FLUOROMONOMERS
MANUFACTURING PROCESS
VINYL ETHERS NORTH CARBON BED
REMOVAL EFFICIENCY AND
DIVISION STACK EMISSIONS TEST REPORT
TEST DATES: 6 AND 7 JANUARY 2020

THE CHEMOURS COMPANY
FAYETTEVILLE, NORTH CAROLINA

Prepared for:

THE CHEMOURS COMPANY
22828 NC Hwy 87 W
Fayetteville, North Carolina 28306

Prepared by:

WESTON SOLUTIONS, INC.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380

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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. Chemours operating areas on the site include the Fluoromonomers, IXM and Polymers Processing Aid (PPA) manufacturing areas, Wastewater Treatment, and Powerhouse.

Chemours contracted Weston Solutions, Inc. (Weston) to perform HFPO Dimer Acid Fluoride, captured as HFPO Dimer Acid, emission testing on the Vinyl Ethers North (VEN) Carbon Bed and Division stack at the facility. Testing was performed on 6 and 7 January 2020 and generally followed the "Emission 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 Fluoride from the Carbon Bed inlet and outlet and Division stack which are located in the Fluoromonomers process area.
- Calculate the Carbon Bed removal efficiency for HFPO Dimer Acid.
- Monitor and record process and emissions control 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 at three locations.

Tables 1-1 and 1-2 provide 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 VEN Carbon Bed

Sampling Point & Location	**VEN Carbon Bed**		
Number of Tests:	6 (3 Carbon Bed inlet, 3 Carbon Bed outlet)		
Parameters To Be Tested:	HFPO Dimer Acid (HFPO-DA)	Volumetric Flow Rate and Gas Velocity	Water Content
Sampling or Monitoring Method	EPA M-0010	EPA M1 and M2 in conjunction with M-0010 tests	EPA M4 in conjunction with M-0010 tests
Sample Extraction/ Analysis Method(s):	LC/MS/MS	NA[6]	NA
Sample Size	$\geq 1.5m^3$	NA	NA
Total Number of Samples Collected[1]	6	6	6
Reagent Blanks (Solvents, Resins)[1]	1 set	0	0
Field Blank Trains[1]	1 per source	0	0
Proof Blanks[1]	1 per train	0	0
Trip Blanks[1,2]	1 set	0	
Lab Blanks	1 per fraction[3]	0	0
Laboratory or Batch Control Spike Samples (LCS)	1 per fraction[3]	0	0
Laboratory or Batch Control Spike Sample Duplicate (LCSD)	1 per fraction[3]	0	0
Media Blanks	1 set[4]	0	0
Isotope Dilution Internal Standard Spikes	Each sample	0	0
Total No. of Samples	10[5]	6	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.

Table 1-2
Sampling Plan for Division Stack

Sampling Point & Location	**Division Stack**				
Number of Tests:	3				
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 and M2 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	≥ 1.5m[3]	NA	NA	NA	NA
Total Number of Samples Collected[1]	3	3	3	3	3
Reagent Blanks (Solvents, Resins)[1]	0 sets	0	0	0	0
Field Blank Trains[1]	0 per source	0	0	0	0
Proof Blanks[1]	0 per train	0	0	0	0
Trip Blanks[1,2]	0 sets	0	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	3[5]	3	3	3	3

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 each were performed on the VEN Carbon Bed inlet and outlet and Division stack. Table 2-1 provides a summary of the HFPO Dimer Acid emissions test results and Carbon Bed removal efficiencies. Detailed test results summaries are provided in Section 6.

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 in Table 2-1 and in this report include a percentage of each of the three compounds.

Table 2-1
Summary of HFPO Dimer Acid VEN Carbon Bed and Division Stack Test Results

	Inlet		Outlet		Removal Efficiency	Division Stack	
	g/sec	lb/hr	g/sec	lb/hr	%	g/sec	lb/hr
R1	4.81E-02	3.82E-01	6.55E-05	5.20E-04	99.86	1.82E-04	1.45E-03
R2	5.64E-02	4.48E-01	7.93E-05	6.30E-04	99.86	1.24E-04	9.82E-04
R3	6.48E-02	5.15E-01	8.44E-05	6.70E-04	99.87	1.14E-04	9.07E-04
Average	5.64E-02	4.48E-01	7.64E-05	6.07E-04	99.86	1.40E-04	1.11E-03

3. PROCESS DESCRIPTIONS

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

3.1 FLUOROMONOMERS

These facilities produce a family of fluorocarbon compounds used to produce Chemours products such as Nafion®, Krytox®, and Viton®, as well as sales to outside customers.

Process emissions are vented to the Thermal Oxidizer. The VE North building air systems are vented to the Carbon Bed and then onto the Division Stack.

3.2 PROCESS OPERATIONS AND PARAMETERS

The following table is a summary of the operation and products from the specific areas tested.

Source	Operation/Product	Batch or Continuous
VE North	PPVE	Condensation is continuous. Agitated Bed Reactor and Refining are batch.

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

- Fluoromonomers Process
  - VEN Precurser Rate
  - VEN Condensation Rate
  - VEN ABR Rate

4. DESCRIPTION OF TEST LOCATIONS

4.1 DIVISION STACK

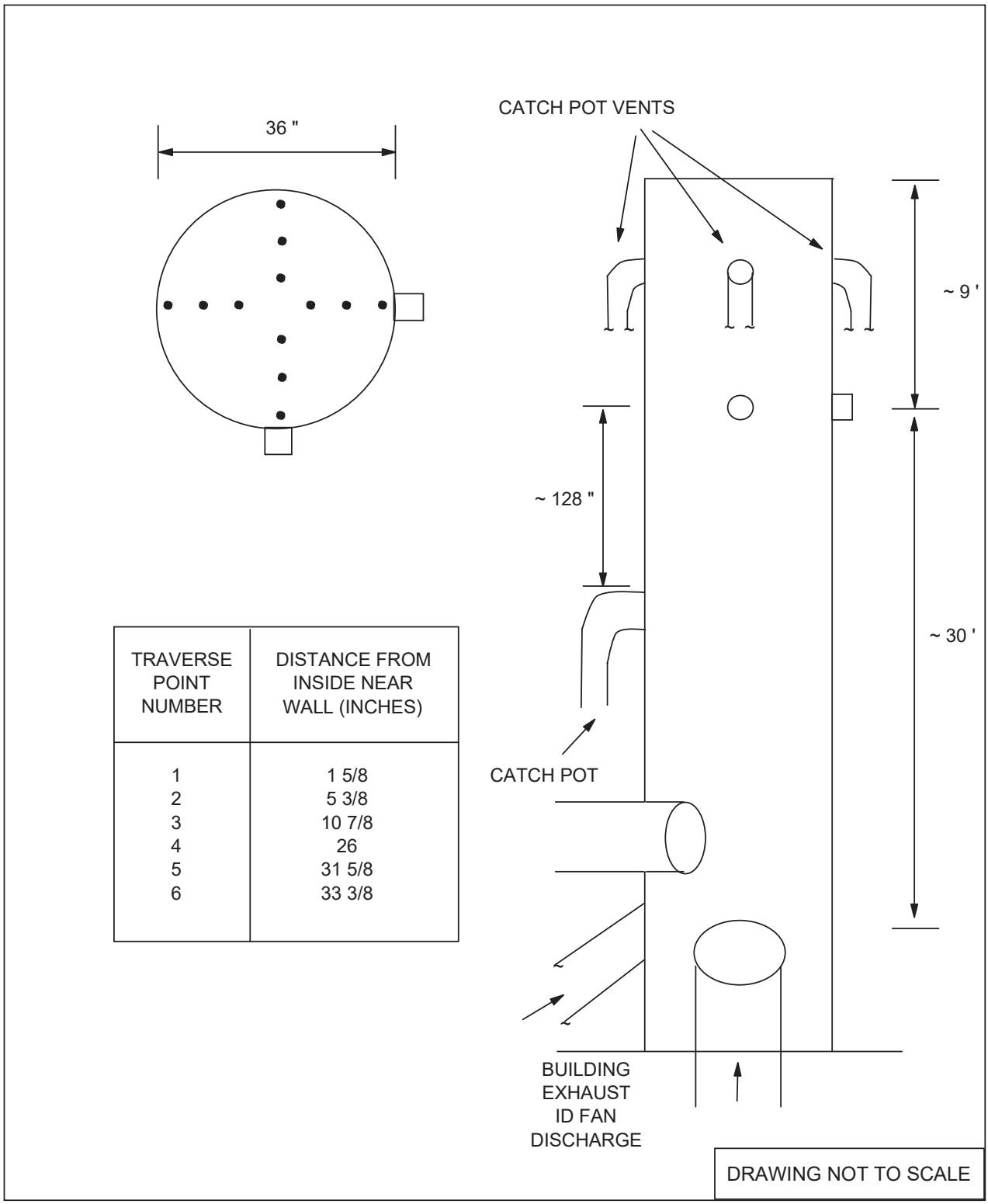
Two 6-inch ID test ports were installed on the 36-inch ID fiberglass stack as shown below. The four vents that enter the top of the stack and the one vent ~11 feet below are catch pots which, under normal process operations, do not discharge to the stack. They are used to vent process gas to the stack in the event of a process upset and are not considered a flow contributor or a disturbance.

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

4.2 VINYL ETHERS NORTH CARBON BED INLET AND OUTLET

Each fiberglass reinforced plastic (FRP) duct at the inlet and outlet of the carbon bed is 34-inch ID. The test ports are located as shown below. Based on EPA Method 1, a total of 24 traverse points (12 per port) were required for HFPO Dimer Acid sampling at both locations. Figure 4-2 provides a schematic of the test port and traverse port locations.

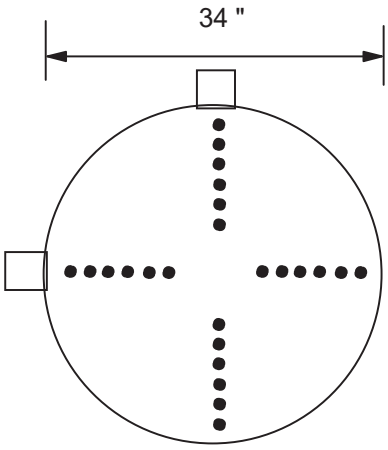
Location	Distance from Flow Disturbance	
	Downstream (B)	Upstream (A)
Carbon Bed Inlet	67 inches > 1.9 duct diameters	61 inches > 1.8 duct diameters
Carbon Bed Outlet	58 inches > 1.7 duct diameters	57 inches > 1.5 duct diameters
Division Stack	30 feet > 10 duct diameters	9 feet > 3 duct diameters



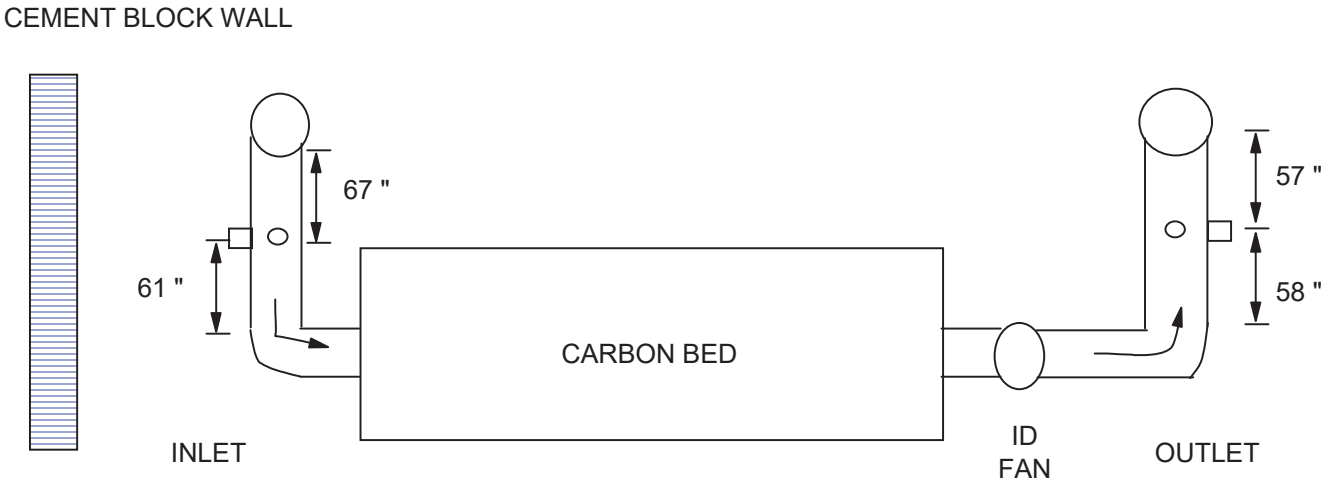
TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1 5/8
2	5 3/8
3	10 7/8
4	26
5	31 5/8
6	33 3/8

FIGURE 4-1
DIVISION STACK TEST PORT
AND TRAVERSE POINT LOCATIONS

IASDATA\CHEMOURS\15418.002.020\FIGURE 4-1 DIVISION 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
VE NORTH PROCESS CARBON BED INLET AND OUTLET SCHEMATIC

IASDATA\CHEMOURS\15418.002.020\FIGURE 4-1 VE NORTH 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 trains 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 were obtained at each 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 each test location. The cyclonic flow checks were negative (< 20°) verifying that the test locations 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 at all three locations 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.

