0010

Job ID: 140-17922-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17922-1	Z-2001,2002 PPA CARBON BED INLET R1 M0010 FH	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-2	Z-2003,2004,2006 PPA CARBON BED INLET R1 M0010 BH	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-3	Z-2005 PPA CARBON BED INLET R1 M0010 IM 1,2&3 CONDENSATE	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-4	Z-2007 PPA CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-5	Z-2008,2009 PPA CARBON BED INLET R2 M0010 FH	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-6	Z-2010,2011,2013 PPA CARBON BED INLET R2 M0010 BH	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-7	Z-2012 PPA CARBON BED INLET R2 M0010 IM 1,2&3 CONDENSATE	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-8	Z-2014 PPA CARBON BED INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/08/20 00:00	01/13/20 07:34	
140-17922-9	Z-2015,2016 PPA CARBON BED INLET R3 M0010 FH	Air	01/09/20 00:00	01/13/20 07:34	
140-17922-10	Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH	Air	01/09/20 00:00	01/13/20 07:34	
140-17922-11	Z-2019 PPA CARBON BED INLET R3 M0010 IM 1,2&3 CONDENSATE	Air	01/09/20 00:00	01/13/20 07:34	
140-17922-12	Z-2021 PPA CARBON BED INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/09/20 00:00	01/13/20 07:34	

Job Narrative
140-17922-1

Sample Receipt

The samples were received on January 10, 2020 at 6:00 AM in good condition and properly preserved. The temperature of the cooler at receipt was 0.2º C.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times, and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the Sacramento laboratory for PFAS analysis. All results are reported in "Total ng" per sample.

LCMS

Method 537 (modified): The method blank for preparation batch 320-351723, 320-352685 and 320-353445 and analytical batch 320-354078 contained HFPO-DA above the reporting limit (RL). Associated samples were not re-extracted or re-analyzed because results were greater than 10X the value found in the method blank.

Method 537 (modified): Due to exceedingly high concentrations of HFPO-DA in the original extract, the following sample required a 1,000x dilution: Z-2003,2004,2006 PPA CARBON BED INLET R1 M0010 BH (140-17922-2) and Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH (140-17922-10) Internal standard and isotope dilution analyte solutions were refortified into the extract after dilution so quantitation could be performed.

Method 537 (modified): Due to exceedingly high concentrations of HFPO-DA in the original extract, the following sample required a 500x dilution: Z-2010,2011,2013 PPA CARBON BED INLET R2 M0010 BH (140-17922-6) Internal standard and isotope dilution analyte solutions were refortified into the extract after dilution so quantitation could be performed.

Method 537 (modified): Results for samples Z-2003,2004,2006 PPA CARBON BED INLET R1 M0010 BH (140-17922-2), Z-2010,2011,2013 PPA CARBON BED INLET R2 M0010 BH (140-17922-6) and Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH (140-17922-10) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

Method 537 (modified): Internal standard (ISTD) response of 13C2 PFOA for the following laboratory control sample (LCS) was outside acceptance criteria: (LCS 320-351723/2-C). The recovery was 153% and the upper limit is 150%. The recoveries for all the target compounds and IDA compounds were in control for this LCS. Additionally the ISTD response was in control for all the associated samples and other batch QC. The internal standard is not used to quantitate target analytes; therefore, there is no impact to the data.

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 and analytical batch 320-354083 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). The following samples associated with this method blank had this compound above 10 times the level in the blank; therefore, re-extraction of samples were not performed. Z-2003,2004,2006 PPA CARBON BED INLET R1 M0010 BH (140-17922-2), Z-2010,2011,2013 PPA CARBON BED INLET R2 M0010 BH (140-17922-6), Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH (140-17922-10) and (MB 320-351722/14-C)

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). Some samples associated with this method blank contained the target compound above the reporting limit. Re-extraction of the samples were not performed due to limited sample volume.

Method 537 (modified): Results for samples Z-2001,2002 PPA CARBON BED INLET R1 M0010 FH (140-17922-1), Z-2003,2004,2006 PPA CARBON BED INLET R1 M0010 BH (140-17922-2), Z-2008,2009 PPA CARBON BED INLET R2 M0010 FH (140-17922-5), Z-2010,2011,2013 PPA CARBON BED INLET R2 M0010 BH (140-17922-6), Z-2015,2016 PPA CARBON BED INLET R3 M0010 FH (140-17922-9) and Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH (140-17922-10) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

Method 537 (modified): The method blank for preparation batch 320-351723, 320-352685 and 320-353445 and analytical batch 320-354179 contained HFPO-DA above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

Method 537 (modified): Due to exceedingly high concentrations of HFPO-DA in the original extracts, the following samples required a 625X dilution: Z-2001,2002 PPA CARBON BED INLET R1 M0010 FH (140-17922-1), Z-2008,2009 PPA CARBON BED INLET R2 M0010

FH (140-17922-5) and Z-2015,2016 PPA CARBON BED INLET R3 M0010 FH (140-17922-9). Internal standard and isotope dilution analyte solutions were refortified into the extracts after dilution so quantitation could be performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Comments

The XAD-2 (or Backhalf) Fraction of the sampling trains display low level detectable quantities of several PFAS compounds that are likely due to background levels present in the resin material present from the manufacturer. The various sampling and laboratory blanks processed for this project consistently show the presence of the same fingerprint pattern of PFAS compounds at approximately the same concentration. Therefore, a general conclusion should be considered that when the same relative levels of PFAS compounds are observed to be present in the Back-half fractions or the Breakthrough XAD-2 resin portions of the three test run data set, the "hits" are most likely due to background and not derived from the stack gas.

Additionally, for low nanogram level PFAS Modified Method 5 Sampling Train applications, when the associated XAD-2 fraction method blank contains a concentrations of PFAS compound greater than the minimum calibration level, a positive result in the associated sample will be flagged with a "B" data flag. The PFAS results for the associated method blanks and field quality control sample data should be evaluated by the client to assess whether the project specific background levels of PFAS compounds are significant, and how to incorporate them into associated stack emissions calculations. Blank subtraction may be necessary, and presenting data with and without blank subtraction may be advisable.

LCMS

Prep Batch: 351722

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-2	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	None	
140-17922-2 - DL	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	None	
140-17922-4	Z-2007 PPA CARBON BED INLET R1 M0010 BF	Total/NA	Air	None	
140-17922-6 - DL	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	None	
140-17922-6	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	None	
140-17922-8	Z-2014 PPA CARBON BED INLET R2 M0010 BF	Total/NA	Air	None	
140-17922-10	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	None	
140-17922-10 - DL	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	None	
140-17922-12	Z-2021 PPA CARBON BED INLET R3 M0010 BF	Total/NA	Air	None	
MB 320-351722/14-C	Method Blank	Total/NA	Air	None	
MB 320-351722/1-C	Method Blank	Total/NA	Air	None	
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 351723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-1	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	None	
140-17922-1 - DL	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	None	
140-17922-5 - DL	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	None	
140-17922-5	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	None	
140-17922-9	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	None	
140-17922-9 - DL	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	None	
MB 320-351723/1-C	Method Blank	Total/NA	Air	None	
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 351724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-3	Z-2005 PPA CARBON BED INLET R1 M0010 IM	Total/NA	Air	None	
140-17922-7	Z-2012 PPA CARBON BED INLET R2 M0010 IM	Total/NA	Air	None	
MB 320-351724/1-B	Method Blank	Total/NA	Air	None	
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 351810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-3	Z-2005 PPA CARBON BED INLET R1 M0010 IM	Total/NA	Air	Preparation	351724
140-17922-7	Z-2012 PPA CARBON BED INLET R2 M0010 IM	Total/NA	Air	Preparation	351724
MB 320-351724/1-B	Method Blank	Total/NA	Air	Preparation	351724
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	Preparation	351724
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	Preparation	351724

Analysis Batch: 352280

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-351724/1-B	Method Blank	Total/NA	Air	537 (modified)	351810
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	351810
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	351810

Cleanup Batch: 352450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-2	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	Split	351722

LCMS (Continued)

Cleanup Batch: 352450 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-2 - DL	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	Split	351722
140-17922-4	Z-2007 PPA CARBON BED INLET R1 M0010 BF	Total/NA	Air	Split	351722
140-17922-6	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	Split	351722
140-17922-6 - DL	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	Split	351722
140-17922-8	Z-2014 PPA CARBON BED INLET R2 M0010 BF	Total/NA	Air	Split	351722
140-17922-10 - DL	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	Split	351722
140-17922-10	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	Split	351722
140-17922-12	Z-2021 PPA CARBON BED INLET R3 M0010 BF	Total/NA	Air	Split	351722
MB 320-351722/14-C	Method Blank	Total/NA	Air	Split	351722
MB 320-351722/1-C	Method Blank	Total/NA	Air	Split	351722
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	Split	351722
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	Split	351722

Analysis Batch: 352564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-3	Z-2005 PPA CARBON BED INLET R1 M0010 IM	Total/NA	Air	537 (modified)	351810
140-17922-7	Z-2012 PPA CARBON BED INLET R2 M0010 IM	Total/NA	Air	537 (modified)	351810

Cleanup Batch: 352685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-1	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	Split	351723
140-17922-1 - DL	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	Split	351723
140-17922-5 - DL	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	Split	351723
140-17922-5	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	Split	351723
140-17922-9 - DL	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	Split	351723
140-17922-9	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	Split	351723
MB 320-351723/1-C	Method Blank	Total/NA	Air	Split	351723
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	Split	351723
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	Split	351723

Prep Batch: 353409

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-11	Z-2019 PPA CARBON BED INLET R3 M0010 IM	Total/NA	Air	None	

Cleanup Batch: 353410

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-11	Z-2019 PPA CARBON BED INLET R3 M0010 IM	Total/NA	Air	Preparation	353409
MB 320-353410/2-A	Method Blank	Total/NA	Air	Preparation	
LCS 320-353410/3-A	Lab Control Sample	Total/NA	Air	Preparation	
LCSD 320-353410/4-A	Lab Control Sample Dup	Total/NA	Air	Preparation	