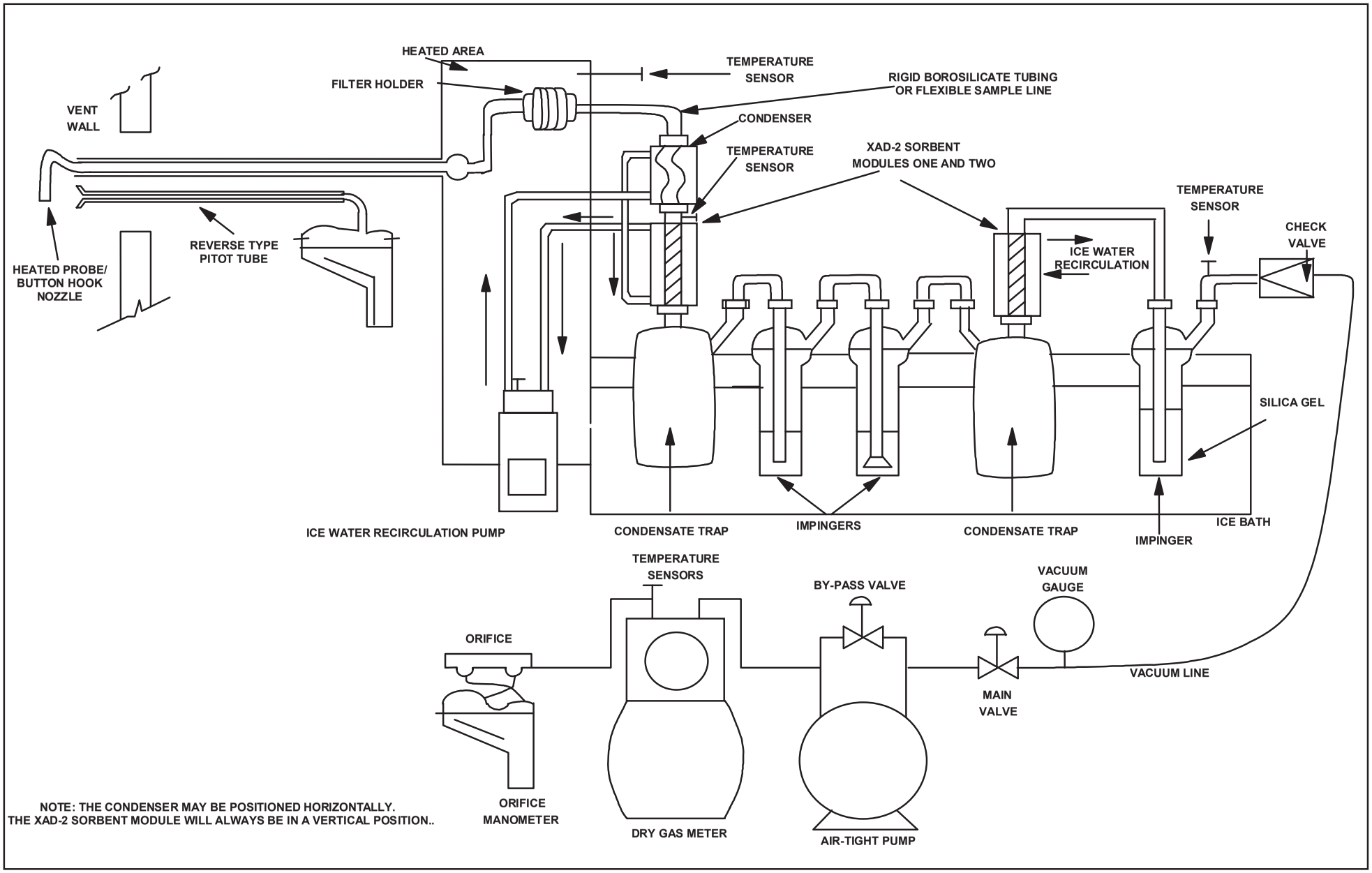


FIGURE 5-1
EPA METHOD 0010 SAMPLING TRAIN

A section of borosilicate glass or flexible polyethylene tubing connected the filter holder exit to a Grahm (spiral) type ice water-cooled condenser, 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-liter 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 underwent hydrolysis instantaneously in water in the sampling train and during the sample recovery step, and was converted to HFPO Dimer Acid such that the amount of HFPO Dimer Acid emissions represented 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 the Carbon Bed inlet and outlet test campaign, a Method 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 Method 0010 sample recovery process.

5.2.3 EPA Method 0010 Sample Analysis

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.

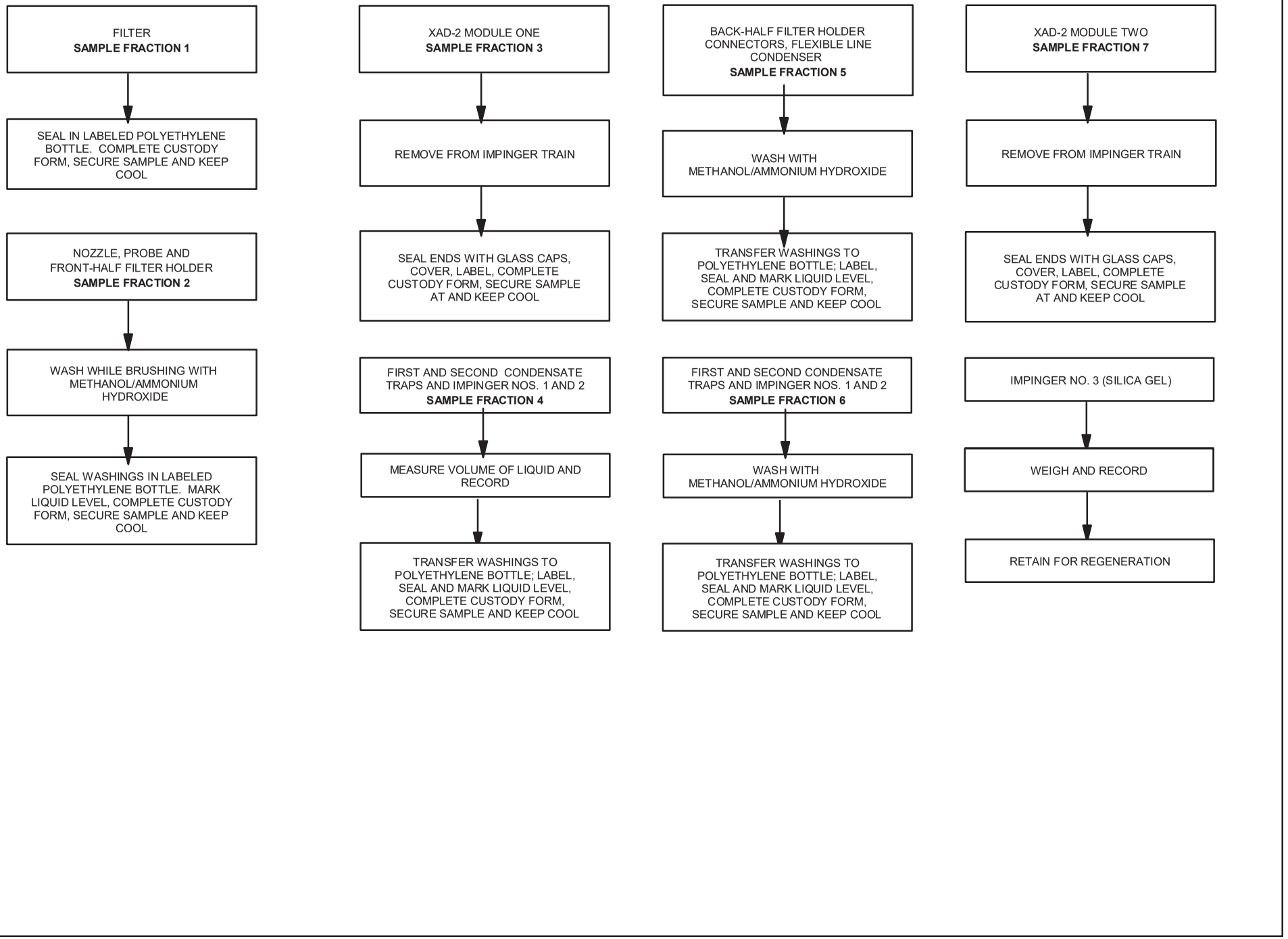


FIGURE 5-2
HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010

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

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.

For the Division stack test campaign, 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 maintained 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 insure 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 the 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.

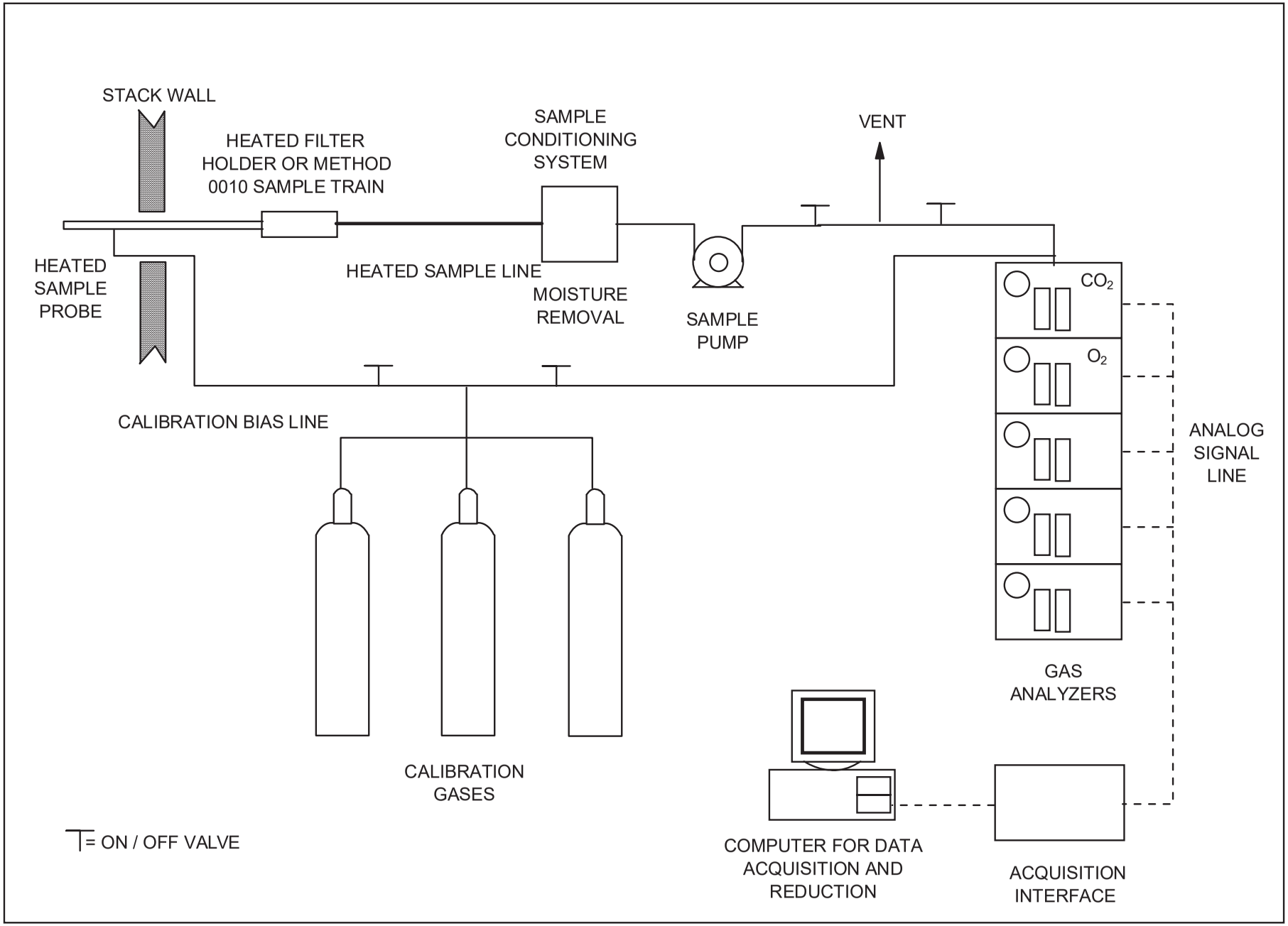


FIGURE 5-3
WESTON SAMPLING SYSTEM

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 at each location.

Tables 6-1 through 6-3 provide detailed test data and test results for the Carbon Bed inlet, the Carbon Bed outlet and the Division stack, respectively.

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

The Method 3A sampling on the Division 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.