Cleanup Batch: 353444

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-2	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	Preparation	352450
140-17922-2 - DL	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	Preparation	352450
140-17922-4	Z-2007 PPA CARBON BED INLET R1 M0010 BF	Total/NA	Air	Preparation	352450
140-17922-6	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	Preparation	352450
140-17922-6 - DL	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	Preparation	352450
140-17922-8	Z-2014 PPA CARBON BED INLET R2 M0010 BF	Total/NA	Air	Preparation	352450
140-17922-10	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	Preparation	352450
140-17922-10 - DL	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	Preparation	352450

LCMS (Continued)

Cleanup Batch: 353444 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-12	Z-2021 PPA CARBON BED INLET R3 M0010 BF	Total/NA	Air	Preparation	352450
MB 320-351722/14-C	Method Blank	Total/NA	Air	Preparation	352450
MB 320-351722/1-C	Method Blank	Total/NA	Air	Preparation	352450
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	Preparation	352450
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	Preparation	352450

Cleanup Batch: 353445

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-1	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	Preparation	352685
140-17922-1 - DL	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	Preparation	352685
140-17922-5 - DL	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	Preparation	352685
140-17922-5	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	Preparation	352685
140-17922-9 - DL	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	Preparation	352685
140-17922-9	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	Preparation	352685
MB 320-351723/1-C	Method Blank	Total/NA	Air	Preparation	352685
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	Preparation	352685
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	Preparation	352685

Analysis Batch: 354070

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-353410/2-A	Method Blank	Total/NA	Air	537 (modified)	353410
LCS 320-353410/3-A	Lab Control Sample	Total/NA	Air	537 (modified)	353410
LCSD 320-353410/4-A	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353410

Analysis Batch: 354078

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-351723/1-C	Method Blank	Total/NA	Air	537 (modified)	353445
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	537 (modified)	353445
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353445

Analysis Batch: 354083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-8	Z-2014 PPA CARBON BED INLET R2 M0010 BF	Total/NA	Air	537 (modified)	353444
140-17922-12	Z-2021 PPA CARBON BED INLET R3 M0010 BF	Total/NA	Air	537 (modified)	353444
MB 320-351722/14-C	Method Blank	Total/NA	Air	537 (modified)	353444
MB 320-351722/1-C	Method Blank	Total/NA	Air	537 (modified)	353444
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	537 (modified)	353444
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353444

Analysis Batch: 354179

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-1	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	537 (modified)	353445
140-17922-2	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	537 (modified)	353444
140-17922-4	Z-2007 PPA CARBON BED INLET R1 M0010 BF	Total/NA	Air	537 (modified)	353444
140-17922-5	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	537 (modified)	353445
140-17922-6	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	537 (modified)	353444
140-17922-9	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	537 (modified)	353445
140-17922-10	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	537 (modified)	353444
140-17922-11	Z-2019 PPA CARBON BED INLET R3 M0010 IM	Total/NA	Air	537 (modified)	353410

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Inlet - M0010

Job ID: 140-17922-1

LCMS

Cleanup Batch: 354663

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-2 - DL	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	Dilution	353444
140-17922-6 - DL	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	Dilution	353444
140-17922-10 - DL	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	Dilution	353444

Analysis Batch: 354746

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-2 - DL	Z-2003,2004,2006 PPA CARBON BED INLET R1	Total/NA	Air	537 (modified)	354663
140-17922-6 - DL	Z-2010,2011,2013 PPA CARBON BED INLET R2	Total/NA	Air	537 (modified)	354663
140-17922-10 - DL	Z-2017.2018,2020 PPA CARBON BED INLET R3	Total/NA	Air	537 (modified)	354663

Cleanup Batch: 355233

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-1 - DL	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	Dilution	353445
140-17922-5 - DL	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	Dilution	353445
140-17922-9 - DL	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	Dilution	353445

Analysis Batch: 355371

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17922-1 - DL	Z-2001,2002 PPA CARBON BED INLET R1 M00	Total/NA	Air	537 (modified)	355233
140-17922-5 - DL	Z-2008,2009 PPA CARBON BED INLET R2 M00	Total/NA	Air	537 (modified)	355233
140-17922-9 - DL	Z-2015,2016 PPA CARBON BED INLET R3 M00	Total/NA	Air	537 (modified)	355233

Client Sample ID: Z-2001,2002 PPA CARBON BED INLET R1 M0010 FH

Lab Sample ID: 140-17922-1

Date Collected: 01/08/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	351		49.7	48.7	ng/Sample		01/21/20 10:00	01/31/20 16:23	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*51*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:23*	*100*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3010	B	311	304	ng/Sample		01/21/20 10:00	02/06/20 03:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*95*		*25 - 150*	*01/21/20 10:00*	*02/06/20 03:22*	*1*

Client Sample ID: Z-2003,2004,2006 PPA CARBON BED INLET R1 M0010 BH

Lab Sample ID: 140-17922-2

Date Collected: 01/08/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	102	B	50.0	49.0	ng/Sample		01/21/20 10:00	01/31/20 14:14	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*44*		*25 - 150*	*01/21/20 10:00*	*01/31/20 14:14*	*100*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	27000		500	490	ng/Sample		01/21/20 10:00	02/03/20 14:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*77*		*25 - 150*	*01/21/20 10:00*	*02/03/20 14:02*	*1*

Client Sample ID: Z-2005 PPA CARBON BED INLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17922-3

Date Collected: 01/08/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:48	1
HFPO-DA	8.18		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*107*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:48*	*1*
13C3 HFPO-DA	*88*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:48*	*1*

Client Sample ID: Z-2007 PPA CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17922-4

Date Collected: 01/08/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.22	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/31/20 13:14	1
HFPO-DA	49.6		0.500	0.490	ng/Sample		01/21/20 10:00	01/31/20 13:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*25*		*25 - 150*	*01/21/20 10:00*	*01/31/20 13:14*	*1*
13C3 HFPO-DA	*30*		*25 - 150*	*01/21/20 10:00*	*01/31/20 13:14*	*1*

Client Sample ID: Z-2008,2009 PPA CARBON BED INLET R2 M0010 FH

Lab Sample ID: 140-17922-5

Date Collected: 01/08/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	683		49.6	48.7	ng/Sample		01/21/20 10:00	01/31/20 16:34	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*79*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:34*	*100*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4510	B	310	304	ng/Sample		01/21/20 10:00	02/06/20 03:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*91*		*25 - 150*	*01/21/20 10:00*	*02/06/20 03:32*	*1*

Client Sample ID: Z-2010,2011,2013 PPA CARBON BED INLET R2 M0010 BH

Lab Sample ID: 140-17922-6

Date Collected: 01/08/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	139	B	50.0	49.0	ng/Sample		01/21/20 10:00	01/31/20 14:24	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*33*		*25 - 150*	*01/21/20 10:00*	*01/31/20 14:24*	*100*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	20100		250	245	ng/Sample		01/21/20 10:00	02/03/20 13:52	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*80*		*25 - 150*	*01/21/20 10:00*	*02/03/20 13:52*	*1*

Client Sample ID: Z-2012 PPA CARBON BED INLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17922-7

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/13/20 07:34
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:58	1
HFPO-DA	**6.15**		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*107*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:58*	*1*
13C3 HFPO-DA	*85*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:58*	*1*

Client Sample ID: Z-2014 PPA CARBON BED INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17922-8

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/13/20 07:34
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**2.57**	**B**	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 21:44	1
HFPO-DA	**23.3**		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 21:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*30*		*25 - 150*	*01/21/20 10:00*	*01/30/20 21:44*	*1*
13C3 HFPO-DA	*26*		*25 - 150*	*01/21/20 10:00*	*01/30/20 21:44*	*1*

Client Sample ID: Z-2015,2016 PPA CARBON BED INLET R3 M0010 FH

Lab Sample ID: 140-17922-9

Date Collected: 01/09/20 00:00
Matrix: Air
Date Received: 01/13/20 07:34
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**516**		50.0	49.0	ng/Sample		01/21/20 10:00	01/31/20 16:43	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*61*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:43*	*100*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**5640**	**B**	313	306	ng/Sample		01/21/20 10:00	02/06/20 03:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*91*		*25 - 150*	*01/21/20 10:00*	*02/06/20 03:42*	*1*

Client Sample ID: Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH

Lab Sample ID: 140-17922-10

Date Collected: 01/09/20 00:00
Matrix: Air
Date Received: 01/13/20 07:34
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**124**	**B**	50.0	49.0	ng/Sample		01/21/20 10:00	01/31/20 14:34	100

Client Sample ID: Z-2017.2018,2020 PPA CARBON BED INLET R3 M0010 BH

Lab Sample ID: 140-17922-10

Date Collected: 01/09/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	42		25 - 150	01/21/20 10:00	01/31/20 14:34	100

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**41400**		500	490	ng/Sample		01/21/20 10:00	02/03/20 14:12	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	71		25 - 150	01/21/20 10:00	02/03/20 14:12	1

Client Sample ID: Z-2019 PPA CARBON BED INLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17922-11

Date Collected: 01/09/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		1.00	0.980	ng/Sample		01/20/20 12:30	01/31/20 12:24	1
HFPO-DA	**22.3**		1.00	0.980	ng/Sample		01/20/20 12:30	01/31/20 12:24	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	139		25 - 150	01/20/20 12:30	01/31/20 12:24	1
13C3 HFPO-DA	145		25 - 150	01/20/20 12:30	01/31/20 12:24	1

Client Sample ID: Z-2021 PPA CARBON BED INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17922-12

Date Collected: 01/09/20 00:00
Date Received: 01/13/20 07:34
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**2.20**	**B**	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 22:04	1
HFPO-DA	**33.6**		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 22:04	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	38		25 - 150	01/21/20 10:00	01/30/20 22:04	1
13C3 HFPO-DA	32		25 - 150	01/21/20 10:00	01/30/20 22:04	1

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Inlet - M0010

Job ID: 140-17922-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.500	0.490	ng/Sample
Perfluorooctanoic acid (PFOA)	0.500	0.490	ng/Sample

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ANALYTICAL REPORT

Job Number: 140-17921-1

Job Description: PPA CB Outlet - M0010

Contract Number: LBIO-67048

For:
The Chemours Company FC, LLC
c/o AECOM
Sabre Building, Suite 300
4051 Ogletown Road
Newark, DE 19713

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager II
2/6/2020 3:38 PM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
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02/06/2020

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Definitions/Glossary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Outlet - M0010

Job ID: 140-17921-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Outlet - M0010