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

Test Data			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.215	0.215	0.215
Cross sectional nozzle area, sq.ft.	0.000252	0.000252	0.000252
Barometric pressure, in. Hg	30.10	30.00	29.93
Avg. orifice press. diff., in H_2O	1.41	1.47	1.36
Avg. dry gas meter temp., deg F	74.3	65.7	73.5
Avg. abs. dry gas meter temp., deg. R	534	526	534
Total liquid collected by train, ml	23.1	22.0	20.8
Std. vol. of H_2O vapor coll., cu.ft.	1.09	1.04	0.98
Dry gas meter calibration factor	1.0014	1.0014	1.0014
Sample vol. at meter cond., dcf	61.794	62.395	61.085
Sample vol. at std. cond., dscf [(1)]	61.701	63.124	60.733
Percent of isokinetic sampling	99.8	98.2	99.2
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.	0.017	0.016	0.016
Mole fraction of dry gas	0.983	0.984	0.984
Molecular wt. of wet gas, lb/lb mole	28.65	28.66	28.66
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-6.30	-6.50	-6.40
Absolute pressure, in. Hg	29.64	29.52	29.46
Avg. temperature, deg. F	84	76	83
Avg. absolute temperature, deg.R	544	536	543
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	45.1	46.3	44.8
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	17066	17508	16946
Avg. gas stream volumetric flow, dscf/min.	16116	16751	15957

[(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
VEN CARBON BED INLET

TEST DATA			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	11057.20	12757.42	14817.04
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	6327.18	7135.58	8613.82
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	3.95E-07	4.46E-07	5.38E-07
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	3.82E-01	4.48E-01	5.15E-01
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	4.81E-02	5.64E-02	6.48E-02

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

Test Data			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.215	0.215	0.215
Cross sectional nozzle area, sq.ft.	0.000252	0.000252	0.000252
Barometric pressure, in. Hg	30.10	30.00	29.93
Avg. orifice press. diff., in H_2O	1.50	1.49	1.48
Avg. dry gas meter temp., deg F	65.1	53.9	66.9
Avg. abs. dry gas meter temp., deg. R	525	514	527
Total liquid collected by train, ml	30.7	17.7	20.0
Std. vol. of H_2O vapor coll., cu.ft.	1.4	0.8	0.9
Dry gas meter calibration factor	0.9972	0.9972	0.9972
Sample vol. at meter cond., dcf	62.920	62.221	63.095
Sample vol. at std. cond., dscf [(1)]	63.674	64.125	63.273
Percent of isokinetic sampling	99.7	99.3	99.0
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.	0.022	0.013	0.015
Mole fraction of dry gas	0.978	0.987	0.985
Molecular wt. of wet gas, lb/lb mole	28.60	28.70	28.68
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	2.80	2.50	2.50
Absolute pressure, in. Hg	30.31	30.18	30.11
Avg. temperature, deg. F	85	78	85
Avg. absolute temperature, deg.R	545	538	545
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	45.9	45.5	45.9
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	17373	17228	17348
Avg. gas stream volumetric flow, dscf/min.	16649	16822	16649

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

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

TEST DATA			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	15.093	18.17	19.27
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	8.37	10.01	10.76
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	5.23E-10	6.25E-10	6.72E-10
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	5.20E-04	6.30E-04	6.70E-04
HFPO Dimer Acid (From Inlet Data)	3.82E-01	4.48E-01	5.15E-01
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	6.55E-05	7.93E-05	8.44E-05
Carbon Bed Removal Efficiency, %	99.86	99.86	99.87

TABLE 6-3
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
DIVISION STACK

Test Data			
Run number	1	2	3
Location	Divison Stack	Divison Stack	Divison Stack
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.160	0.160	0.160
Cross sectional nozzle area, sq.ft.	0.000140	0.000140	0.000140
Barometric pressure, in. Hg	30.08	29.90	29.83
Avg. orifice press. diff., in H_2O	1.05	1.06	1.09
Avg. dry gas meter temp., deg F	64.1	65.1	61.3
Avg. abs. dry gas meter temp., deg. R	524	525	521
Total liquid collected by train, ml	14.8	15.3	16.3
Std. vol. of H_2O vapor coll., cu.ft.	0.7	0.7	0.77
Dry gas meter calibration factor	0.9834	0.9834	0.9834
Sample vol. at meter cond., dcf	56.635	56.380	56.882
Sample vol. at std. cond., dscf [(1)]	56.528	55.837	56.617
Percent of isokinetic sampling	98.9	98.1	98.7
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.	0.012	0.013	0.013
Mole fraction of dry gas	0.988	0.987	0.987
Molecular wt. of wet gas, lb/lb mole	28.70	28.70	28.69
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-0.65	-0.32	-0.30
Absolute pressure, in. Hg	30.03	29.88	29.81
Avg. temperature, deg. F	78	70	77
Avg. absolute temperature, deg.R	538	530	537
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	12	12	12
Avg. gas stream velocity, ft./sec.	73.0	72.2	73.8
Stack/duct cross sectional area, sq.ft.	7.07	7.07	7.07
Avg. gas stream volumetric flow, wacf/min.	30981	30610	31314
Avg. gas stream volumetric flow, dscf/min.	30158	30035	30254

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

TABLE 6-3 (cont.)
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
DIVISION STACK

TEST DATA			
Run number	1	2	3
Location	Divison Stack	Divison Stack	Divison Stack
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	20.51	13.80	12.83
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	12.81	8.73	8.00
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	8.00E-10	5.45E-10	5.00E-10
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	1.45E-03	9.82E-04	9.07E-04
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.82E-04	1.24E-04	1.14E-04

APPENDIX A
PROCESS OPERATIONS DATA

Date: 1/6/2020

Time	1200				1300		1400				1500					
Stack Testing							RUN 1: 1333-1533									
VEN Product	PPVE															
VEN Precursor																
VEN Condensation (HFPO)																
VEN ABR																
VEN Refining																
Stripper Column Vent																

Date: 1/7/2020

Time	800				900			1000			1100				1200			1300			1400			1500				1600			
Stack Testing					RUN 2 0900-1106												RUN 3 1235-1432														
VEN Product	PPVE																													
VEN Precursor																														
VEN Condensation (HFPO)																														
VEN ABR																		Burnout												
VEN Refining																														
Stripper Column Vent																														

APPENDIX B
RAW AND REDUCED TEST DATA

INLET

Sample and Velocity Traverse Point Data Sheet - Method 1

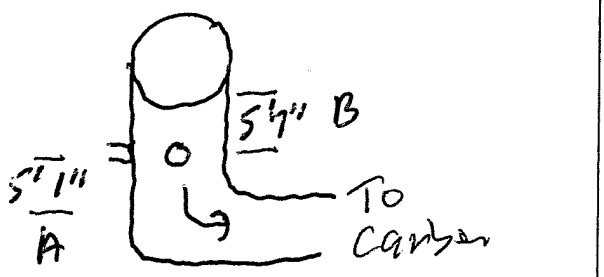
Client Chemours
Loaction/Plant Fayetteville NC
Source VE North Carbon Inlet
Operator AS
Date 6-13-18
W.O. Number

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	54 5/4"
Port Depth (in.) = D	20 5/8"
Depth of Duct, diameter (in.) = C-D	34"
Area of Duct (ft^2)	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)	5' 7"
Downstream - B (ft)	5' 1"
Upstream - A (duct diameters)	1.97
Downstream - B (duct diameters)	1.80

Diagram of Stack



Traverse Point Locations

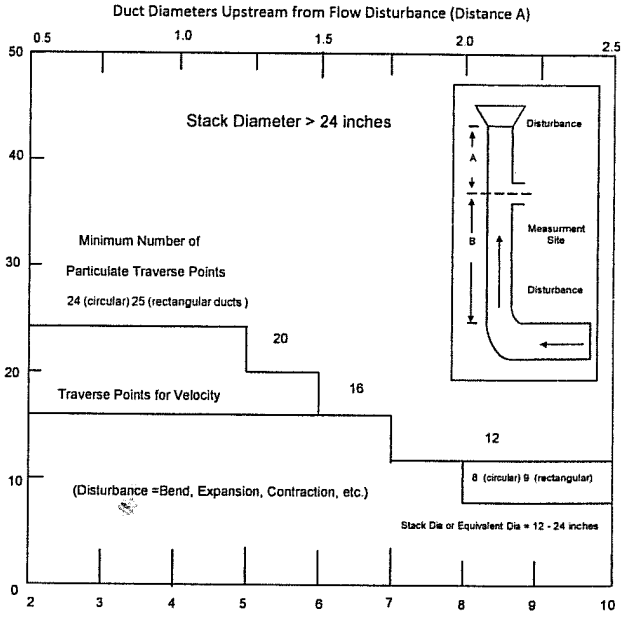
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	.021	3/4	21 3/8
2	.067	2 1/4	22 7/8
3	.118	4	24 5/8
4	.177	6	26 5/8
5	.250	8 1/2	29 1/8
6	.356	12 1/8	32 3/4
7	.644	21 7/8	42 1/2
8	.750	25 1/2	46 1/8
9	.823	28	48 5/8
10	.882	30	50 5/8
11	.933	31 3/4	52 3/8
12	.979	33 1/4	53 7/8

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 (Distance 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		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

WESTON MANAGERS DESIGNERS/CONSULTANTS

OUTLET

Sample and Velocity Traverse Point Data Sheet - Method 1

Client Chemours
Location/Plant Fayetteville NC
Source VE North Carbon Outlet
Operator KG
Date 6/13/18
W.O. Number

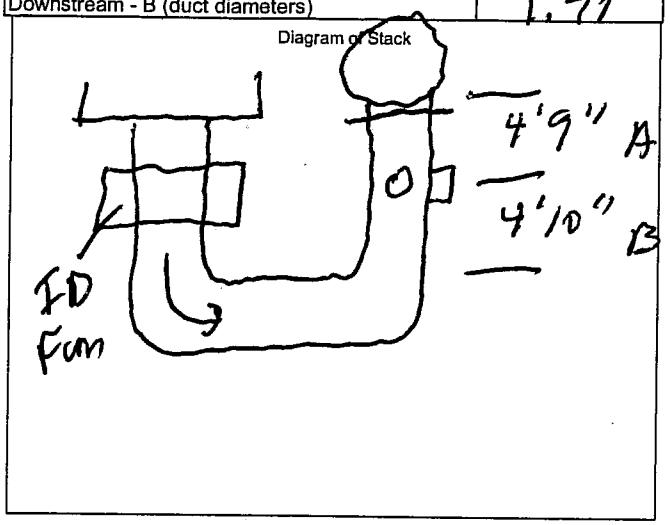
Duct Type	☒ Circular	☐ Rectangular Duct	Indicate appropriate type	
Traverse Type	☒ Particulate Traverse	☐ Velocity Traverse		☐ CEM Traverse

Distance from far wall to outside of port (in.) = C	54 5/8
Port Depth (in.) = D	20 5/8
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)	

N

Flow Disturbances	
Upstream - A (ft)	4' 4"
Downstream - B (ft)	4' 10"
Upstream - A (duct diameters)	1.53
Downstream - B (duct diameters)	1.71

Diagram of Stack



Traverse Point Locations

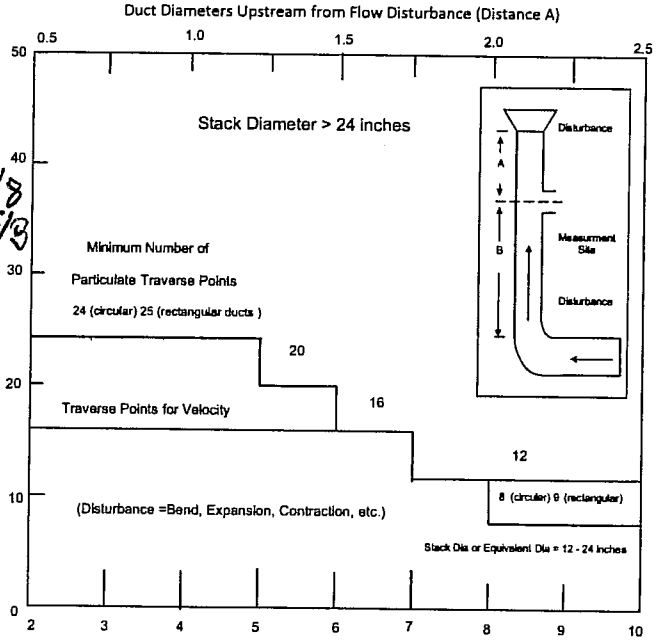
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	.021	3/4	21 3/8
2	.067	2 1/4	22 7/8
3	.118	4	24 5/8
4	.177	6	26 5/8
5	.250	8 1/2	29 1/8
6	.356	12 1/8	32 3/4
7	.644	21 5/8	42 1/2
8	.75	25 1/2	46 1/8
9	.823	28	48 5/8
10	.882	30	50 5/8
11	.933	31 3/4	52 3/8
12	.979	33 1/4	53 7/8

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 (Distance 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		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 CHCMOUNS
Loaction/Plant Fayetteville, N.C.
Source Division Stack

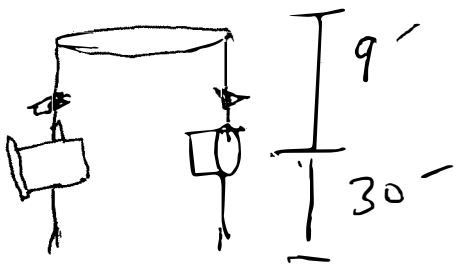
Operator MWKS
Date 11/22/12
W.O. Number 10418.00.002

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	55
Port Depth (in.) = D	12.5
Depth of Duct, diameter (in.) = C-D	37
Area of Duct (ft²) 3/07/18 7.07	7.66
Total Traverse Points MD	12
Total Traverse Points per Port	6
Port Diameter (in.) —(Flange-Threaded-Hole)	4"
Monorail Length	8'
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)	12 9'
Downstream - B (ft)	18' 30'
Upstream - A (duct diameters)	9.2
Downstream - B (duct diameters)	13.8

Diagram of Stack



Traverse Point Locations

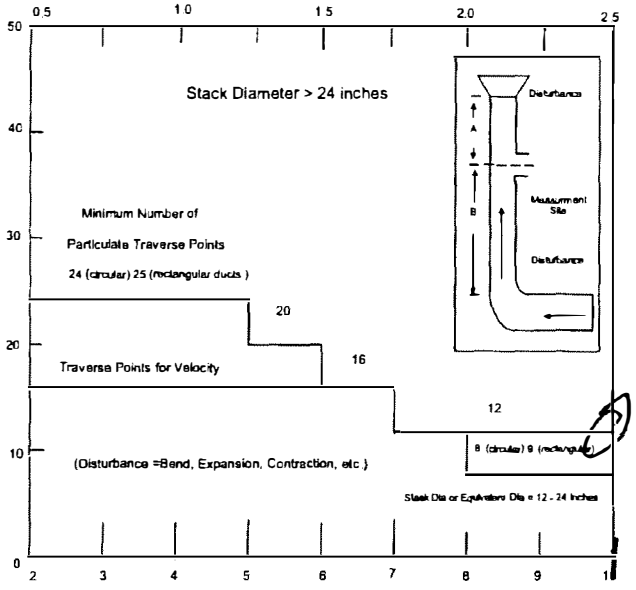
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)	
1	4.4	1.62	19 3/4	20 1/8
2	14.6	5.40	23 3/4	24 3/8
3	29.6	10.95	23 7/8	24 7/8
4	70.4	26.04	49.0	49
5	95.4	31.59	49 3/4	50 5/8
6	95.6	35.37	53 1/4	54 3/8
7				
8				
9				
10				
11				
12				