Job ID: 140-17921-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17921-1	D-2501,2502 PPA CARBON BED OUTLET R1 M0010 FH	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-2	D-2503,2504,2506 PPA CARBON BED OUTLET R1 M0010 BH	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-3	D-2505 PPA CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-4	D2507 PPA CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-5	D-2508,2509 PPA CARBON BED OUTLET R2 M0010 FH	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-6	D-2510,2511,2513 PPA CARBON BED OUTLET R2 M0010 BH	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-7	D-2512 PPA CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-8	D-2514 PPA CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/08/20 00:00	01/10/20 06:00	
140-17921-9	D-2515,2516 PPA CARBON BED OUTLET R3 M0010 FH	Air	01/09/20 00:00	01/10/20 06:00	
140-17921-10	D-2517.2518,2520 PPA CARBON BED OUTLET R3 M0010 BH	Air	01/09/20 00:00	01/10/20 06:00	
140-17921-11	D-2519 PPA CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE	Air	01/09/20 00:00	01/10/20 06:00	
140-17921-12	D-2521 PPA CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/09/20 00:00	01/10/20 06:00	

Method Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Outlet - M0010

Job ID: 140-17921-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
None	Leaching Procedure	TAL SOP	TAL SAC
None	Leaching Procedure for Condensate	TAL SOP	TAL SAC
None	Leaching Procedure for XAD	TAL SOP	TAL SAC
Preparation	Dilution	None	TAL SAC
Split	Source Air Split	None	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Job Narrative
140-17921-1

Sample Receipt

The samples were received on January 10, 2020 at 6:00 AM in good condition and properly preserved. The temperature of the cooler at receipt was 1.1º C.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times, and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the Sacramento laboratory for PFAS analysis. All results are reported in "Total ng" per sample.

LCMS

Method 537 (modified): The method blank for preparation batch 320-351723, 320-352685 and 320-353445 and analytical batch 320-354078 contained HFPO-DA above the reporting limit (RL). Associated samples were not re-extracted or re-analyzed because results were greater than 10X the value found in the method blank.

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 and analytical batch 320-354083 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). The following samples associated with this method blank had this compound above 10 times the level in the blank; therefore, re-extraction of samples were not performed. D-2510,2511,2513 PPA CARBON BED OUTLET R2 M0010 BH (140-17921-6), D-2514 PPA CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-17921-8) and (MB 320-351722/1-C)

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). The method blank was re-analyzed and confirmed. Some samples associated with this method blank contained the target compound above the reporting limit. Re-extraction of the samples were not performed due to limited sample volume.

Method 537 (modified): Internal standard (ISTD) response of 13C2 PFOA for the following laboratory control sample (LCS) was outside acceptance criteria: (LCS 320-351723/2-C). The recovery was 153% and the upper limit is 150%. The recoveries for all the target compounds and IDA compounds were in control for this LCS. Additionally the ISTD response was in control for all the associated samples and other batch QC. The internal standard is not used to quantitate target analytes; therefore, there is no impact to the data.

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 and analytical batch 320-354083 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). The following samples associated with this method blank had this compound above 10 times the level in the blank; therefore, re-extraction of sample was not performed. (MB 320-351722/14-C)

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit for 13C4 PFOA: D-2503,2504,2506 PPA CARBON BED OUTLET R1 M0010 BH (140-17921-2) and D-2510,2511,2513 PPA CARBON BED OUTLET R2 M0010 BH (140-17921-6). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method 537 (modified): Results for samples D-2501,2502 PPA CARBON BED OUTLET R1 M0010 FH (140-17921-1), D-2503,2504,2506 PPA CARBON BED OUTLET R1 M0010 BH (140-17921-2), D-2508,2509 PPA CARBON BED OUTLET R2 M0010 FH (140-17921-5), D-2510,2511,2513 PPA CARBON BED OUTLET R2 M0010 BH (140-17921-6), D-2515,2516 PPA CARBON BED OUTLET R3 M0010 FH (140-17921-9) and D-2517.2518,2520 PPA CARBON BED OUTLET R3 M0010 BH (140-17921-10) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit for 13C3 HFPO-DA: D-2503,2504,2506 PPA CARBON BED OUTLET R1 M0010 BH (140-17921-2) and D-2510,2511,2513 PPA CARBON BED OUTLET R2 M0010 BH (140-17921-6). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Method 537 (modified): The method blank for preparation batch 320-351723, 320-352685 and 320-353445 and analytical batch 320-354179 contained HFPO-DA above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Notes

The XAD-2 (or Backhalf) Fraction of the sampling trains display low level detectable quantities of several PFAS compounds that are likely due to background levels present in the resin material present from the manufacturer. The various sampling and laboratory blanks processed for this project consistently show the presence of the same fingerprint pattern of PFAS compounds at approximately the same concentration. Therefore, a general conclusion should be considered that when the same relative levels of PFAS compounds are observed to be present in the Back-half fractions or the Breakthrough XAD-2 resin portions of the three test run data set, the “hits” are most likely due to background and not derived from the stack gas.
Additionally, for low nanogram level PFAS Modified Method 5 Sampling Train applications, when the associated XAD-2 fraction method blank contains a concentrations of PFAS compound greater than the minimum calibration level, a positive result in the associated sample will be flagged with a “B” data flag. The PFAS results for the associated method blanks and field quality control sample data should be evaluated by the client to assess whether the project specific background levels of PFAS compounds are significant, and how to incorporate them into associated stack emissions calculations. Blank subtraction may be necessary, and presenting data with and without blank subtraction may be advisable.

LCMS

Prep Batch: 351722

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-2	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	None	
140-17921-2 - DL	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	None	
140-17921-4	D2507 PPA CARBON BED OUTLET R1 M0010 E	Total/NA	Air	None	
140-17921-6	D-2510,2511,2513 PPA CARBON BED OUTLET	Total/NA	Air	None	
140-17921-8	D-2514 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	None	
140-17921-10	D-2517.2518,2520 PPA CARBON BED OUTLET	Total/NA	Air	None	
140-17921-12	D-2521 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	None	
MB 320-351722/14-C	Method Blank	Total/NA	Air	None	
MB 320-351722/1-C	Method Blank	Total/NA	Air	None	
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 351723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-1	D-2501,2502 PPA CARBON BED OUTLET R1 M	Total/NA	Air	None	
140-17921-5	D-2508,2509 PPA CARBON BED OUTLET R2 M	Total/NA	Air	None	
140-17921-9	D-2515,2516 PPA CARBON BED OUTLET R3 M	Total/NA	Air	None	
MB 320-351723/1-C	Method Blank	Total/NA	Air	None	
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 351724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-3	D-2505 PPA CARBON BED OUTLET R1 M0010	Total/NA	Air	None	
140-17921-7	D-2512 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	None	
140-17921-11	D-2519 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	None	
MB 320-351724/1-B	Method Blank	Total/NA	Air	None	
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 351810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-3	D-2505 PPA CARBON BED OUTLET R1 M0010	Total/NA	Air	Preparation	351724
140-17921-7	D-2512 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	Preparation	351724
140-17921-11	D-2519 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	Preparation	351724
MB 320-351724/1-B	Method Blank	Total/NA	Air	Preparation	351724
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	Preparation	351724
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	Preparation	351724

Analysis Batch: 352280

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-351724/1-B	Method Blank	Total/NA	Air	537 (modified)	351810
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	351810
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	351810

Cleanup Batch: 352450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-2	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	Split	351722
140-17921-2 - DL	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	Split	351722
140-17921-4	D2507 PPA CARBON BED OUTLET R1 M0010 E	Total/NA	Air	Split	351722
140-17921-6	D-2510,2511,2513 PPA CARBON BED OUTLET	Total/NA	Air	Split	351722

LCMS (Continued)

Cleanup Batch: 352450 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-8	D-2514 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	Split	351722
140-17921-10	D-2517.2518,2520 PPA CARBON BED OUTLET	Total/NA	Air	Split	351722
140-17921-12	D-2521 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	Split	351722
MB 320-351722/14-C	Method Blank	Total/NA	Air	Split	351722
MB 320-351722/1-C	Method Blank	Total/NA	Air	Split	351722
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	Split	351722
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	Split	351722

Analysis Batch: 352564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-3	D-2505 PPA CARBON BED OUTLET R1 M0010	Total/NA	Air	537 (modified)	351810
140-17921-7	D-2512 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	537 (modified)	351810
140-17921-11	D-2519 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	537 (modified)	351810

Cleanup Batch: 352685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-1	D-2501,2502 PPA CARBON BED OUTLET R1 M	Total/NA	Air	Split	351723
140-17921-5	D-2508,2509 PPA CARBON BED OUTLET R2 M	Total/NA	Air	Split	351723
140-17921-9	D-2515,2516 PPA CARBON BED OUTLET R3 M	Total/NA	Air	Split	351723
MB 320-351723/1-C	Method Blank	Total/NA	Air	Split	351723
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	Split	351723
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	Split	351723

Cleanup Batch: 353444

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-2	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	Preparation	352450
140-17921-2 - DL	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	Preparation	352450
140-17921-4	D2507 PPA CARBON BED OUTLET R1 M0010 E	Total/NA	Air	Preparation	352450
140-17921-6	D-2510,2511,2513 PPA CARBON BED OUTLET	Total/NA	Air	Preparation	352450
140-17921-8	D-2514 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	Preparation	352450
140-17921-10	D-2517.2518,2520 PPA CARBON BED OUTLET	Total/NA	Air	Preparation	352450
140-17921-12	D-2521 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	Preparation	352450
MB 320-351722/14-C	Method Blank	Total/NA	Air	Preparation	352450
MB 320-351722/1-C	Method Blank	Total/NA	Air	Preparation	352450
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	Preparation	352450
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	Preparation	352450

Cleanup Batch: 353445

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-1	D-2501,2502 PPA CARBON BED OUTLET R1 M	Total/NA	Air	Preparation	352685
140-17921-5	D-2508,2509 PPA CARBON BED OUTLET R2 M	Total/NA	Air	Preparation	352685
140-17921-9	D-2515,2516 PPA CARBON BED OUTLET R3 M	Total/NA	Air	Preparation	352685
MB 320-351723/1-C	Method Blank	Total/NA	Air	Preparation	352685
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	Preparation	352685
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	Preparation	352685

Analysis Batch: 354078

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-351723/1-C	Method Blank	Total/NA	Air	537 (modified)	353445
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	537 (modified)	353445
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353445