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 (Distance 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		26		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

WESTON

CHEMOURS - FAYETTEVILLE, NC
INPUTS FOR HFPO DIMER ACID CALCULATIONS
VEN CARBON BED INLET

Test Data			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
Operator	CH/AS	CH/AS	CH/AS
Inputs For Calcs.			
Sq. rt. delta P	0.78479	0.81010	0.77781
Delta H	1.4058	1.4700	1.3588
Stack temp. (deg.F)	84.0	75.5	83.1
Meter temp. (deg.F)	74.3	65.7	73.5
Sample volume (act.)	61.794	62.395	61.085
Barometric press. (in.Hg)	30.10	30.00	29.93
Volume H_2O imp. (ml)	7.0	7.0	6.0
Weight change sil. gel (g)	16.1	15.0	14.8
% CO_2	0.0	0.0	0.0
% O_2	20.9	20.9	20.9
% N_2	79.1	79.1	79.1
Area of stack (sq.ft.)	6.305	6.305	6.305
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	-6.30	-6.50	-6.40
Nozzle dia. (in.)	0.215	0.215	0.215
Meter box cal.	1.0014	1.0014	1.0014
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

			Assumed	Actual
Client	Chemours			
W.O.#	15418.002.020			
Project ID	Chemours	% Moisture	2.5	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		7
Samp. Loc. ID	IN	Silica gel (g)		16.1
Run No.ID	1	CO2, % by Vol	0	0
Test Method ID	M0010	O2, % by Vol	20.9	20.9
Date ID	JAN2020	Temperature (°F) (4)	60 ~~65~~	~~75~~ 65
Source/Location	VE North CB Inlet	Meter Temp (°F)	65	
Sample Date	1-6-2020 ✓	Static Press (in H_2O)	~~3.5~~ -6.5	-6.3 ✓
Baro. Press (in Hg)	30.10 ✓		-6.5	
Operator	H / AS ✓	Ambient Temp (°F)	60	

Stack Conditions

Meter Box ID	24		
Meter Box Y	1.0014 ✓		
Meter Box Del H	1.8790		
Probe ID / Length	P711		
Probe Material	Boro		
Pitot / Thermocouple ID			
Pitot Coefficient	0.84 ✓		
Nozzle ID			
Nozzle Measurements	0.215	0.215	0.215
Avg Nozzle Dia (in)	0.215 ✓		
Area of Stack (ft^2)	6.305 ✓		
Sample Time	96 ✓		
Total Traverse Pts	24 ✓		

K Factor 2.37 → 2.27 (4)

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.012	0.008	0.008
Leak Check @ (in Hg)	15	10	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	60		61
Reference Temp	60.9		60.9
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 (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
		0	✓1333 (4)			312.755									
A	1	4	0.76	~~0.76~~	1.73	315.6	83	71	110	110	56	6.5	44		
	2	8		0.80	1.82	318.4	83	71	110	111	50	6.5	46		
	3	12		0.78	1.77	321.5	83	71	110	112	47	6.5	43		
	4	16		0.76	1.73	324.2	83	72	110	109	48	6.5	45		
	5	20		0.72	1.63	326.9	83	73	110	110	48	6.0	41		
	6	24		0.69	1.57	329.7	83	74	110	111	48	6.0	44		V=31.628
	7	28		0.64	1.45	332.3	83	73	110	110	48	6.0	45		
	8	32		0.58	1.32	334.9	83	73	110	109	49	5.5	44		
	9	36		0.58	1.32	337.4	83	73	110	111	50	5.5	44		
	10	40		0.54	1.23	339.8	83	74	110	111	49	5.0	44		
	11	44		0.53	1.20	342.1	82	74	110	109	49	5.0	45		
	12	48	1421	0.52	1.18	344.383	82	74	110	109	48	5.0	44		
			1445			344.568									
B	1	4		0.62	1.41	347.1	85	76	110	111	56	5.5	43		
	2	8		0.58	1.32	349.5	85	75	110	109	49	5.5	46		
	3	12		0.56	1.27	352.0	85	76	110	111	47	5.0	41		
	4	16		0.55	1.25	354.7	85	76	110	109	48	5.0	45		
	5	20		0.52	1.18	357.0	85	76	110	109	48	5.0	42		
	6	24		0.54	1.23	359.4	85	76	110	110	48	5.0	43		
	7	28		0.61	1.39	362.0	85	76	110	111	48	5.5	43		
	8	32		0.64	1.45	364.6	86	76	110	109	48	5.5	41		
	9	36		0.64	1.45	367.2	86	76	110	111	48	5.5	41		
	10	40		0.58	1.32	369.7	85	76	110	109	48	5.0	45		
	11	44		0.56	1.27	372.2	85	76	110	109	49	5.0	45		
	12	48	✓1533	0.55	1.25	374.734	85	76	110	110	50	5.0	42		
				Avg Delta P	Avg Delta H	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
				✓0.61875	1.40583	61.794 ✓	84.0	74.3	110	109/112	56	6.5	41/46		
				Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
				✓0.78479	1.18293										

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)		
Samp. Loc. ID	IN	Silica gel (g)		
Run No.ID	2	CO2, % by Vol	0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	JAN2020	Temperature (°F)	80	
Source/Location	VE North CB Inlet	Meter Temp (°F)	65	
Sample Date	1-7-2020 ✓	Static Press (in H_2O)	-6.5	-6.5 ✓
Baro. Press (in Hg)	30.00 ✓			
Operator	CH / AS ✓	Ambient Temp (°F)	45	

Meter Box ID	24
Meter Box Y	1.0014 ✓
Meter Box Del H	1.3790
Probe ID / Length	P711
Probe Material	Boro
Pitot / Thermocouple ID	
Pitot Coefficient	0.84 ✓
Nozzle ID	
Nozzle Measurements	
Avg Nozzle Dia (in)	0.215 ✓
Area of Stack (ft^2)	6.305 ✓
Sample Time	96 ✓
Total Traverse Pts	24 ✓

K Factor 2.23

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.010	0.008	0.008
Leak Check @ (in Hg)	15	10	5
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	45		63
Reference Temp	45.6		62.8
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	0900 ✓			376.176									
A 1	4		0.84	1.87	379.2	70	60	110	110	43	6.5	39		
2	8		0.85	1.90	381.6	71	59	110	111	42	6.5	38		
3	12		0.82	1.83	384.6	71	59	110	110	42	6.0	36		
4	16	(4)	~~0.790.77~~	1.72	387.3	72	59	110	110	42	6.0	36		
5	20		0.73	1.63	390.0	72	60	110	110	43	6.0	37		
6	24		0.71	1.58	393.2	73	60	110	110	43	6.0	36		
7	28		0.71	1.58	395.6	73	61	110	110	43	6.0	37		
8	32		0.67	1.49	398.2	73	62	110	110	43	5.5	39		
9	36		0.62	1.38	400.7	73	62	110	110	43	5.5	37		
10	40		0.54	1.20	403.1	73	63	110	110	43	5.0	37		
11	44		0.53	1.18	405.4	73	64	110	110	43	5.0	38		
12	48	0948	0.51	1.14	407.684	73	65	110	111	43	4.5	38		
		1018			407.848									
B 1	4		0.61	1.36	410.4	77	64	110	113	50	5.0	41		
2	8		0.63	1.40	413.0	78	69	110	108	43	5.0	42		
3	12		0.58	1.29	415.5	78	70	110	112	43	5.0	41		
4	16		0.56	1.25	418.0	78	70	110	108	45	5.0	41		
5	20		0.56	1.25	420.3	78	70	110	108	45	5.0	40		
6	24		0.58	1.29	423.0	79	70	110	112	46	5.0	41		
7	28		0.69	1.54	425.5	79	70	110	108	46	5.5	40		
8	32		0.71	1.58	428.2	80	71	110	111	47	5.5	40		
9	36		0.68	1.52	430.7	80	71	110	110	46	5.5	42		
10	40		0.67	1.49	433.5	80	71	110	108	47	5.5	41		
11	44		0.64	1.43	436.0	79	71	110	109	47	5.5	41		
12	48	1106 ✓	0.62	1.38	438.735	79	71	110	111	47		41		
			✓ Avg Delta P	✓ Avg Delta H	✓ Total Volume	✓ Avg Ts	✓ Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.65958	1.47000	62.395	75.5	65.7	110/110	108/113	50	6.5			
			✓ Avg Sqrt Delta P	✓ Avg Sqrt Del H	Comments:									
			0.81010	1.20936										

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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	% Moisture	2	
Project ID	Chemours	Impinger Vol (ml)		6
Mode/Source ID	Carbon Bed	Silica gel (g)		14.8
Samp. Loc. ID	IN	CO2, % by Vol	0	0
Run No.ID	3	O2, % by Vol	20.9	20.9
Test Method ID	M0010	Temperature (°F)	80	
Date ID	JAN2020	Meter Temp (°F)	65	
Source/Location	VE North CB Inlet	Static Press (in H_2O)	-6.5	-6.4 ✓
Sample Date	01/07/2020 ✓	Ambient Temp (°F)	50	
Baro. Press (in Hg)	29.93 ✓			
Operator	AJ / AS ✓			

Meter Box ID	24		
Meter Box Y	1.00,4 ✓		
Meter Box Del H	1.8740		
Probe ID / Length	P711		Sample Train (ft^3)
Probe Material	Boro		Leak Check @ (in Hg)
Pitot / Thermocouple ID			Pitot leak check good
Pitot Coefficient	0.84 ✓		Pitot Inspection good
Nozzle ID			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 (ft^2)	6.305 ✓		Reference Temp
Sample Time	96 ✓		Pass/Fail (+/- 2°)
Total Traverse Pts	24 ✓		Temp Change Response ?

K Factor 2.23

	Initial	Mid-Point	Final
	0.015	0.010	0.008
	15	10	8
Leak Check	yes / no	yes / no	yes / no
Pitot leak check	yes / no	yes / no	yes / no
Pitot Inspection	yes / no	yes / no	yes / no
Method 3 System	yes / no	yes / no	yes / no
	Pre-Test Set		Post-Test Set
Meter Box Temp			
Reference Temp			
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 (°F)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1235 ✓			439.259									
A 1	4		0.81	1.81	442.1	84	77	110	109	59	5.5	47		
2	8		0.81	1.81	445.0	84	76	110	110	51	5.5	43		
3	12		0.78	1.74	448.1	84	76	110	111	47	5.5	43		
4	16		0.76	~~1.64~~	450.8	84	76	110	109	48	5.0	44		1.70 (4)
5	20		0.72	1.61	453.6	84	75	110	110	48	5.0	42		
6	24		0.65	1.45	456.2	84	75	110	111	48	4.5	43		
7	28		0.61	1.36	458.8	84	74	110	109	48	4.5	42		
8	32		0.56	1.25	461.5	83	74	110	108	48	4.0	43		
9	36		0.56	1.25	463.7	83	73	110	112	47	4.0	42		
10	40		0.51	1.14	465.9	82	73	110	108	47	4.0	43		
11	44		0.49	1.09	468.2	81	73	110	108	47	4.0	43		
12	48	1323	0.47	1.05	470.383	80	73	110	113	47	3.5	44		
		1344			470.773	(4)								
B 1	4		0.60	1.34	473.3	~~75~~ 80	74	109	115	54	4.5	47		
2	8		0.55	1.23	475.8	83	74	110	114	47	4.5	47		
3	12		0.56	1.25	478.2	83	74	110	108	47	4.5	47		
4	16		0.53	1.18	480.5	84	74	110	112	48	4.5	48		
5	20		0.52	1.16	482.8	83	74	110	110	49	4.5	49		
6	24		0.55	1.23	485.2	84	74	110	108	50	4.5	50		
7	28		0.64	1.43	487.8	84	73	110	111	52	4.5	51		
8	32		0.64	1.43	490.5	84	72	110	109	52	4.5	51		
9	36		0.63	1.40	493.1	84	71	110	110	54	4.5	53		
10	40		0.58	1.29	495.5	84	71	110	110	54	4.0	53		
11	44		0.53	1.18	498.2	83	70	110	107	54	4.0	53		
12	48	1432 ✓	0.55	1.23	500.734	82	69	110	111	55	4.0	53		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.60875	1.35875	61.085	83.1	73.5							
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.77781	1.16202										

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EPA Method 0010 from EPA SW-846

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

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

Run No. 1 — Sample Date 1-6-2020 — Recovery Date 1-6-2020

Sample I.D. Chemours - Carbon Bed - IN - 1 - M0010 - — Analyst 4 — 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	0	100	105	2				207	316.1	
Initial	0	100	100	0				200	300	
Gain	0	0	5	2				7	16.1	

Impinger Color clear — Labeled? ↓ ✓

Silica Gel Condition 50% spent — Sealed?

Run No. 2 — Sample Date 1/7/20 — Recovery Date 1/7/20

Sample I.D. Chemours - Carbon Bed - IN - 2 - M0010 - — Analyst DMA/CH — Filter Number M

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	2	105	100	0				207	315.0	
Initial	0	100	100	0				200	300	
Gain	2	5	0	0				7	15.0	

Impinger Color clear — Labeled? ✓ ✓

Silica Gel Condition Good — Sealed? ✓

Run No. 3 — Sample Date 1/7/2020 — Recovery Date 1/7/2020

Sample I.D. Chemours - Carbon Bed - IN - 3 - M0010 - — Analyst 4 — 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	2	104	100	0				206	314.8	
Initial	0	100	100	0				200	300	
Gain	2	4	0	0				6	14.8	

Impinger Color Clear — Labeled? ✓ ✓

Silica Gel Condition Good — Sealed? ✓

Check COC for Sample IDs of Media Blanks

CHEMOURS - FAYETTEVILLE, NC
INPUTS FOR HFPO DIMER ACID CALCULATIONS
VEN CARBON BED OUTLET

Test Data			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
Operator	JM/NG	JM/NG	JM/NG
Inputs For Calcs.			
Sq. rt. delta P	0.80608	0.80443	0.80357
Delta H	1.5021	1.4896	1.4829
Stack temp. (deg.F)	85.5	78.3	85.4
Meter temp. (deg.F)	65.1	53.9	66.9
Sample volume (act.)	62.920	62.221	63.095
Barometric press. (in.Hg)	30.10	30.00	29.93
Volume H_2O imp. (ml)	14.0	5.0	5.0
Weight change sil. gel (g)	16.7	12.7	15.0
% CO_2	0.0	0.0	0.0
% O_2	20.9	20.9	20.9
% N_2	79.1	79.1	79.1
Area of stack (sq.ft.)	6.305	6.305	6.305
Sample time (min.)	96	96	96
Static pressure (in.H_2O)	2.8	2.5	2.5
Nozzle dia. (in.)	0.215	0.215	0.215
Meter box cal.	0.9972	0.9972	0.9972
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

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		Stack Conditions	Assumed	Actual					
Client	Chemours				Meter Box ID	UG 30		K Factor	2.23
W.O.#	15418.002.020				Meter Box Y	0.9972 ✓		Initial	Mid-Point / Final
Project ID	Chemours	% Moisture	25		Meter Box Del H	1.8715			
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		14	Probe ID / Length		Sample Train (ft^3)	0.010	0.012 / 0.012
Samp. Loc. ID	OUT	Silica gel (g)		16.7	Probe Material	Boro	Leak Check @ (in Hg)	15	7 / 8
Run No.ID	1	CO2, % by Vol	0		Pitot / Thermocouple ID	P710	Pitot leak check good	~~yes~~ / no	yes / no / ~~yes~~ / no
Test Method ID	M0010	O2, % by Vol	20.9		Pitot Coefficient	0.84 ✓	Pitot Inspection good	~~yes~~ / no	yes / no / ~~yes~~ / no
Date ID	JAN2020	Temperature (°F)	85		Nozzle ID		Method 3 System good	~~yes~~ / no	yes / no / ~~yes~~ / no
Source/Location	VE North Outlet	Meter Temp (°F)	65		Nozzle Measurements	0.215 / 0.215 / 0.214	**Temp Check**	Pre-Test Set	Post-Test Set
Sample Date	01/06/20 ✓	Static Press (in H_2O)	3.5	+2.8 ✓	Avg Nozzle Dia (in)	0.215 ✓	Meter Box Temp	59	59
Baro. Press (in Hg)	30.10 ✓				Area of Stack (ft^2)	6.305 ✓	Reference Temp	60	54
Operator	Mike/Brandon ✓	Ambient Temp (°F)	60		Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
					Total Traverse Pts	24 ✓	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 (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1233 ✓			215.897									
Y 1	4		0.86	1.92	216.9	82	62	111	111	56	4	55		
2	8		0.84	1.87	222.2	84	63	111	110	53	4	43		
3	12		0.82	1.87	225.1	85	63	110	110	51	4	38		
4	16		0.82	1.83	227.9	85	63	110	109	52	4	38		
5	20		0.78	1.74	230.8	85	63	110	110	51	4	38		
6	24		0.74	1.65	233.7	85	64	111	110	51	4	37		
7	28		0.55	1.23	236.0	85	64	110	109	51	3	38		
8	32		0.47	1.05	238.3	85	64	111	112	50	3	37		
9	36		0.43	0.96	240.4	85	65	108	110	49	3	37		
10	40		0.38	0.85	242.2	85	65	109	109	49	2.5	37		30.397
11	44		0.36	0.80	244.4	85	65	111	112	50	2.5	38		
12	48	1421	0.34	0.76	246.294	85	65	110	111	50	2.0	38		
	0	1445	—	—	246.421	—	—	—	—	—	—	—		
X 1	4		0.39	0.87	248.5	85	65	110	110	56	2.5	44		
2	8		0.42	0.94	250.6	86	66	110	108	51	2.5	42		
3	12		0.46	1.02	253.8	86	66	111	113	48	2.5	41		
4	16		0.50	1.11	255.1	86	66	110	113	47	3	42		
5	20		0.57	1.27	257.5	86	66	109	111	48	3	43		
6	24		0.63	1.40	260.0	86	66	109	109	48	4	44		
7	28		0.89	1.98	263.0	86	66	109	110	52	4	44		
8	32		0.95	2.12	266.2	86	66	109	110	54	5.5	44		
9	36		0.95	2.12	269.3	87	67	110	110	54	5.5	45		62
10	40		0.97	2.23	272.7	87	67	110	113	54	5.5	45		72
11	44		0.97	2.23	275.7	87	64	110	109	54	5.5	41		
12	48	1517 ✓	0.97	2.23	278.944	87	64	109	109	54	5.5	41		
			✓ Avg Delta P	✓ Avg Delta H	✓ Total Volume	✓ Avg Ts	J Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.67000	1.50208	67.970	85.46	65.13	109/111	109/113	56	5.5	55/41		
			✓ Avg Sqrt Delta P	✓ Avg Sqrt Del H	Comments:									
			0.80607	1.20641										

EPA Method 0010 from EPA SW-846

37/55

Y / N / OX

I 99.65 / 98.38 M = 2.2 Qs 166.48 Vol 67.67 MDL

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

			Stack Conditions	
			Assumed	Actual
Client	Chemours	% Moisture	2.5	
W.O.#	15418.002.020	Impinger Vol (ml)		
Project ID	Chemours	Silica gel (g)		
Mode/Source ID	Carbon Bed	CO2, % by Vol	0	
Samp. Loc. ID	OUT	O2, % by Vol	20.9	
Run No.ID	2	Temperature (°F)	85	
Test Method ID	M0010	Meter Temp (°F)	65	
Date ID	JAN2020	Static Press (in H_2O)	+3	+2.5 ✓
Source/Location	VE North Outlet	Ambient Temp (°F)	50	
Sample Date	01/07/20 ✓			
Baro. Press (in Hg)	30.00 ✓			
Operator	Mills / Gwin ✓			

Meter Box ID	WC30		
Meter Box Y	0.9972 ✓		
Meter Box Del H	1.8715		
Probe ID / Length			
Probe Material	Boro		
Pitot / Thermocouple ID	P20		
Pitot Coefficient	0.84 ✓		
Nozzle ID			
Nozzle Measurements	0.215	0.215	0.214
Avg Nozzle Dia (in)	0.215 ✓		
Area of Stack (ft^2)	0.305 ✓		
Sample Time	96 ✓		
Total Traverse Pts	24 ✓		

K Factor 2.23

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.014	0.006	0.008
Leak Check @ (in Hg)	15	7	9
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	48		57
Reference Temp	47		57
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	0400 ✓			280.290									
1	4		0.88	1.96	283.2	75	45	110	111	42	4	44		
2	8		0.86	1.92	286.2	76	45	110	110	43	4	39		
3	12		0.84	1.87	289.3	76	45	109	110	43	4	37		
4	16		0.82	1.83	292.2	75	46	110	110	43	4	35		
5	20		0.80	1.78	295.0	76	48	111	110	44	4	35		
6	24		0.76	1.70	297.9	76	48	109	109	43	3.5	35		
7	28		0.56	1.25	300.3	77	49	109	110	43	3	35		
8	32		0.46	1.07	302.4	77	50	110	110	42	2.5	35		
9	36		0.43	0.96	304.5	77	51	112	110	43	2	36		
10	40		~~0.44~~ 0.39	0.85	306.5	78	51	111	110	43	2	36		
11	44		0.35	0.78	308.3	78	52	111	110	43	2	36		29,980
12	48	0948	0.34	0.76	310.270	77	53	110	110	43	2	36		
	0	—	—	—	310,435	—	—	—	—	—	—	—		
1	4	1018	0.37	0.83	312.5	78	56	110	114	49	2	39		
2	8		0.40	0.89	314.6	80	56	109	112	46	2	38		
3	12		0.45	1.00	316.6	80	57	110	111	45	3	38		
4	16		0.50	1.12	319.0	80	58	111	110	45	3	38		
5	20		0.56	1.25	321.4	80	58	110	110	46	3	38		
6	24		0.65	1.45	324.0	80	59	110	110	47	4	38		
7	28		0.87	1.94	327.0	80	59	111	110	48	4	39		
8	32		0.92	2.05	330.0	80	61	111	110	49	4	38		
9	36		0.95	2.12	333.2	80	61	111	110	49	4.5	38		
10	40		0.96	2.14	336.3	81	62	110	110	49	4.5	40		
11	44		0.96	2.14	339.5	81	62	109	110	49	4.5	40		32,241
12	48	1100 ✓	0.96	2.14	342.676	81	62	111	111	50	4.5	40		
			√Avg Delta P	√Avg Delta H	Total Volume	Avg Ts	√Avg Tm	Min/Max	Min/Max	Max	Max Vac	~~Min~~/Max		
			0.66797	1.48968	62.221	78.31	53.92	109/112	109/114	50	4.5	44		
			√Avg Sqrt Delta P	√Avg Sqrt Del H	Comments:	78.292								
			0.804431	1.20137										

EPA Method 0010 from EPA SW-846

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Page 1 of 1

		Stack Conditions							
Client	Chemours		Assumed	Actual	Meter Box ID	M30		K Factor	2.23
W.O.#	15418.002.020				Meter Box Y	0.9972 ✓		Initial	Mid-Point / Final
Project ID	Chemours	% Moisture	2.5		Meter Box Del H	1.8715			
Mode/Source ID	Carbon Bed	Impinger Vol (ml)			Probe ID / Length		Sample Train (ft^3)	0.012	0.004 / 0.008
Samp. Loc. ID	OUT	Silica gel (g)			Probe Material	Boro	Leak Check @ (in Hg)	15	7 / 7
Run No.ID	3	CO2, % by Vol	0.0		Pitot / Thermocouple ID	P10	Pitot leak check good	yes / no	yes / no / yes / no
Test Method ID	M0010	O2, % by Vol	20.9		Pitot Coefficient	0.84 ✓	Pitot Inspection good	yes / no	yes / no / yes / no
Date ID	JAN2020	Temperature (°F)	83		Nozzle ID		Method 3 System good	yes / no	yes / no / yes / no
Source/Location	VE North / Outlet	Meter Temp (°F)	75		Nozzle Measurements	0.215 / 0.215 / 0.217	**Temp Check**	Pre-Test Set	Post-Test Set
Sample Date	01/07/20	Static Press (in H_2O)	+2.7	+2.5 ✓	Avg Nozzle Dia (in)	0.215 ✓	Meter Box Temp	64	59
Baro. Press (in Hg)	29.93 ✓				Area of Stack (ft^2)	0.305 ✓	Reference Temp	64	70
Operator	Mills / Guarino ✓	Ambient Temp (°F)	64		Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
					Total Traverse Pts	24 ✓	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 ✓			343.045					60 Hot				
1	4		0.86	1.92	346.1	85	67	112	111		4	45		
2	8		0.85	1.90	349.1	85	67	111	110	56	4	41		
3	12		0.83	1.85	352.3	85	68	111	111	51	4	39		
4	16		0.83	1.85	355.3	85	68	109	109	51	4	39		
5	20		0.78	1.74	358.3	85	68	109	111	51	4	39		
6	24		0.73	1.63	360.9	84	68	110	109	49	3.5	39		
7	28		0.57	1.27	363.4	85	68	110	110	49	3	39		
8	32		0.47	1.05	365.8	85	68	111	110	48	2.5	40		
9	36		0.42	0.94	368.2	85	68	109	112	48	2	39		
10	40		0.37	0.83	369.8	85	67	110	110	48	2	39		
11	44		0.36	0.80	371.8	85	67	111	110	48	2	39		
12	48	1323	0.34	0.76	373.733	85	67	111	109	48	2	40		
	0		—	—	373.865	—	—	—	—	—	—	—		
1	4	1344	0.41	0.91	376.0	84	66	110	112	52	2	46		
2	8		0.43	0.96	378.2	86	66	111	112	51	2	47		
3	12		0.45	1.00	380.5	86	66	112	111	50	2	47		
4	16		0.50	1.11	383.4	86	66	111	110	51	2	47		
5	20		0.55	1.23	385.1	86	66	111	110	53	3	47		
6	24		0.65	1.45	387.7	86	66	109	111	55	3	49		
7	28		0.86	1.92	390.7	86	66	110	110	55	4	51		
8	32		0.92	2.05	393.8	86	66	110	110	53	4	52		
9	36		0.93	2.07	396.9	86	66	110	110	55	4	52		
10	40		0.93	2.07	400.0	86	67	110	111	57	4	52		
11	44		0.96	2.14	403.1	86	67	109	110	59	4	52		
12	48		0.96	2.14	406.272	86	67	110	110	59	4	52		
		1432 ✓	Avg Delta P	Avg Delta H	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.665	1.48291	103.095	85.375	66.92	109/112	109/112	59	4	52		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.80356 ✓	1.19998										

EPA Method 0010 from EPA SW-846

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.020
Location/Plant	Fayetteville, NC	Source & Location	VE North Outlet

Run No. 1 — Sample Date 1/6/20 — Recovery Date 1/6/20

Sample I.D. Chemours - Carbon Bed - OUT - 1 - M0010 - — Analyst PM — Filter Number

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	9	102	103	2					316.7	
Initial	0	100	100	0					300	
Gain	9	2	3	2				14	16.7	30.7

Impinger Color Clear — Labeled? ✓ ✓ ✓

Silica Gel Condition Blue Good — Sealed? ✓

Run No. 2 — Sample Date 1/7/20 — Recovery Date 1/7/20

Sample I.D. Chemours - Carbon Bed - OUT - 2 - M0010 - — Analyst PM — Filter Number

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	2	99	102	3					312.7	
Initial	0	100	100	0					300	
Gain	2	-1	2	3				5	12.7	17.7

Impinger Color Clear — Labeled? ✓ ✓ ✓

Silica Gel Condition Good — Sealed? ✓

Run No. 3 — Sample Date 1/7/20 — Recovery Date 1/8/20

Sample I.D. Chemours - Carbon Bed - OUT - 3 - M0010 - — Analyst PM — Filter Number

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	2	98	101	3					315.0	
Initial	0	100	100	0					300	
Gain	2	-1	1	3				5	15.0	20.0

Impinger Color Clear — Labeled? ✓ ✓

Silica Gel Condition Good — Sealed? ✓

Check COC for Sample IDs of Media Blanks

CHEMOURS - FAYETTEVILLE, NC
INPUTS FOR HFPO DIMER ACID CALCULATIONS
DIVISION STACK

Test Data

Run number	1	2	3
Location	Divison Stack	Divison Stack	Divison Stack
Date	1/6/2020	1/7/2020	1/7/2020
Time period	1333-1533	0900-1106	1235-1432
Operator	MW	MW	MW

Inputs For Calcs.