LCMS

Analysis Batch: 354083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-2	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	537 (modified)	353444
140-17921-4	D2507 PPA CARBON BED OUTLET R1 M0010 E	Total/NA	Air	537 (modified)	353444
140-17921-8	D-2514 PPA CARBON BED OUTLET R2 M0010	Total/NA	Air	537 (modified)	353444
140-17921-12	D-2521 PPA CARBON BED OUTLET R3 M0010	Total/NA	Air	537 (modified)	353444
MB 320-351722/14-C	Method Blank	Total/NA	Air	537 (modified)	353444
MB 320-351722/1-C	Method Blank	Total/NA	Air	537 (modified)	353444
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	537 (modified)	353444
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353444

Analysis Batch: 354179

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17921-1	D-2501,2502 PPA CARBON BED OUTLET R1 M	Total/NA	Air	537 (modified)	353445
140-17921-2 - DL	D-2503,2504,2506 PPA CARBON BED OUTLET	Total/NA	Air	537 (modified)	353444
140-17921-5	D-2508,2509 PPA CARBON BED OUTLET R2 M	Total/NA	Air	537 (modified)	353445
140-17921-6	D-2510,2511,2513 PPA CARBON BED OUTLET	Total/NA	Air	537 (modified)	353444
140-17921-9	D-2515,2516 PPA CARBON BED OUTLET R3 M	Total/NA	Air	537 (modified)	353445
140-17921-10	D-2517.2518,2520 PPA CARBON BED OUTLET	Total/NA	Air	537 (modified)	353444

Client Sample ID: D-2501,2502 PPA CARBON BED OUTLET R1 M0010 FH

Lab Sample ID: 140-17921-1

Date Collected: 01/08/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	17.4		4.95	4.85	ng/Sample		01/21/20 10:00	01/31/20 15:53	10
HFPO-DA	746		4.95	4.85	ng/Sample		01/21/20 10:00	01/31/20 15:53	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*77*		*25 - 150*	*01/21/20 10:00*	*01/31/20 15:53*	*10*
13C3 HFPO-DA	*63*		*25 - 150*	*01/21/20 10:00*	*01/31/20 15:53*	*10*

Client Sample ID: D-2503,2504,2506 PPA CARBON BED OUTLET R1 M0010 BH

Lab Sample ID: 140-17921-2

Date Collected: 01/08/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.79	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*22*	*	*25 - 150*	*01/21/20 10:00*	*01/30/20 19:24*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	2070		10.0	9.80	ng/Sample		01/21/20 10:00	01/31/20 14:04	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*15*	*	*25 - 150*	*01/21/20 10:00*	*01/31/20 14:04*	*20*

Client Sample ID: D-2505 PPA CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17921-3

Date Collected: 01/08/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	1.24		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:18	1
HFPO-DA	28.2		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:18	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*100*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:18*	*1*
13C3 HFPO-DA	*79*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:18*	*1*

Client Sample ID: D2507 PPA CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17921-4

Date Collected: 01/08/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	3.04	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:34	1

Client Sample ID: D2507 PPA CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17921-4

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	24.4		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*34*		*25 - 150*	*01/21/20 10:00*	*01/30/20 19:34*	*1*
13C3 HFPO-DA	*32*		*25 - 150*	*01/21/20 10:00*	*01/30/20 19:34*	*1*

Client Sample ID: D-2508,2509 PPA CARBON BED OUTLET R2 M0010 FH

Lab Sample ID: 140-17921-5

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	72.8		5.00	4.90	ng/Sample		01/21/20 10:00	01/31/20 16:03	10
HFPO-DA	775		5.00	4.90	ng/Sample		01/21/20 10:00	01/31/20 16:03	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*82*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:03*	*10*
13C3 HFPO-DA	*69*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:03*	*10*

Client Sample ID: D-2510,2511,2513 PPA CARBON BED OUTLET R2 M0010 BH

Lab Sample ID: 140-17921-6

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	8.70	B	2.50	2.45	ng/Sample		01/21/20 10:00	01/31/20 15:34	5
HFPO-DA	354		2.50	2.45	ng/Sample		01/21/20 10:00	01/31/20 15:34	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*20*	*	*25 - 150*	*01/21/20 10:00*	*01/31/20 15:34*	*5*
13C3 HFPO-DA	*18*	*	*25 - 150*	*01/21/20 10:00*	*01/31/20 15:34*	*5*

Client Sample ID: D-2512 PPA CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17921-7

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	1.68		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:28	1
HFPO-DA	30.3		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*102*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:28*	*1*
13C3 HFPO-DA	*87*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:28*	*1*

Client Sample ID: D-2514 PPA CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17921-8

Date Collected: 01/08/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	38.5	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 20:44	1
HFPO-DA	109		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 20:44	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*46*		*25 - 150*	*01/21/20 10:00*	*01/30/20 20:44*	*1*
13C3 HFPO-DA	*34*		*25 - 150*	*01/21/20 10:00*	*01/30/20 20:44*	*1*

Client Sample ID: D-2515,2516 PPA CARBON BED OUTLET R3 M0010 FH

Lab Sample ID: 140-17921-9

Date Collected: 01/09/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	84.5		10.0	9.80	ng/Sample		01/21/20 10:00	01/31/20 16:13	20
HFPO-DA	1110		10.0	9.80	ng/Sample		01/21/20 10:00	01/31/20 16:13	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*76*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:13*	*20*
13C3 HFPO-DA	*70*		*25 - 150*	*01/21/20 10:00*	*01/31/20 16:13*	*20*

Client Sample ID: D-2517.2518,2520 PPA CARBON BED OUTLET R3 M0010 BH

Lab Sample ID: 140-17921-10

Date Collected: 01/09/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	12.0	B	5.00	4.90	ng/Sample		01/21/20 10:00	01/31/20 13:54	10
HFPO-DA	447		5.00	4.90	ng/Sample		01/21/20 10:00	01/31/20 13:54	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*28*		*25 - 150*	*01/21/20 10:00*	*01/31/20 13:54*	*10*
13C3 HFPO-DA	*25*		*25 - 150*	*01/21/20 10:00*	*01/31/20 13:54*	*10*

Client Sample ID: D-2519 PPA CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17921-11

Date Collected: 01/09/20 00:00
Date Received: 01/10/20 06:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.03		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:38	1
HFPO-DA	55.9		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*103*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:38*	*1*
13C3 HFPO-DA	*90*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:38*	*1*

Client Sample ID: D-2521 PPA CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-17921-12
Date Collected: 01/09/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	2.55	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 21:04	1
HFPO-DA	86.3		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 21:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*37*		*25 - 150*	*01/21/20 10:00*	*01/30/20 21:04*	*1*
13C3 HFPO-DA	*36*		*25 - 150*	*01/21/20 10:00*	*01/30/20 21:04*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: PPA CB Outlet - M0010

Job ID: 140-17921-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.500	0.490	ng/Sample
Perfluorooctanoic acid (PFOA)	0.500	0.490	ng/Sample

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ANALYTICAL REPORT

Job Number: 140-17920-1

Job Description: PPA Field QC - M0010

Contract Number: LBIO-67048

For:
The Chemours Company FC, LLC
c/o AECOM
Sabre Building, Suite 300
4051 Ogletown Road
Newark, DE 19713

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager II
2/6/2020 3:30 PM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
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02/06/2020

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Definitions/Glossary

Client: The Chemours Company FC, LLC
Job ID: 140-17920-1
Project/Site: PPA Field QC - M0010

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA Field QC - M0010

Job ID: 140-17920-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
None	Leaching Procedure	TAL SOP	TAL SAC
None	Leaching Procedure for Condensate	TAL SOP	TAL SAC
None	Leaching Procedure for XAD	TAL SOP	TAL SAC
Preparation	Dilution	None	TAL SAC
Split	Source Air Split	None	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA Field QC - M0010

Job ID: 140-17920-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17920-1	G-2740, 2741 QC PPA CARBON BED M0010 FH BT	Air	01/08/20 00:00	01/10/20 06:00	
140-17920-2	G-2742, 2743, 2745 QC PPA CARBON BED M0010 BH BT	Air	01/08/20 00:00	01/10/20 06:00	
140-17920-3	G-2744 QC PPA CARBON BED M0010 IMP 1,28 CONDENSATE BT	Air	01/08/20 00:00	01/10/20 06:00	
140-17920-4	G-2746 QC PPA CARBON BED M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT	Air	01/08/20 00:00	01/10/20 06:00	
140-17920-5	G-2747 QC PPA CARBON BED M0010 DI WATER	Air	01/08/20 00:00	01/10/20 06:00	
140-17920-6	G-2748 QC PPA CARBON BED M0010 MEOH WITH 5% NH4OH RB	Air	01/08/20 00:00	01/10/20 06:00	
140-17920-7	G-2749 QC PPA CARBON BED M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB	Air	01/08/20 00:00	01/10/20 06:00	

Job Narrative
140-17920-1

Sample Receipt

The samples were received on January 10, 2020 at 6:00 AM in good condition and properly preserved. The temperature of the cooler at receipt was 0.4º C.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times, and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the Sacramento laboratory for PFAS analysis. All results are reported in "Total ng" per sample.

LCMS

Method 537 (modified): The method blank for preparation batch 320-351723, 320-352685 and 320-353445 and analytical batch 320-354078 contained HFPO-DA above the reporting limit (RL). Associated samples were not re-extracted or re-analyzed because results were greater than 10X the value found in the method blank.

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). The method blank was then re-analyzed and confirmed. The following sample associated with this method blank did not contain the target compound; therefore, re-extraction of samples were not performed. G-2748 QC PPA CARBON BED M0010 MEOH WITH 5% NH4OH RB (140-17920-6) and (MB 320-351722/1-C)

Method 537 (modified): The method blank for preparation batch 320-351722, 320-352450 and 320-353444 contained Perfluorooctanoic acid (PFOA) above the reporting limit (RL). The method blank was re-analyzed and confirmed. Some samples associated with this method blank contained the target compound above the reporting limit. Re-extraction of the samples were not performed due to limited sample volume.

Method 537 (modified): Internal standard (ISTD) response of 13C2 PFOA for the following laboratory control sample (LCS) was outside acceptance criteria: (LCS 320-351723/2-C). The recovery was 153% and the upper limit is 150%. The recoveries for all the target compounds and IDA compounds were in control for this LCS. Additionally the ISTD response was in control for all the associated samples and other batch QC. The internal standard is not used to quantitate target analytes; therefore, there is no impact to the data.

Method 537 (modified): Results for samples G-2742, 2743, 2745 QC PPA CARBON BED M0010 BH BT (140-17920-2) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Notes

The XAD-2 (or Backhalf) Fraction of the sampling trains display low level detectable quantities of several PFAS compounds that are likely due to background levels present in the resin material present from the manufacturer. The various sampling and laboratory blanks processed for this project consistently show the presence of the same fingerprint pattern of PFAS compounds at approximately the same concentration. Therefore, a general conclusion should be considered that when the same relative levels of PFAS compounds are observed to be present in the Back-half fractions or the Breakthrough XAD-2 resin portions of the three test run data set, the "hits" are most likely due to background and not derived from the stack gas.
Additionally, for low nanogram level PFAS Modified Method 5 Sampling Train applications, when the associated XAD-2 fraction method blank contains a concentrations of PFAS compound greater than the minimum calibration level, a positive result in the associated sample will be flagged with a "B" data flag. The PFAS results for the associated method blanks and field quality control sample data should be evaluated by the client to assess whether the project specific background levels of PFAS compounds are significant, and how to incorporate them into associated stack emissions calculations. Blank subtraction may be necessary, and presenting data with and without blank subtraction may be advisable.

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA Field QC - M0010

Job ID: 140-17920-1

LCMS

Prep Batch: 351722

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-2	G-2742, 2743, 2745 QC PPA CARBON BED M0(	Total/NA	Air	None	
140-17920-4	G-2746 QC PPA CARBON BED M0010 BREAKT	Total/NA	Air	None	
140-17920-6	G-2748 QC PPA CARBON BED M0010 MEOH W	Total/NA	Air	None	
140-17920-7	G-2749 QC PPA CARBON BED M0010 COMBIN	Total/NA	Air	None	
MB 320-351722/1-C	Method Blank	Total/NA	Air	None	
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 351723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-1	G-2740, 2741 QC PPA CARBON BED M0010 FF	Total/NA	Air	None	
MB 320-351723/1-C	Method Blank	Total/NA	Air	None	
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 351724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-3	G-2744 QC PPA CARBON BED M0010 IMP 1,28	Total/NA	Air	None	
140-17920-5	G-2747 QC PPA CARBON BED M0010 DI WATE	Total/NA	Air	None	
MB 320-351724/1-B	Method Blank	Total/NA	Air	None	
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 351810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-3	G-2744 QC PPA CARBON BED M0010 IMP 1,28	Total/NA	Air	Preparation	351724
140-17920-5	G-2747 QC PPA CARBON BED M0010 DI WATE	Total/NA	Air	Preparation	351724
MB 320-351724/1-B	Method Blank	Total/NA	Air	Preparation	351724
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	Preparation	351724
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	Preparation	351724

Analysis Batch: 352280

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-351724/1-B	Method Blank	Total/NA	Air	537 (modified)	351810
LCS 320-351724/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	351810
LCSD 320-351724/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	351810

Cleanup Batch: 352450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-2	G-2742, 2743, 2745 QC PPA CARBON BED M0(	Total/NA	Air	Split	351722
140-17920-4	G-2746 QC PPA CARBON BED M0010 BREAKT	Total/NA	Air	Split	351722
140-17920-6	G-2748 QC PPA CARBON BED M0010 MEOH W	Total/NA	Air	Split	351722
140-17920-7	G-2749 QC PPA CARBON BED M0010 COMBIN	Total/NA	Air	Split	351722
MB 320-351722/1-C	Method Blank	Total/NA	Air	Split	351722
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	Split	351722
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	Split	351722

Analysis Batch: 352564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-3	G-2744 QC PPA CARBON BED M0010 IMP 1,28	Total/NA	Air	537 (modified)	351810
140-17920-5	G-2747 QC PPA CARBON BED M0010 DI WATE	Total/NA	Air	537 (modified)	351810

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: PPA Field QC - M0010

Job ID: 140-17920-1

LCMS

Cleanup Batch: 352685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-1	G-2740, 2741 QC PPA CARBON BED M0010 FF	Total/NA	Air	Split	351723
MB 320-351723/1-C	Method Blank	Total/NA	Air	Split	351723
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	Split	351723
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	Split	351723

Cleanup Batch: 353444

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-2	G-2742, 2743, 2745 QC PPA CARBON BED M0(	Total/NA	Air	Preparation	352450
140-17920-4	G-2746 QC PPA CARBON BED M0010 BREAKT	Total/NA	Air	Preparation	352450
140-17920-6	G-2748 QC PPA CARBON BED M0010 MEOH W	Total/NA	Air	Preparation	352450
140-17920-7	G-2749 QC PPA CARBON BED M0010 COMBIN	Total/NA	Air	Preparation	352450
MB 320-351722/1-C	Method Blank	Total/NA	Air	Preparation	352450
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	Preparation	352450
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	Preparation	352450

Cleanup Batch: 353445

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-1	G-2740, 2741 QC PPA CARBON BED M0010 FF	Total/NA	Air	Preparation	352685
MB 320-351723/1-C	Method Blank	Total/NA	Air	Preparation	352685
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	Preparation	352685
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	Preparation	352685

Analysis Batch: 354078

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-1	G-2740, 2741 QC PPA CARBON BED M0010 FF	Total/NA	Air	537 (modified)	353445
MB 320-351723/1-C	Method Blank	Total/NA	Air	537 (modified)	353445
LCS 320-351723/2-C	Lab Control Sample	Total/NA	Air	537 (modified)	353445
LCSD 320-351723/3-C	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353445

Analysis Batch: 354083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-4	G-2746 QC PPA CARBON BED M0010 BREAKT	Total/NA	Air	537 (modified)	353444
140-17920-6	G-2748 QC PPA CARBON BED M0010 MEOH W	Total/NA	Air	537 (modified)	353444
140-17920-7	G-2749 QC PPA CARBON BED M0010 COMBIN	Total/NA	Air	537 (modified)	353444
MB 320-351722/1-C	Method Blank	Total/NA	Air	537 (modified)	353444
LCS 320-351722/2-C	Lab Control Sample	Total/NA	Air	537 (modified)	353444
LCSD 320-351722/3-C	Lab Control Sample Dup	Total/NA	Air	537 (modified)	353444

Analysis Batch: 354179

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17920-2	G-2742, 2743, 2745 QC PPA CARBON BED M0(	Total/NA	Air	537 (modified)	353444

Client Sample ID: G-2740, 2741 QC PPA CARBON BED M0010 FH BT
Lab Sample ID: 140-17920-1

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	1.77		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 16:14	1
HFPO-DA	72.2	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 16:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*70*		*25 - 150*	*01/21/20 10:00*	*01/30/20 16:14*	*1*
13C3 HFPO-DA	*45*		*25 - 150*	*01/21/20 10:00*	*01/30/20 16:14*	*1*

Client Sample ID: G-2742, 2743, 2745 QC PPA CARBON BED M0010 BH BT
Lab Sample ID: 140-17920-2

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	7.83	B	5.00	4.90	ng/Sample		01/21/20 10:00	01/31/20 13:44	10
HFPO-DA	421		5.00	4.90	ng/Sample		01/21/20 10:00	01/31/20 13:44	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*38*		*25 - 150*	*01/21/20 10:00*	*01/31/20 13:44*	*10*
13C3 HFPO-DA	*42*		*25 - 150*	*01/21/20 10:00*	*01/31/20 13:44*	*10*

Client Sample ID: G-2744 QC PPA CARBON BED M0010 IMP 1,2&3 CONDENSATE BT
Lab Sample ID: 140-17920-3

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 12:58	1
HFPO-DA	15.2		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 12:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*107*		*25 - 150*	*01/20/20 12:30*	*01/23/20 12:58*	*1*
13C3 HFPO-DA	*91*		*25 - 150*	*01/20/20 12:30*	*01/23/20 12:58*	*1*

Client Sample ID: G-2746 QC PPA CARBON BED M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT
Lab Sample ID: 140-17920-4

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	1.91	B	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 18:54	1
HFPO-DA	100		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 18:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*52*		*25 - 150*	*01/21/20 10:00*	*01/30/20 18:54*	*1*
13C3 HFPO-DA	*42*		*25 - 150*	*01/21/20 10:00*	*01/30/20 18:54*	*1*

Client Sample ID: G-2747 QC PPA CARBON BED M0010 DI WATER
Lab Sample ID: 140-17920-5

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:08	1
HFPO-DA	ND		0.500	0.490	ng/Sample		01/20/20 12:30	01/23/20 13:08	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*102*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:08*	*1*
13C3 HFPO-DA	*75*		*25 - 150*	*01/20/20 12:30*	*01/23/20 13:08*	*1*

Client Sample ID: G-2748 QC PPA CARBON BED M0010 MEOH WITH 5% NH4OH RB
Lab Sample ID: 140-17920-6

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:04	1
HFPO-DA	ND		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*50*		*25 - 150*	*01/21/20 10:00*	*01/30/20 19:04*	*1*
13C3 HFPO-DA	*44*		*25 - 150*	*01/21/20 10:00*	*01/30/20 19:04*	*1*

Client Sample ID: G-2749 QC PPA CARBON BED M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB
Lab Sample ID: 140-17920-7

Date Collected: 01/08/20 00:00
Matrix: Air
Date Received: 01/10/20 06:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**0.748**	**B**	0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:14	1
HFPO-DA	**65.0**		0.500	0.490	ng/Sample		01/21/20 10:00	01/30/20 19:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*51*		*25 - 150*	*01/21/20 10:00*	*01/30/20 19:14*	*1*
13C3 HFPO-DA	*39*		*25 - 150*	*01/21/20 10:00*	*01/30/20 19:14*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: PPA Field QC - M0010

Job ID: 140-17920-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.500	0.490	ng/Sample
Perfluorooctanoic acid (PFOA)	0.500	0.490	ng/Sample

APPENDIX D
SAMPLE CALCULATIONS

EXAMPLE CALCULATIONS FOR
VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 1	Test Date: 1/8/2020
Test Location: PPA-Carbon Bed Outlet	Test Period: 1015-1210