Sq. rt. delta P	1.28787	1.27773	1.29732
Delta H	1.0474	1.0571	1.0939
Stack temp. (deg.F)	77.6	70.3	77.0
Meter temp. (deg.F)	64.1	65.1	61.3
Sample volume (act.)	56.635	56.380	56.882
Barometric press. (in.Hg)	30.08	29.90	29.83
Volume H_2O imp. (ml)	-2.0	3.0	2.0
Weight change sil. gel (g)	16.8	12.3	14.3
% CO_2	0.0	0.0	0.0
% O_2	20.9	20.9	20.9
% N_2	79.1	79.1	79.1
Area of stack (sq.ft.)	7.070	7.070	7.070
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	-0.65	-0.32	-0.30
Nozzle dia. (in.)	0.160	0.160	0.160
Meter box cal.	0.9834	0.9834	0.9834
Cp of pitot tube	0.84	0.84	0.84
Traverse points	12	12	12

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	Division	Impinger Vol (ml)		-2
Samp. Loc. ID	STK	Silica gel (g)		16.8
Run No.ID	1	CO2, % by Vol	0.0	
Test Method ID	M0010	O2, % by Vol	20.6	
Date ID	JAN2020	Temperature (°F)	≈70	
Source/Location	Division Stack	Meter Temp (°F)	≈57	
Sample Date	1/06/20 ✓	Static Press (in H_2O)	-0.25	-0.65 ✓
Baro. Press (in Hg)	30.08 ✓			
Operator	MPW WENKIELIEL	Ambient Temp (°F)	~~≈55~~ ≈63	
			MPW 1/06/20	

Meter Box ID	32			
Meter Box Y	0.9834 ✓			
Meter Box Del H	1.7175			
Probe ID / Length	750	5'	Sample Train (ft³)	
Probe Material	Boro		Leak Check @ (in Hg)	
Pitot / Thermocouple ID	P700		Pitot leak check good	
Pitot Coefficient	0.84 ✓		Pitot Inspection good	
Nozzle ID	0.160	0.160	Method 3 System good	
Nozzle Measurements	0.160	0.160	0.160	**Temp Check**
Avg Nozzle Dia (in)	0.160 ✓		Meter Box Temp	
Area of Stack (ft²)	~~7.04~~ 7.07 ✓		Reference Temp	
Sample Time	96 ✓		Pass/Fail (+/- 2°)	
Total Traverse Pts	12 ✓		Temp Change Response ?	

K Factor 0.634

	Initial	Mid-Point	Final
Sample Train (ft³)	0.001	0.001	0.001
Leak Check @ (in Hg)	≈15	≈20	≈0
Pitot leak check good	(yes) / no	(yes) / no	(yes) / no
Pitot Inspection good	(yes) / no	(yes) / no	~~no~~ / no
Method 3 System good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	55		60
Reference Temp	~~52~~ 54		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 (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	1333 ✓			348.270									
A 1	4		0.5	0.951	350.51	76	57	101	100	62	3	54		
1	8		1.0	1.01	352.75	76	57	101	101	59	3	45		K-FACTOR
2	12		1.8	1.12	355.52	76	58	100	101	51	4	45	←	0.627
2	16		1.9	1.19	357.81	76	58	100	99	51	4	45		
3	20		2.0	1.25	360.43	77	59	100	99	51	4	48		
3	24		2.0	1.25	362.89	77	59	100	99	51	4	48		28.600
4	28		1.8	1.12	365.30	77	59	100	100	51	4	48		
4	32		1.8	1.12	367.8393	77	61	100	100	51	4	48		
5	36		1.6	1.00	370.15	77	61	100	100	51	4	50		
5	40		1.6	1.00	372.53	77	62	100	100	55	4	51		
6	44		1.4	0.87	374.67	78	62	100	100	57	3	52		
6	48	1421	1.4	0.87	376.870	78	62	100	100	57	3	52		
	0	1445			376.990									
B 1	04		1.1	0.87	379.12	78	65	100	100	59	3	48		
1	8		1.4	0.87	381.35	78	68	100	100	59	3	48		
2	12		1.8	1.12	383.34	78	68	100	100	54	24	49		K-FACTOR
2	16		1.9	1.124	386.66	78	68	100	100	59	4	49	←	0.637
3	20		2.0	1.27	388.83	78	68	100	100	55	4	47		
3	24		2.0	1.27	391.44	78	69	100	100	55	4	47		
4	28		1.8	1.14	393.90	78	69	100	100	55	3	47		28.035
4	32		1.8	1.14	396.33	78	69	100	100	55	3	47		
5	36		1.5	0.955	398.56	79	70	100	100	56	3	48		
5	40		1.5	0.955	400.80	79	70	100	101	56	3	48		
6	44		1.3	0.828	402.91	79	70	100	100	56	3	48		
6	48	1533 ✓	1.3	0.828	405.025	79	70	100	100	56	2	48		
			✓ Avg Delta P	✓ Avg Delta H	✓ Total Volume	✓ Avg Ts	✓ Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.66667	1.04738	56.635	77.58	64.1	100/101	94/101	62	4	45/54		
			✓ Avg Sqrt Delta P	✓ Avg Sqrt Del H	Comments:									
			1.28787	1.02094										

EPA Method 0010 from EPA SW-846

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

			Stack Conditions						
Client	Chemours		Assumed	Actual	Meter Box ID	32			
W.O.#	15418.002.020				Meter Box Y	0.9834 ✓			
Project ID	Chemours	% Moisture	≈1.8		Meter Box Del H	1.3175			
Mode/Source ID	Division	Impinger Vol (ml)		100	Probe ID / Length	705 5'	Sample Train (ft^3)		
Samp. Loc. ID	STK	Silica gel (g)		12.3	Probe Material	Boro	Leak Check @ (in Hg)		
Run No.ID	2	CO2, % by Vol	0.1		Pitot / Thermocouple ID	P700	Pitot leak check good		
Test Method ID	M0010	O2, % by Vol	20.8		Pitot Coefficient	0.84 ✓	Pitot Inspection good		
Date ID	JAN2020	Temperature (°F)	=		Nozzle ID	G160	Method 3 System good		
Source/Location	Division Stack	Meter Temp (°F)	≈ 55		Nozzle Measurements	0.160 0.160 0.160	**Temp Check**	Pre-Test Set	Post-Test Set
Sample Date	1/07/20 ✓	Static Press (in H_2O)	-0.60	-0.32	Avg Nozzle Dia (in)	0.160 ✓	Meter Box Temp	41	59
Baro. Press (in Hg)	29.90 ✓				Area of Stack (ft^2)	7.04 7.07	Reference Temp	45	58
Operator	M. WINKELER ✓	Ambient Temp (°F)	≈ 40		Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
					Total Traverse Pts	12 ✓	Temp Change Response ?	yes / no	yes / no

K Factor 0.636

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.001	0.001	0.001
Leak Check @ (in Hg)	✓	✓	✓
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

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) MJ 1/07/20	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	0900 ✓			405.165									
A 1	4		1.5	0.954	407.53	65	49 51	99	100	49	3	42		
1	8		1.5	0.954	409.76	65	52	99	100	49	3	42		
2	12		1.8	1.14	413.11	66	52	100	101	49	3	43		VOL.
2	16		1.8	1.14	414.81	66	53	100	100	48	3	47		28.162
3	20		2.0	1.27	417.28	68	53	100	100	42	4	46		
3	24		2.0	1.27	419.88	68	56	100	101	42	4	46		
4	28		1.8	1.14	422.19	69	60	100	100	44	4	47		
4	32		1.8	1.14	424.64	69	60	100	100	45	4	47		
5	36		1.5	0.954	427.08	69	63	100	100	45	3	47		K-Factor
5	40		1.5	0.954	428.65	69	65	100	100	45	3	47		
6	44		1.3	0.846	431.14	69	65	100	98	45	3	49		← 0.651
6	48	0942	1.3	0.846	433.285	69	66	100	98	45	3	49		
B		1018			433.410									K-Factor
1	4		1.5	0.979	435.73	72	70	100	100	54	3	50	←	0.653
1	8		1.5	0.979	437.75	72	72	100	100	54	3	50		
2	12		1.8	1.17	440.28	72	72	100	100	54	3	50		
2	16		1.8	1.17	442.85	72	72	100	100	54	3	50		28.260
3	20		2.0	1.30	445.500	72	73	100	100	54	3 4	50		
3	24		2.0	1.30	448.24	73	73	99	100	52	4	54		
4	28		1.8	1.17	450.36	73	73	99	100	52	4	54		
4	32		1.8	1.17	453.11	73	73	99	100	52	4	54		
5	36		1.4	0.914	455.27	74	74	100	100	52	3	55		
5	40		1.4	0.914	457.51	74	74	100	100	52	3	54		
6	44		1.3	0.848	459.70	74	75	100	100	52	3	51		
6	48	1106 ✓	1.3	0.848	461.070	73	76	100	100	52	2	51		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			✓ 1.64167	✓ 1.05708	~~56.422~~	✓ 70.3	✓ 65.1	99/100	98/101	54	4	42/54		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			✓ 1.27773	1.02545	56.380 ✓									
			1.65060	1.05066										
			1.28119											

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Page ____ of ____

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.020	% Moisture	≈1.0	
Project ID	Chemours	Impinger Vol (ml)		2
Mode/Source ID	Division	Silica gel (g)		14.3
Samp. Loc. ID	STK	CO2, % by Vol	0.1	
Run No.ID	3	O2, % by Vol	20.8	
Test Method ID	M0010	Temperature (°F)	≈65	
Date ID	JAN2020	Meter Temp (°F)	≈65	
Source/Location	Division Stack	Static Press (in H_2O)	-0.30	
Sample Date	1/07/2020 ✓			
Baro. Press (in Hg)	29.83 ✓			
Operator MW	WINKLER ✓	Ambient Temp (°F)	≈60	

Meter Box ID	32		
Meter Box Y	0.9834 ✓		
Meter Box Del H	1.7175		
Probe ID / Length	701	5' ✓	Sample Train (ft³)
Probe Material	Boro		Leak Check @ (in Hg)
Pitot / Thermocouple ID	Y701		Pitot leak check good
Pitot Coefficient	0.84 ✓		Pitot Inspection good
Nozzle ID	0160		Method 3 System good
Nozzle Measurements	0.160	0.160 / 0.160	**Temp Check**
Avg Nozzle Dia (in)	0.160 ✓		Meter Box Temp
Area of Stack (ft²)	~~7.07~~ 7.07		Reference Temp
Sample Time	96 ✓		Pass/Fail (+/- 2°)
Total Traverse Pts	12 ✓		Temp Change Response ?

K Factor 0.667

	Initial	Mid-Point	Final
	0.001	0.001	0.001
	≤15	≤6	≤6
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
	Pre-Test Set		Post-Test Set
	60		60
	59		59
	Pass / Fail		Pass / Fail
	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	1235 ✓			461.954									
1	4		1.5	0.993	464.82	77	64	100	100	59	4	56		
1	8		1.5	0.993	466.00	77	64	100	100	59	4	55		
2	12		1.8	1.16	469.91	77	63	100	100	55	5	54	←	0.667
2	16		1.8	1.16	471.65	77	63	100	100	55	5	54		
3	20		2.0	1.29	474.26	77	63	100	100	54	5	54		28.232
3	24		2.0	1.29	476.82	77	63	100	100	55	5	53		
4	28		1.9	1.20	479.37	77	62	100	100	57	4	51		
4	32		1.9	1.20	482.19	76	62	100	100	57	4	51		
5	36		1.5	0.972	484.22	76	62	100	100	57	4	52		
5	40		1.5	0.972	486.30	76	62	100	100	57	4	52		
6	44		1.4	0.907	488.57	76	62	100	100	52	3	52		
6	48	1323 / 1344	1.4	0.907	490.126 / 490.900	76	62	100	101	58	3	52		
1	4		1.6	1.03	493.15	77	59	100	100	55	4	55		28.650
1	8		1.6	1.03	495.19	77	59	100	100	55	4	55		
2	12		1.9	1.20	497.96	77	59	100	100	55	5	55		
2	16		1.9	1.20	500.55	77	59	100	101	55	5	55		
3	20		2.0	1.29	503.44	78	59	100	100	55	5	56		
3	24		2.0	1.29	505.76	78	60	100	100	56	5	56		
4	28		1.9	1.20	508.38	78	60	100	100	56	5	54		
4	32		1.9	1.20	510.77	78	60	100	100	56	5	54		
5	36		1.5	0.993	513.03	77	61	100	100	56	5	54		
5	40		1.5	0.993	515.30	77	61	100	100	56	5	54		
6	44		1.3	0.898	517.33	77	61	100	100	57	4	50		
6	48	1432 ✓	1.3	0.898	519.550	77	61	100	100	57	4	50		
			√ Avg Delta P	√Avg Delta H	√Total Volume	√Avg Ts	√ Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.69167	1.093917	56.882	77	61	100	100/101	59	5	50/56		
			√Avg Sqrt Delta P	√Avg Sqrt Del H	Comments:									
			1.29732	1.04379										