1. Volume of dry gas sampled at standard conditions (68 deg F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times Vm \times \left(Pb + \frac{delta\ H}{13.6} \right)}{(Tm + 460)}$$

$$Vm(std) = \frac{17.64 \times 0.9834 \times 48.515 \times \left(30.28 + \frac{0.820}{13.6} \right)}{47.67 + 460} = 50.297$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
Vm	=	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
Pb	=	Barometric Pressure, in Hg.
delt H	=	Average pressure drop across the orifice meter, in H_2O
Tm	=	Average dry gas meter temperature , deg F.
Y	=	Dry gas meter calibration factor.
17.64	=	Factor that includes ratio of standard temperature (528 deg R) to standard pressure (29.92 in. Hg), deg R/in. Hg.
13.6	=	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

$$Vw(std) = (0.04707 \times 2.0) + (0.04715 \times 9.9) = 0.56$$

Where:

Vw(std)	=	Volume of water vapor in the gas sample corrected to standard conditions, scf.
Vwc	=	Volume of liquid condensed in impingers, ml.
Wwsg	=	Weight of water vapor collected in silica gel, g.
0.04707	=	Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.
0.04715	=	Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$bws = \frac{0.56}{0.56 + 50.297} = 0.011$$

Where:

bws = Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.011 = 0.989

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

MWd = (0.440 x % CO_2) + (0.320 x % O_2) + (0.280 x (% N_2 + % CO))

MWd = (0.440 x 0.0) + (0.320 x 20.9) + (0.280 x (79.1 + 0.00))

MWd = 28.84

Where:

MWd = Dry molecular weight , lb/lb-mole.
% CO2 = Percent carbon dioxide by volume, dry basis.
% O_2 = Percent oxygen by volume, dry basis.
% N_2 = Percent nitrogen by volume, dry basis.
% CO = Percent carbon monoxide by volume, dry basis.
0.440 = Molecular weight of carbon dioxide, divided by 100.
0.320 = Molecular weight of oxygen, divided by 100.
0.280 = Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

MWs = (MWd x Md) + (18 x (1 - Md))

MWs = (28.84 x 0.989) +(18 (1 - 0.989)) = 28.72

Where:

MWs = Molecular weight of wet gas, lb/lb-mole.
18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$Vs = 85.49 \times Cp \times ((\text{delt } p)^{1/2})avg \times \left(\frac{Ts\ (avg)}{Ps \times MWs} \right)^{1/2}$$

$$Vs = 85.49 \times 0.84 \times 0.79161 \times \left(\frac{521}{30.41 \times 28.72} \right)^{\wedge}1/2 = 43.9$$

Where:

Vs = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, $\frac{\text{ft/sec} \times \sqrt{(\text{lb/lb-mole})(\text{in. Hg})}}{(\text{deg R})(\text{in } H_2O)}$

Cp = Pitot tube coefficient, dimensionless.

Ts = Absolute gas stream temperature, deg R = Ts, deg F + 460.

Ps = Absolute gas stack pressure, in. Hg. = $Pb + \frac{P(static)}{13.6}$

delt p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flow rate at actual conditions, wacf/min.

$$Qs(act) = 60 \times Vs \times As$$

$$Qs(act) = 60 \times 43.9 \times 4.90 = 12907$$

Where:

Qs(act) = Volumetric flow rate of wet stack gas at actual conditions, wacf/min.

As = Cross-sectional area of stack, ft^2.

60 = Conversion factor from seconds to minutes.

9. Average gas stream dry volumetric flow rate at standard conditions, dscf/min.

$$Qs(std) = 17.64 \times Md \times \frac{Ps}{Ts} \times Qs(act)$$

$$Qs(std) = 17.64 \times 0.989 \times \frac{30.41}{520.8} \times 12907$$

$$Qs(std) = 13148$$

Where:

Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min.

10. Isokinetic variation calculated from intermediate values, percent.

$$I = \frac{17.327 \times Ts \times Vm(std)}{Vs \times O \times Ps \times Md \times (Dn)^2}$$

$$I = \frac{17.327 \times 521 \times 50.297}{43.9 \times 96 \times 30.41 \times 0.989 \times (0.190)\text{^}2} = 99.2$$

Where:

I	=	Percent of isokinetic sampling.
O	=	Total sampling time, minutes.
Dn	=	Diameter of nozzle, inches.
17.327	=	Factor which includes standard temperature (528 deg R), standard pressure (29.92 in. Hg), the formula for calculating area of circle $D^{2/4}$, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100), $\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(\text{deg R})(\text{ft}^2)(\text{sec})}$

EXAMPLE CALCULATIONS FOR
VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 1	Test Date: 1/8/2020
Test Location: PPA CB Inlet	Test Period: 1015-1210

1. Volume of dry gas sampled at standard conditions (68 deg F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times Vm \times \left(Pb + \frac{\text{delta H}}{13.6} \right)}{(Tm + 460)}$$

$$Vm(std) = \frac{17.64 \times 0.9972 \times 53.290 \times \left(30.38 + \frac{1.087}{13.6} \right)}{52.50 + 460} = 55.714$$

Where:

Vm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
Vm	=	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
Pb	=	Barometric Pressure, in Hg.
delt H	=	Average pressure drop across the orifice meter, in H_2O
Tm	=	Average dry gas meter temperature , deg F.
Y	=	Dry gas meter calibration factor.
17.64	=	Factor that includes ratio of standard temperature (528 deg R) to standard pressure (29.92 in. Hg), deg R/in. Hg.
13.6	=	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

$$Vw(std) = (0.04707 \times 13.0) + (0.04715 \times 11.7) = 1.16$$

Where:

Vw(std)	=	Volume of water vapor in the gas sample corrected to standard conditions, scf.
Vwc	=	Volume of liquid condensed in impingers, ml.
Wwsg	=	Weight of water vapor collected in silica gel, g.
0.04707	=	Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.
0.04715	=	Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$bws = \frac{1.16}{1.16 + 55.714} = 0.020$$

Where:

bws = Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.020 = 0.980

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$MWd = (0.440 \times \% CO_2) + (0.320 \times \% O_2) + (0.280 \times (\% N_2 + \% CO))$

MWd = (0.440 x 0.0) + (0.320 x 20.9) + (0.280 x (79.1 + 0.00))

MWd = 28.84

Where:

MWd = Dry molecular weight , lb/lb-mole.
% CO2 = Percent carbon dioxide by volume, dry basis.
$\% O_2$ = Percent oxygen by volume, dry basis.
$\% N_2$ = Percent nitrogen by volume, dry basis.
% CO = Percent carbon monoxide by volume, dry basis.
0.440 = Molecular weight of carbon dioxide, divided by 100.
0.320 = Molecular weight of oxygen, divided by 100.
0.280 = Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

MWs = (MWd x Md) + (18 x (1 - Md))

MWs = (28.84 x 0.980) +(18 (1 - 0.980)) = 28.61

Where:

MWs = Molecular weight of wet gas, lb/lb-mole.
18 = Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$Vs = 85.49 \times Cp \times ((\text{delt } p)^{1/2})avg \times \left(\frac{Ts\ (avg)}{Ps \times MWs} \right)^{1/2}$$

$$Vs = 85.49 \times 0.84 \times 0.51591 \times \left(\frac{524}{30.26 \times 28.61} \right)^{\wedge}1/2 = 28.8$$

Where:

Vs = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, ft/sec $\times \frac{(lb/lb\text{-}mole)(in.\ Hg)^{1/2}}{(deg\ R)(in\ H_2O)}$

Cp = Pitot tube coefficient, dimensionless.

Ts = Absolute gas stream temperature, deg R = Ts, deg F + 460.

Ps = Absolute gas stack pressure, in. Hg. = Pb + $\frac{P(static)}{13.6}$

delt p = Velocity head of stack, in. H_2O.

8. Average gas stream volumetric flow rate at actual conditions, wacf/min.

$$Qs(act) = 60 \times Vs \times As$$

$$Qs(act) = 60 \times 28.8 \times 6.31 = 10914$$

Where:

Qs(act) = Volumetric flow rate of wet stack gas at actual conditions, wacf/min.

As = Cross-sectional area of stack, ft^2.

60 = Conversion factor from seconds to minutes.

9. Average gas stream dry volumetric flow rate at standard conditions, dscf/min.

$$Qs(std) = 17.64 \times Md \times \frac{Ps}{Ts} \times Qs(act)$$

$$Qs(std) = 17.64 \times 0.980 \times \frac{30.26}{524.1} \times 10914$$

$$Qs(std) = 10886$$

Where:

Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min.

10. Isokinetic variation calculated from intermediate values, percent.

$$I = \frac{17.327 \times Ts \times Vm(std)}{Vs \times O \times Ps \times Md \times (Dn)^2}$$

$$I = \frac{17.327 \times 524 \times 55.714}{28.8 \times 96 \times 30.26 \times 0.980 \times (0.250)\text{^}2} = 98.7$$

Where:

I	=	Percent of isokinetic sampling.
O	=	Total sampling time, minutes.
Dn	=	Diameter of nozzle, inches.
17.327	=	Factor which includes standard temperature (528 deg R), standard pressure (29.92 in. Hg), the formula for calculating area of circle $D^{2/4}$, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100), $\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(\text{deg R})(\text{ft}^2)(\text{sec})}$

APPENDIX E
EQUIPMENT CALIBRATION RECORDS

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: Servomex - O_2
Model No: 4900
Serial No: 49000-652921
Calibration Span: 21.09 %
Pollutant: 21.09% O_2 - CC418692

INTERFERENT GAS	ANALYZER RESPONSE		% OF CALIBRATION SPAN[(a)]
	INTERFERENT GAS RESPONSE (%)	INTERFERENT GAS RESPONSE, WITH BACKGROUND POLLUTANT (%)	
CO_2 (30.17% CC199689)	0.00	-0.01	0.00
NO (445 ppm CC346681)	0.00	0.02	0.11
NO_2 (23.78 ppm CC500749)	NA	NA	NA
N_2O (90.4 ppm CC352661)	0.00	0.05	0.24
CO (461.5 ppm XC006064B)	0.00	0.02	0.00
SO_2 (451.2 ppm CC409079)	0.00	0.05	0.23
CH_4 (453.1 ppm SG901795)	NA	NA	NA
H_2 (552 ppm ALM048043)	0.00	0.09	0.44
HCl (45.1 ppm CC17830)	0.00	0.03	0.14
NH_3 (9.69 ppm CC58181)	0.00	0.01	0.03
TOTAL INTERFERENCE RESPONSE			**1.20**
METHOD SPECIFICATION			**< 2.5%**

[(a)] The larger of the absolute values obtained for the interferent tested with and without the pollutant present was used in summing the interferences.

Chad Walker

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: Servomex - CO_2
Model No: 4900
Serial No: 49000-652921
Calibration Span: 16.65%
Pollutant: 16.65% CO_2 - CC418692

INTERFERENT GAS	ANALYZER RESPONSE		% OF CALIBRATION SPAN[(a)]
	INTERFERENT GAS RESPONSE (%)	INTERFERENT GAS RESPONSE, WITH BACKGROUND POLLUTANT (%)	
CO_2 (30.17% CC199689)	NA .	NA	NA
NO (445 ppm CC346681)	0.00	0.02	0.10
NO_2 (23.78 ppm CC500749)	0.00	0.00	0.02
N_2O (90.4 ppm CC352661)	0.00	0.01	0.04
CO (461.5 ppm XC006064B)	0.00	0.01	0.00
SO_2 (451.2 ppm CC409079)	0.00	0.11	0.64
CH_4 (453.1 ppm SG901795)	0.00	0.07	0.44
H_2 (552 ppm ALM048043)	0.00	0.04	0.22
HCl (45.1 ppm CC17830)	0.10	0.06	0.60
NH_3 (9.69 ppm CC58181)	0.00	0.02	0.14
TOTAL INTERFERENCE RESPONSE			**2.19**
METHOD SPECIFICATION			**< 2.5%**

[(a)] The larger of the absolute values obtained for the interferent tested with and without the pollutant present was used in summing the interferences.

Chad Walker

Long Cal and Temperature Cal Datasheet for Standard Dry Gas Meter Console

Calibrator MDW | **Meter Box Number** 30 | **Ambient Temp** 72

Date 21-Feb-19 | **Wet Test Meter Number** P-2952 | **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 17485131

Baro Press, in Hg (Pb)	29.87

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	905.750	70.0	70.00	70.00	68.0	12.8	1.0002	1.8501
		910.724		70.00	70.00				
		4.974		70.00	70.00				
1.0	5.0	911.701	70.0	71.00	71.00	70.0	9.0	1.0007	1.8224
		916.685		71.00	71.00				
		4.984		71.00	71.00				
1.5	10.0	917.680	70.0	72.00	72.00	72.5	15.0	0.9995	1.8894
		927.695		74.00	74.00				
		10.015		73.00	73.00				
2.0	10.0	928.690	70.0	74.00	74.00	74.5	13.0	0.9946	1.8851
		938.780		75.00	75.00				
		10.090		74.50	74.50				
3.0	10.0	939.800	70.0	76.00	76.00	76.0	10.7	0.9910	1.9103
		949.930		77.00	77.00				
		10.130		76.50	76.50				
							Average	**0.9972**	**1.8715**

Vw - Gas Volume passing through the wet test meter
Vd - Gas Volume passing through the dry gas meter
Tw - Temp of gas in the wet test meter
Tdi - Temp of the inlet gas of the dry gas meter
Tdo - Temp of the outlet gas of the dry gas meter
Td - Average temp of the gas in the dry gas meter

0 - Time of calibration run
Pb - Barometric Pressure
ΔH - Pressure differential across orifice
Y - Ratio of accuracy of wet test meter to dry gas meter

$$Y = \frac{Vw * Pb * (td + 460)}{Vd * \left[Pb + \frac{(\Delta H)}{13.6}\right] * (tw + 460)}$$

$$\Delta H = \left[\frac{0.0317 * \Delta H}{Pb * (td + 460)}\right] * \left[\frac{(tw + 460) * O}{Vw}\right]^2$$

Reference Temperature (Select Temperature ○ °C ◉ °F)	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
	Channel Number							
	1	2	3	4	5	6		
32	32	32	32	32	32		32.0	0.0%
212	212	213	213	212	212		212.4	-0.1%
932	932	933	933	932	932		932.4	0.0%
1832	1832	1832	1832	1832	1832		1832.0	0.0%

1 - Channel Temps must agree with +/- 5°F or 3°C

2 - Acceptable Temperature Difference less than 1.5 %

$$\text{Temp Diff} = \left[\frac{(\text{Reference Temp}(^\circ F) + 460) - (\text{Test Temp}(^\circ F) + 460)}{\text{Reference Temp}(^\circ F) + 460}\right]$$

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN

PPA CARBON BED INLET

METER BOX NO. 30

01/08/2020 + 01/09/2020

	Run 1	Run 2	Run 3
MWd = Dry molecular weight source gas, lb/lb-mole.			
0.32 = Molecular weight of oxygen, divided by 100.			
0.44 = Molecular weight of carbon dioxide, divided by 100.			
0.28 = Molecular weight of nitrogen or carbon monoxide, divided by 100.			
% CO_2 = Percent carbon dioxide by volume, dry basis.	0.0	0.0	0.0
% O_2 = Percent oxygen by volume, dry basis.	20.9	20.9	20.9

$$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$$

$$MWd = (0.32 * 20.9) + (0.44 * 0) + (0.28 * (100 - (0 + 20.9)))$$

$$MWd = (6.69) + (0.00) + (22.15)$$

MWd =	28.84	28.84	28.84

Tma = Source Temperature, absolute(^oR)			
Tm = Average dry gas meter temperature , deg F.	52.5	60.2	44.8

$$Tma = Ts + 460$$

$$Tma = 52.50 + 460$$

Tma =	512.50	520.17	504.79

Ps = Absolute meter pressure, inches Hg.			
13.60 = Specific gravity of mercury.			
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	1.09	1.57	1.56
Pb = Barometric Pressure, in Hg.	30.38	30.31	30.65

$$Pm = Pb + (delta\ H / 13.6)$$

$$Pm = 30.38 + (1.08666666666667 / 13.6)$$

Pm =	30.46	30.43	30.76

Yqa = dry gas meter calibration check value, dimensionless.			
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.			
29.00 = dry molecular weight of air, lb/lb-mole.			
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	53.290	64.478	63.048
Y = Dry gas meter calibration factor (based on full calibration)	0.9972	0.9972	0.9972
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.8715	1.8715	1.8715
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.0318	1.2383	1.2349
O = Total sampling time, minutes.	96	96	96

$$Yqa = (O / Vm) * SQRT (0.0319 * Tma * 29) / (Delta\ H@ * Pm * MWd) * avg\ SQRT\ Delta\ H$$

$$Yqa = (96.00 / 53.29) * SQRT (0.0319 * 512.50 * 29) / (1.87 * 30.46 * 28.84) * 1.03$$

$$Yqa = 1.801 * SQRT 474.114 / 1,643.822 * 1.03$$

Yqa =	0.9983	0.9980	0.9973

Diff = Absolute difference between Yqa and Y	0.11	0.08	0.01

$$Diff = ((Y - Yqa) / Y) * 100$$

$$Diff = ((0.9972 - 0.998) / 0.9972) * 100$$

Average Diff = 0.07

Allowable = 5.0

DRY GAS METER CALIBRATION REPORT

Customer: Weston Solutions Date: March 27, 2019

Console Serial # 2381 Console Model # C-5000 SOL

DGM Model # S-275 DGM SN # 18100293 Reference Meter S/N 16300942

Barometric Pressure, P_b: 30.12 in. Hg Tested at: 0 in. Hg - Vacuum

Standard Pressure : 29.92 in. Hg Standard Temperature : 528 °R

	1	2	3	Units
Orifice Manometer Setting, ΔH	2.00	0.75	6.00	in. H_2O
Elapsed Time	14	22	8	min.
Reference Meter				
Final Volume Reading	069.903	081.075	092.929	ft^3
Initial Volume Reading	058.660	070.214	081.710	ft^3
Total Gas Volume, V_w	11.243	10.861	11.219	ft^3
Temperature, Initial	66.8	66.8	67.7	°F
Temperature, Final	66.8	67.5	67.8	°F
Avg Temperature, T_w	66.8	67.2	67.8	°F
Dry Gas Meter				
Final Volume Reading	082.220	093.515	105.476	ft^3
Initial Volume Reading	070.874	082.530	094.149	ft^3
Total Gas Volume, V_m	11.346	10.985	11.327	ft^3
Average Temperature, Initial	67.4	67.9	68.1	°F
Average Temperature, Final	67.9	68.1	68.4	°F
Avg Temperature, T_m	67.7	68.0	68.3	°F
ΔH (a)	1.7295	1.7174	1.7057	**Avg. ΔH(a) 1.7175**
ΔH (a) Tolerance Check	OK	OK	OK	
Gamma, Y	0.9867	0.9875	0.9761	**Avg. Y 0.9834**
Gamma Tolerance Check	OK	OK	OK	

Calibration Performed By:

$$\Delta H_{(a)} = \frac{0.0319\,\Delta H}{P_b\,(T_m + 460)}\left[\frac{(T_w + 460)\,\theta}{V_w}\right]^2 \qquad Y = \frac{V_w P_b\,(T_m + 460)}{V_m\,(P_b + \Delta H/13.6)(T_w + 460)}$$