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client: Chemours | W.O. #: 15418.002.020

Location/Plant: Fayetteville, NC | Source & Location: Division Stack

Run No. 1 | Sample Date 1/6/20 | Recovery Date 1/6/20

Sample I.D. Chemours - Division - STK - 1 - M0010 - | Analyst WF | Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	2	96	100					198	316.8	
Initial	0	100	100					200	300	
Gain	2	-4	0					-2	16.8	

Impinger Color: Clear | Labeled? ✓ ✓

Silica Gel Condition: 95% Blue | Sealed? ✓

Run No. 2 | Sample Date 1/7/20 | Recovery Date 1/7/20

Sample I.D. Chemours - Division - STK - 2 - M0010 - | Analyst SR | Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	1	100	102					203	312.3	
Initial	0	100	100					200	300	
Gain	1	0	2					3 ✓	12.3 ✓	

Impinger Color: Clear | Labeled? ✓

Silica Gel Condition: 95% Blue | Sealed? ✓

Run No. 3 | Sample Date 1/7/20 | Recovery Date 1/7/20

Sample I.D. Chemours - Division - STK - 3 - M0010 - | Analyst SR | Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	2	100	100					202	314.3	
Initial	0	100	100					200	300	
Gain	2	0	0					2 ✓	14.3 ✓	

Impinger Color: Clear | Labeled? ✓

Silica Gel Condition: 95% Blue | Sealed? ✓

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

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

Project Number: **15418**
Operator: **SR**
Date: **6 Jan 2020**

File: C:\DATA\Chemours\January\010619 Division.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: **VEN**

Project Number: **15418**
Operator: **SR**
Date: **6 Jan 2020**

Start Time: 10:56

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	9 mv
Span, 21.3 %	8117 mv

Curve Coefficients

Slope	**Intercept**
381.6	9

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 %	8554 mv

Curve Coefficients

Slope	**Intercept**
502.1	-7

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **VEN** | Calibration **1** | Date: **6 Jan 2020**

Start Time: 10:56

O_2
Method: EPA 3A
Span Conc. 21.3 %
Slope 381.6 **Intercept** 9.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.1	0.1	0.5	Pass
21.2	21.2	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %
Slope 502.1 **Intercept** -7.0

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**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **VEN** | Calibration **1** | Date: **6 Jan 2020**

Start Time: 11:00

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	0.1	0.1	0.6	Pass
Span	8.7	8.6	-0.1	-0.6	Pass

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **6 Jan 2020**

Time	O_2 %	CO_2 %
13:33	20.8	0.1
13:34	20.7	0.1
13:35	19.7	0.9
13:36	20.7	0.3
13:37	20.8	0.2
13:38	20.9	0.1
13:39	20.9	0.1
13:40	20.9	0.1
13:41	20.9	0.1
13:42	20.9	0.1
13:43	20.9	0.1
13:44	20.9	0.1
13:45	20.9	0.1
13:46	20.9	0.1
13:47	20.9	0.1
13:48	20.9	0.1
13:49	20.9	0.1
13:50	20.9	0.1
13:51	20.9	0.0
13:52	20.9	0.1
13:53	20.9	0.1
13:54	20.9	0.1
13:55	20.9	0.1
13:56	20.9	0.0
13:57	20.9	0.1
13:58	20.9	0.1
13:59	20.9	0.1
14:00	20.9	0.1
14:01	20.9	0.1
14:02	20.9	0.1
14:03	20.9	0.1
14:04	20.9	0.1
14:05	20.9	0.1
14:06	20.9	0.1
14:07	20.9	0.1
14:08	20.9	0.1
14:09	20.9	0.1
14:10	20.9	0.1
14:11	20.9	0.1
14:12	20.9	0.1

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **6 Jan 2020**

Time	O_2 %	CO_2 %
14:13	20.9	0.1
14:14	20.9	0.1
14:15	20.9	0.1
14:16	20.9	0.1
14:17	20.9	0.1
14:18	20.9	0.1
14:19	20.9	0.1
14:20	20.9	0.1
14:21	20.9	0.1
14:22	20.9	0.1
14:23	20.9	0.1
14:24	20.9	0.1
14:25	20.9	0.1
14:26	20.9	0.1
14:27	20.9	0.1
14:28	20.9	0.1
14:29	20.9	0.1
14:30	20.9	0.1
14:31	20.9	0.1
14:32	20.9	0.1
14:33	20.8	0.1
14:34	20.8	0.1
14:35	20.8	0.1
14:36	20.8	0.1
14:37	20.8	0.1
14:38	20.8	0.1
14:39	20.8	0.1
14:40	20.8	0.1
14:41	20.8	0.1
14:42	20.8	0.1
14:43	20.8	0.1
14:44	20.8	0.1
14:45	20.8	0.1
14:46	20.8	0.1
14:47	20.8	0.1
14:48	20.8	0.1
14:49	20.9	0.1
14:50	20.9	0.1
14:51	20.9	0.1
14:52	20.9	0.1

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **6 Jan 2020**

Time	O_2 %	CO_2 %
14:53	20.9	0.1
14:54	20.9	0.1
14:55	20.9	0.1
14:56	20.9	0.1
14:57	20.9	0.1
14:58	20.9	0.1
14:59	20.9	0.0
15:00	20.9	0.1
15:01	20.9	0.1
15:02	20.9	0.1
15:03	20.9	0.1
15:04	20.9	0.1
15:05	20.9	0.0
15:06	20.9	0.0
15:07	20.9	0.1
15:08	20.9	0.1
15:09	20.9	0.1
15:10	20.9	0.1
15:11	20.9	0.1
15:12	20.9	0.1
15:13	20.9	0.1
15:14	20.9	0.1
15:15	20.9	0.1
15:16	20.9	0.1
15:17	20.9	0.1
15:18	20.9	0.0
15:19	20.9	0.1
15:20	20.9	0.1
15:21	20.9	0.1
15:22	20.9	0.1
15:23	20.9	0.1
15:24	20.9	0.1
15:25	20.9	0.0
15:26	20.9	0.1
15:27	20.9	0.1
15:28	20.9	0.1
15:29	20.9	0.1
15:30	20.9	0.1
15:31	20.9	0.1
15:32	20.9	0.0

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **6 Jan 2020**

Time	O_2 %	CO_2 %
15:33	20.9	0.1
Avgs	**20.9**	**0.1**

RUN SUMMARY

Number 1

Client: **Chemours** | Project Number: **15418**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **VEN** | Calibration **1** | Date: **6 Jan 2020**

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

Time: 13:32 to 15:33

Run Averages

20.9	0.1

Pre-run Bias at 11:00

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

Post-run Bias at 15:38

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

20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number: **15418**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **VEN** | Calibration **1** | Date: **6 Jan 2020**

Start Time: 15:38

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	0.1	0.1	0.6	Pass
Span	8.7	8.6	-0.1	-0.6	Pass

Calibration Drift

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

*Bias No. 1

METHODS AND ANALYZERS

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

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

File: C:\DATA\Chemours\January\010719 Division.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: **Division**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Start Time: 07:37

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 %	8121 mv

Curve Coefficients

Slope	**Intercept**
381.6	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	2 mv
Span, 17.1 %	8542 mv

Curve Coefficients

Slope	**Intercept**
500.9	2

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **Division** | Calibration **1** | Date: **7 Jan 2020**

Start Time: 07:37

O_2
Method: EPA 3A
Span Conc. 21.3 %
Slope 381.6 **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 500.9 **Intercept** 2.0

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**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **Division** | Calibration **1** | Date: **7 Jan 2020**

Start Time: 07:46

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

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	8.7	8.6	-0.1	-0.6	Pass

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
09:00	20.8	0.0
09:01	20.8	0.0
09:02	20.5	0.0
09:03	20.7	0.0
09:04	20.8	0.0
09:05	20.8	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
09:19	20.9	0.0
09:20	21.0	0.0
09:21	21.0	0.0
09:22	21.0	0.0
09:23	21.0	0.0
09:24	21.0	0.0
09:25	21.0	0.0
09:26	21.0	0.0
09:27	21.0	0.0
09:28	21.0	0.0
09:29	21.0	0.0
09:30	21.0	0.0
09:31	21.0	0.0
09:32	21.0	0.0
09:33	21.0	0.0
09:34	21.0	0.0
09:35	21.0	0.0
09:36	21.0	0.0
09:37	21.0	0.0
09:38	21.0	0.0
09:39	21.0	0.0

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
09:40	21.0	0.0
09:41	21.0	0.0
09:42	21.0	0.0
09:43	21.0	0.0
09:44	21.0	0.0
09:45	21.0	0.0
09:46	21.0	0.0
09:47	21.0	0.0
09:48	21.0	0.0
09:49	21.0	0.0
09:50	21.0	0.0
09:51	21.0	0.0
09:52	20.9	0.0
09:53	20.9	0.0
09:54	20.9	0.0
09:55	20.8	0.0
09:56	20.8	0.0
09:57	20.8	0.0
09:58	20.8	0.0
09:59	20.8	0.0
10:00	20.8	0.0
10:01	20.8	0.0
10:02	20.8	0.0
10:03	20.8	0.0
10:04	20.8	0.0
10:05	20.8	0.0
10:06	20.8	0.0
10:07	20.8	0.0
10:08	20.8	0.0
10:09	20.8	0.0
10:10	20.8	0.0
10:11	20.8	0.0
10:12	20.8	0.0
10:13	20.8	0.0
10:14	20.8	0.0
10:15	20.8	0.0
10:16	20.8	0.0
10:17	20.8	0.0
10:18	20.8	0.0
10:19	20.8	0.0

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
10:20	20.8	0.0
10:21	20.8	0.0
10:22	20.8	0.0
10:23	20.8	0.0
10:24	20.8	0.0
10:25	20.8	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
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

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
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
Avgs	**20.9**	**0.0**

RUN SUMMARY

Number 2

Client: **Chemours** | Project Number: **15418**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **Division** | Calibration **1** | Date: **7 Jan 2020**

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

Time: 08:59 to 11:06

Run Averages

20.9	0.0

Pre-run Bias at 07:46

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

Post-run Bias at 11:09

Zero Bias	0.2	0.1
Span Bias	12.0	8.5
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**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **Division** | Calibration **1** | Date: **7 Jan 2020**

Start Time: 11:09

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	0.9	Pass
Span	12.0	12.0	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.2	0.1	0.5	Pass
Span	12.1	12.0	-0.1	-0.5	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	8.7	8.5	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.1	0.0	0.0	Pass
Span	8.6	8.5	-0.1	-0.6	Pass

*Bias No. 1

RUN DATA

Number 3

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
12:35	20.7	0.0
12:36	20.7	0.0
12:37	20.7	0.0
12:38	20.7	0.0
12:39	20.7	0.0
12:40	20.7	0.0
12:41	20.7	0.0
12:42	20.7	0.0
12:43	20.7	0.0
12:44	20.7	0.0
12:45	20.7	0.0
12:46	20.7	0.0
12:47	20.7	0.0
12:48	20.7	0.0
12:49	20.7	0.0
12:50	20.8	0.0
12:51	20.8	0.0
12:52	20.8	0.0
12:53	20.9	0.0
12:54	20.9	0.0
12:55	20.9	0.0
12:56	20.9	0.0
12:57	20.9	0.0
12:58	20.9	0.0
12:59	20.9	0.0
13:00	20.9	0.0
13:01	20.9	0.0
13:02	20.9	0.0
13:03	20.9	0.0
13:04	20.9	0.0
13:05	20.9	0.0
13:06	20.9	0.0
13:07	20.9	0.0
13:08	20.9	0.0
13:09	20.9	0.0
13:10	20.9	0.0
13:11	20.9	0.0
13:12	20.9	0.0
13:13	20.9	0.0
13:14	20.9	0.0

RUN DATA

Number 3

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
13:15	20.9	0.0
13:16	20.9	0.0
13:17	20.9	0.0
13:18	20.9	0.0
13:19	20.9	0.0
13:20	20.9	0.0
13:21	20.9	0.0
13:22	20.9	0.0
13:23	20.9	0.0
13:24	20.9	0.0
13:25	20.9	0.0
13:26	20.9	0.0
13:27	20.9	0.0
13:28	20.8	0.0
13:29	20.8	0.0
13:30	20.8	0.0
13:31	20.8	0.0
13:32	20.8	0.0
13:33	20.8	0.0
13:34	20.8	0.0
13:35	20.8	0.0
13:36	20.8	0.0
13:37	20.8	0.0
13:38	20.8	0.0
13:39	20.8	0.0
13:40	20.8	0.0
13:41	20.8	0.0
13:42	20.8	0.0
13:43	20.8	0.0
13:44	20.8	0.0
13:45	20.8	0.0
13:46	20.8	0.0
13:47	20.8	0.0
13:48	20.8	0.0
13:49	20.8	0.0
13:50	20.8	0.0
13:51	20.8	0.0
13:52	20.9	0.0
13:53	20.9	0.0
13:54	20.9	0.0

RUN DATA

Number 3

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

Calibration **1**

Project Number: **15418**
Operator: **SR**
Date: **7 Jan 2020**

Time	O_2 %	CO_2 %
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
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
Avgs	**20.9**	**0.0**

RUN SUMMARY

Number 3

Client: **Chemours** | Project Number: **15418**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **Division** | Calibration **1** | Date: **7 Jan 2020**

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

Time: 12:34 to 14:32

Run Averages

20.9	0.0

Pre-run Bias at 11:09

Zero Bias	0.2	0.1
Span Bias	12.0	8.5
Span Gas	12.0	8.9

Post-run Bias at 14:34

Zero Bias	0.1	0.1
Span Bias	12.1	8.5
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**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **Division** | Calibration **1** | Date: **7 Jan 2020**