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN

PPA STACK

METER BOX NO. 32

01/08/2020 and 01/09/2020

	Run 1	Run 2	Run 3
MWd = Dry molecular weight source gas, lb/lb-mole.			
0.32 = Molecular weight of oxygen, divided by 100.			
0.44 = Molecular weight of carbon dioxide, divided by 100.			
0.28 = Molecular weight of nitrogen or carbon monoxide, divided by 100.			
% CO_2 = Percent carbon dioxide by volume, dry basis.	0.0	0.0	0.0
% O_2 = Percent oxygen by volume, dry basis.	20.9	20.9	20.9

$$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$$

$$MWd = (0.32 * 20.9) + (0.44 * 0) + (0.28 * (100 - (0 + 20.9)))$$

$$MWd = (6.69) + (0.00) + (22.15)$$

MWd =	28.84	28.84	28.84

Tma = Source Temperature, absolute(^oR)			
Tm = Average dry gas meter temperature , deg F.	47.7	66.3	39.5

$$Tma = Ts + 460$$

$$Tma = 47.67 + 460$$

Tma =	507.67	526.33	499.46

Ps = Absolute meter pressure, inches Hg.			
13.60 = Specific gravity of mercury.			
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	0.82	0.88	0.89
Pb = Barometric Pressure, in Hg.	30.28	30.21	30.52

$$Pm = Pb + (delta\ H / 13.6)$$

$$Pm = 30.28 + (0.819583333333333 / 13.6)$$

Pm =	30.34	30.27	30.59

Yqa = dry gas meter calibration check value, dimensionless.			
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.			
29.00 = dry molecular weight of air, lb/lb-mole.			
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	48.515	51.590	50.318
Y = Dry gas meter calibration factor (based on full calibration)	0.9834	0.9834	0.9834
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.7175	1.7175	1.7175
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	0.8930	0.9346	0.9421
O = Total sampling time, minutes.	96	96	96

$$Yqa = (O / Vm) * SQRT (0.0319 * Tma * 29) / (Delta\ H@ * Pm * MWd) * avg\ SQRT\ Delta\ H$$

$$Yqa = (96.00 / 48.52) * SQRT (0.0319 * 507.67 * 29) / (1.72 * 30.34 * 28.84) * 0.89$$

$$Yqa = 1.979 * SQRT\ 469.642 / 1{,}502.614 * 0.89$$

Yqa =	0.988	0.991	0.993

Diff = Absolute difference between Yqa and Y	0.47	0.77	0.98

$$Diff = ((Y - Yqa) / Y) * 100$$

$$Diff = ((0.9834 - 0.988) / 0.9834) * 100$$

Average Diff = 0.74

Allowable = 5.0

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-706**

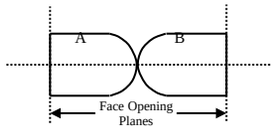
Inspection Date 2/19/19 Individual Conducting Inspection KS

If all Criteria PASS
Cp is equal to 0.84

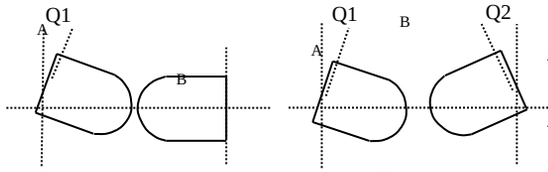
		PASS/FAIL
Distance to A Plane (PA) - inches	0.45	PASS
Distance to B Plane (PB) - inches	0.45	PASS
Pitot OD (D_t) - inches	0.375	

$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB

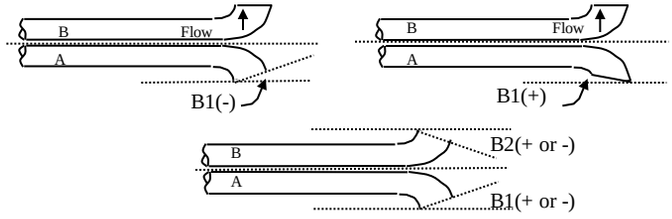


Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	0	PASS

Q1 and Q2 must be $\leq 10^o$

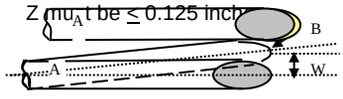


Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

B1 or B2 must be $\leq 5^o$

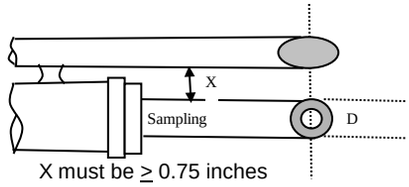
Horizontal offset between A and B Tubes (Z) - inches	0.006	PASS

Z must be $\leq$ 0.125 inch



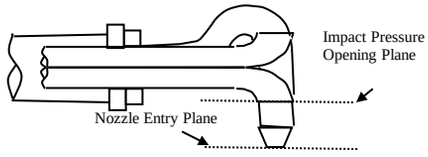
Vertical offset between A and B Tubes (W) - inches	0.012	PASS

W must be $\leq$ 0.03125 inches

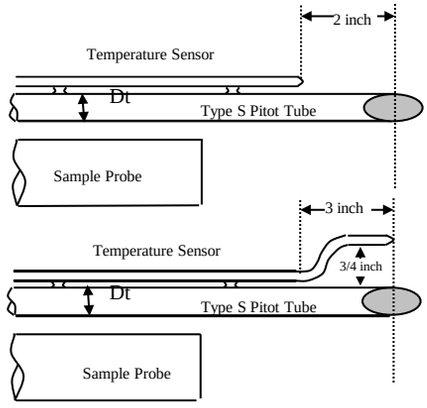


Distance between Sample Nozzle and Pitot (X) - inches	0.79	PASS

X must be $\geq$ 0.75 inches



Impact Pressure Opening Plane is above the Nozzle Entry Plane: (●) YES ( ) NO ( ) NA



Thermocouple meets the Distance Criteria in the adjacent figure: (●) YES ( ) NO ( ) NA

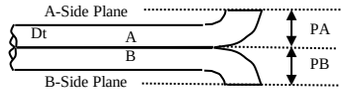
Thermocouple meets the Distance Criteria in the adjacent figure: ( ) YES ( ) NO (●) NA

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-563**

If all Criteria PASS
Cp is equal to 0.84

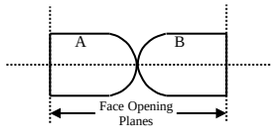
Inspection Date 2/19/19 Individual Conducting Inspection KS



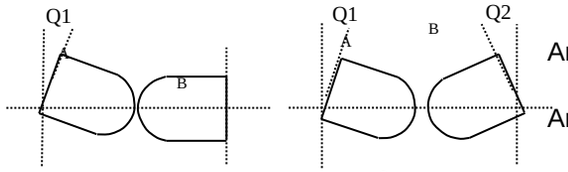
		PASS/FAIL
Distance to A Plane (PA) - inches	0.469	PASS
Distance to B Plane (PB) - inches	0.469	PASS
Pitot OD (D_t) - inches	0.375	

1.05 D_t < P < 1.5 D_t

PA must Equal PB

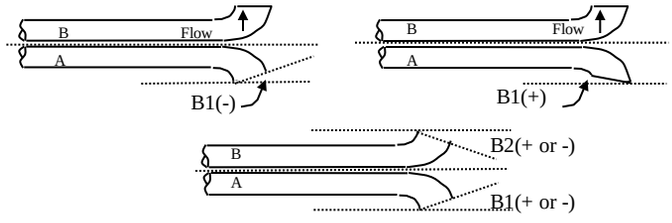


Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



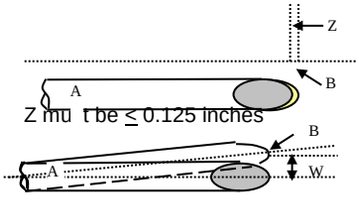
Angle of Q1 from vertical A Tube- degrees (absolute)	1	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	1	PASS

Q1 and Q2 must be ≤ 10°



Angle of B1 from vertical A Tube- degrees (absolute)	2	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	1	PASS

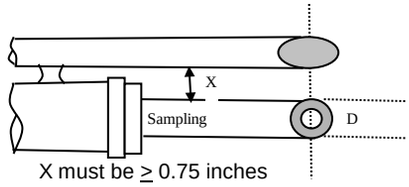
B1 or B2 must be ≤ 5°



Z must be ≤ 0.125 inches

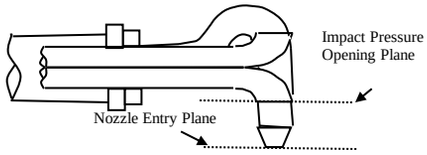
W must be ≤ 0.03125 inches

Horizontal offset between A and B Tubes (Z) - inches	0.006	PASS
Vertical offset between A and B Tubes (W) - inches	0.012	PASS

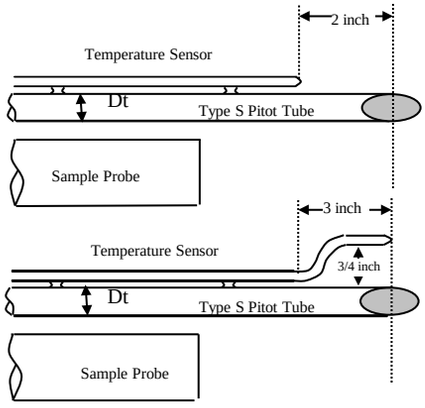


X must be ≥ 0.75 inches

Distance between Sample Nozzle and Pitot (X) - inches	0.9325	PASS



Impact Pressure Opening Plane is above the Nozzle Entry Plane: (●) YES ( ) NO ( ) NA



Thermocouple meets the Distance Criteria in the adjacent figure: (●) YES ( ) NO ( ) NA

Thermocouple meets the Distance Criteria in the adjacent figure: ( ) YES ( ) NO (●) NA

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	160-401590223-1
Cylinder Number:	ALM056900	Cylinder Volume:	150.5 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Sep 09, 2019

Expiration Date: Sep 09, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.921 %	G1	+/- 0.5% NIST Traceable	09/09/2019
OXYGEN	12.00 %	12.01 %	G1	+/- 0.4% NIST Traceable	09/09/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	102505	K025852	7.016 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	Jan 13, 2022
NTRM	102909	k021729	9.967 % OXYGEN/NITROGEN	0.30%	Apr 19, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA VA5011 T5V6VU9P NDIR CO2	NDIR	Aug 19, 2019
SIEMENS OXYMAT 6 - W5951 - O2	PARAMAGNETIC	Aug 27, 2019

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
600 Union Landing Road
Cinnaminson, NJ 08077-0000
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI62E15A0224	Reference Number:	82-401288925-1
Cylinder Number:	ALM047628	Cylinder Volume:	157.2 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Sep 04, 2018

Expiration Date: Sep 04, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	17.00 %	17.05 %	G1	+/- 0.7% NIST Traceable	09/04/2018
OXYGEN	21.00 %	21.25 %	G1	+/- 0.5% NIST Traceable	09/04/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060804	CC415400	24.04 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 16, 2019
NTRM	09061420	CC273671	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-19GYCXEG	NDIR	Aug 09, 2018
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Aug 09, 2018

Triad Data Available Upon Request

Signature on file
Approved for Release

APPENDIX F
LIST OF PROJECT PARTICIPANTS

The following Weston employees participated in this project:

Paul Meeter	Senior Project Manager
Austin Squires	Team Member
Jack Mills	Team Member
Matt Winkeler	Team Member
Kyle Schweitzer	Team Member