Start Time: 14:34

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	0.2	0.1	-0.1	-0.5	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	0.1	0.1	0.6	Pass
Span	8.7	8.5	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.1	0.0	0.0	Pass
Span	8.5	8.5	0.0	0.0	Pass

*Bias No. 2

APPENDIX C
LABORATORY ANALYTICAL REPORT

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Job Number: 140-17861-1

Job Description: VEN 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
1/31/2020 8:00 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
01/31/2020

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Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
D	Sample results are obtained from a dilution; the surrogate or matrix spike recoveries reported are calculated from diluted samples.
E	Result exceeded calibration range.
H	Sample was prepped or analyzed beyond the specified holding time
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
X	Surrogate is outside control limits

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: VEN CB Inlet - M0010

Job ID: 140-17861-1

Method	Method Description	Protocol	Laboratory
8321A	HFPO-DA	SW846	TAL DEN
8321A	PFOA and PFOS	SW846	TAL DEN
None	Leaching Procedure	TAL SOP	TAL DEN
None	Leaching Procedure for Condensate	TAL SOP	TAL DEN
None	Leaching Procedure for XAD	TAL SOP	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL DEN = Eurofins TestAmerica, Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

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

Job ID: 140-17861-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17861-1	A-6137,6138 DIV VEN CARBON BED INLET R1 M0010 FH	Air	01/06/20 00:00	01/08/20 13:55	
140-17861-2	A-6139,6140,6142 DIV VEN CARBON BED INLET R1 M0010 BH	Air	01/06/20 00:00	01/08/20 13:55	
140-17861-3	A-6141 DIV VEN CARBON BED INLET R1 M001 IMP 1,2&3 CONDENSATE	Air	01/06/20 00:00	01/08/20 13:55	
140-17861-4	A-6143 DIV VEN CARBON BED INLET R1 M001 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/06/20 00:00	01/08/20 13:55	
140-17861-5	A-6144,2945 DIV VEN CARBON BED INLET R2 M0010 FH	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-6	A-6146,6147,6149 DIV VEN CARBON BED INLET R2 M0010 BH	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-7	A-6148 DIV VEN CARBON BED INLET R2 M001 IMP 1,2&3 CONDENSATE	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-8	A-6150 DIV VEN CARBON BED INLET R2 M001 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-9	A-6151,6152 DIV VEN CARBON BED INLET R3 M0010 FH	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-10	A-6153,6154,6156 DIV VEN CARBON BED INLET R3 M0010 BH	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-11	A-6155 DIV VEN CARBON BED INLET R3 M001 IMP 1,2&3 CONDENSATE	Air	01/07/20 00:00	01/08/20 13:55	
140-17861-12	A-6157 DIV VEN CARBON BED INLET R3 M001 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/07/20 00:00	01/08/20 13:55	

Job Narrative
140-17861-1

Sample Receipt

The samples were received on January 8, 2020 at 1:55 PM in good condition and properly preserved. The temperature of the cooler at receipt was 0.0º 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 Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample.

LCMS

Samples associated with this analytical batch were originally analyzed with an "E" flag to indicate that the HFPO-DA exceeded the calibration curve of the method. Project specific calculations are provided as an addendum to this narrative.

Organic Prep

All samples were extracted in the Knoxville Laboratory within holding time. Back half samples were re-analyzed outside of preparation hodling time due to additional dilutions.

Chemours VEN Carbon Bed Inlet Test Analytical Report
TestAmerica Job No. 140-17861-1
January 31, 2020

The following samples exceeded the Method 8321A calibration range for HFPO-DA and required that dilution of the extracts be performed:

- DIV VEN CB INLET R1 M0010 Back Half Composite (XAD-2 Resin and Glassware Rinses)
- DIV VEN CB INLET R2 M0010 Back Half Composite (XAD-2 Resin and Glassware Rinses)
- DIV VEN CB INLET R3 M0010 Back Half Composite (XAD-2 Resin and Glassware Rinses)

The original analysis concentration which displays the "E" flag is provided with the data set indicating that the value provided is estimated. The $^{13}C_3$ – HFPO-DA isotope dilution internal standard (IDA) recovery percentage (%) however, is provided with this analysis run.

A second analysis concentration displays an accurate concentration of the HFPO-DA in the diluted sample extract, but the value is uncorrected for the IDA recovery percentage from the original matrix. The recovery percentage presented with the second concentration represents a post-spike of IDA to benchmark the instrument quantification of native HFPO-DA.

Final recovery-corrected concentrations of the native HFPO-DA are provided by calculation using the original recovery value of the IDA and the diluted extract values of the native HFPO-DA. The final concentrations are calculated as follows:

- DIV VEN CB INLET R1 M0010 Back Half Composite (XAD-2 Resin and Glassware Rinses)

$$(4600\,ug) \times \left(\frac{108}{46}\right) = 10799\,ug$$

- DIV VEN CB INLET R2 M0010 Back Half Composite (XAD-2 Resin and Glassware Rinses)

$$(6980\,ug) \times \left(\frac{113}{63}\right) = 12519\,ug$$

- DIV VEN CB INLET R3 M0010 Back Half Composite (XAD-2 Resin and Glassware Rinses)

$$(5540\,ug) \times \left(\frac{111}{42}\right) = 14641\,ug$$

LCMS

Analysis Batch: 481729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-481729/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 483119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-2	A-6139,6140,6142 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-17861-4	A-6143 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	None	
MB 280-483119/14-A	Method Blank	Total/NA	Air	None	
MB 280-483119/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483119/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483119/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483248

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-1	A-6137,6138 DIV VEN CARBON BED INLET R1	Total/NA	Air	None	
140-17861-5	A-6144,2945 DIV VEN CARBON BED INLET R2	Total/NA	Air	None	
140-17861-9	A-6151,6152 DIV VEN CARBON BED INLET R3	Total/NA	Air	None	
MB 280-483248/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483248/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483248/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483274

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-6	A-6146,6147,6149 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-17861-8	A-6150 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	None	
140-17861-10	A-6153,6154,6156 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-17861-12	A-6157 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	None	
MB 280-483274/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483274/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483274/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483335

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-3	A-6141 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	None	
140-17861-7	A-6148 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	None	
140-17861-11	A-6155 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	None	
MB 280-483335/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483335/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483335/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Analysis Batch: 483830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-2	A-6139,6140,6142 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	483119
140-17861-4	A-6143 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	8321A	483119
MB 280-483119/14-A	Method Blank	Total/NA	Air	8321A	483119
MB 280-483119/1-A	Method Blank	Total/NA	Air	8321A	483119
LCS 280-483119/2-A	Lab Control Sample	Total/NA	Air	8321A	483119
LCSD 280-483119/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483119

Analysis Batch: 483831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 280-483248/1-A	Method Blank	Total/NA	Air	8321A	483248

LCMS (Continued)

Analysis Batch: 483831 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 280-483248/2-A	Lab Control Sample	Total/NA	Air	8321A	483248
LCSD 280-483248/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483248

Analysis Batch: 483832

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-3	A-6141 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	8321A	483335
140-17861-7	A-6148 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	8321A	483335
140-17861-11	A-6155 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	8321A	483335
MB 280-483335/1-A	Method Blank	Total/NA	Air	8321A	483335
LCS 280-483335/2-A	Lab Control Sample	Total/NA	Air	8321A	483335
LCSD 280-483335/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483335

Analysis Batch: 483833

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-6	A-6146,6147,6149 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	483274
140-17861-8	A-6150 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	8321A	483274
140-17861-10	A-6153,6154,6156 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	483274
140-17861-12	A-6157 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	8321A	483274
MB 280-483274/1-A	Method Blank	Total/NA	Air	8321A	483274
LCS 280-483274/2-A	Lab Control Sample	Total/NA	Air	8321A	483274
LCSD 280-483274/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483274

Analysis Batch: 483834

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-1	A-6137,6138 DIV VEN CARBON BED INLET R1	Total/NA	Air	8321A	483248
140-17861-5	A-6144,2945 DIV VEN CARBON BED INLET R2	Total/NA	Air	8321A	483248
140-17861-9	A-6151,6152 DIV VEN CARBON BED INLET R3	Total/NA	Air	8321A	483248

Prep Batch: 484153

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-2 - REDL	A-6139,6140,6142 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-17861-6 - REDL	A-6146,6147,6149 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-17861-10 - REDL	A-6153,6154,6156 DIV VEN CARBON BED INLE	Total/NA	Air	None	

Analysis Batch: 484412

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17861-2 - REDL	A-6139,6140,6142 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	484153
140-17861-6 - REDL	A-6146,6147,6149 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	484153
140-17861-10 - REDL	A-6153,6154,6156 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	484153

Client Sample ID: A-6137,6138 DIV VEN CARBON BED INLET R1 M0010 FH

Lab Sample ID: 140-17861-1

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	249	B	3.00	0.324	ug/Sample		01/17/20 13:55	01/22/20 16:23	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*85*	*D*	*50 - 200*	*01/17/20 13:55*	*01/22/20 16:23*	*20*

Client Sample ID: A-6139,6140,6142 DIV VEN CARBON BED INLET R1 M0010 BH

Lab Sample ID: 140-17861-2

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	6920	E	13.8	2.75	ug/Sample		01/17/20 11:30	01/22/20 13:29	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*46*	*X D*	*50 - 200*	*01/17/20 11:30*	*01/22/20 13:29*	*50*

Method: 8321A - PFOA and PFOS - REDL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4600	H	278	55.6	ug/Sample		01/28/20 10:23	01/30/20 06:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*108*		*50 - 200*	*01/28/20 10:23*	*01/30/20 06:42*	*1*

Client Sample ID: A-6141 DIV VEN CARBON BED INLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17861-3

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0151	J H	0.201	0.0102	ug/Sample		01/20/20 11:15	01/22/20 15:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*83*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:32*	*1*

Client Sample ID: A-6143 DIV VEN CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17861-4

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	9.18		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:22	1

Client Sample ID: A-6143 DIV VEN CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17861-4

Date Collected: 01/06/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	52		50 - 200	01/17/20 11:30	01/22/20 12:22	1

Client Sample ID: A-6144,2945 DIV VEN CARBON BED INLET R2 M0010 FH

Lab Sample ID: 140-17861-5

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	238	B	2.50	0.270	ug/Sample		01/17/20 13:55	01/22/20 16:26	20

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	89	D	50 - 200	01/17/20 13:55	01/22/20 16:26	20

Client Sample ID: A-6146,6147,6149 DIV VEN CARBON BED INLET R2 M0010 BH

Lab Sample ID: 140-17861-6

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4690	E	13.8	2.75	ug/Sample		01/17/20 15:30	01/22/20 15:59	50

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	63	D	50 - 200	01/17/20 15:30	01/22/20 15:59	50

Method: 8321A - PFOA and PFOS - REDL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	6980	H	278	55.6	ug/Sample		01/28/20 10:23	01/30/20 06:45	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	113		50 - 200	01/28/20 10:23	01/30/20 06:45	1

Client Sample ID: A-6148 DIV VEN CARBON BED INLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17861-7

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0290	J	0.202	0.0103	ug/Sample		01/20/20 11:15	01/22/20 15:36	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	84		50 - 200	01/20/20 11:15	01/22/20 15:36	1

Client Sample ID: A-6150 DIV VEN CARBON BED INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17861-8

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.393		0.200	0.0400	ug/Sample		01/17/20 15:30	01/22/20 16:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*60*		*50 - 200*	*01/17/20 15:30*	*01/22/20 16:03*	*1*

Client Sample ID: A-6151,6152 DIV VEN CARBON BED INLET R3 M0010 FH

Lab Sample ID: 140-17861-9

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	174	B	2.00	0.216	ug/Sample		01/17/20 13:55	01/22/20 16:30	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*100*	*D*	*50 - 200*	*01/17/20 13:55*	*01/22/20 16:30*	*20*

Client Sample ID: A-6153,6154,6156 DIV VEN CARBON BED INLET R3 M0010 BH

Lab Sample ID: 140-17861-10

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	7120	E	11.3	2.25	ug/Sample		01/17/20 15:30	01/22/20 16:07	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*42*	*X D*	*50 - 200*	*01/17/20 15:30*	*01/22/20 16:07*	*50*

Method: 8321A - PFOA and PFOS - REDL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	5540	H	227	45.5	ug/Sample		01/28/20 10:23	01/30/20 06:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*111*		*50 - 200*	*01/28/20 10:23*	*01/30/20 06:48*	*1*

Client Sample ID: A-6155 DIV VEN CARBON BED INLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17861-11

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 13:55
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.127	J	0.203	0.0103	ug/Sample		01/20/20 11:15	01/22/20 15:40	1

Client Sample ID: A-6155 DIV VEN CARBON BED INLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17861-11

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*90*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:40*	*1*

Client Sample ID: A-6157 DIV VEN CARBON BED INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17861-12

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.91		0.200	0.0400	ug/Sample		01/17/20 15:30	01/22/20 16:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*60*		*50 - 200*	*01/17/20 15:30*	*01/22/20 16:11*	*1*

Default Detection Limits

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

Job ID: 140-17861-1

Method: 8321A - HFPO-DA

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.00250	0.00128	ug/Sample

Method: 8321A - PFOA and PFOS

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.0250	0.00270	ug/Sample
HFPO-DA	0.100	0.0200	ug/Sample

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ANALYTICAL REPORT

Job Number: 140-17854-1

Job Description: VEN 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
1/27/2020 10:04 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
01/27/2020

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Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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: VEN CB Outlet - M0010

Job ID: 140-17854-1

Method	Method Description	Protocol	Laboratory
8321A	HFPO-DA	SW846	TAL DEN
8321A	PFOA and PFOS	SW846	TAL DEN
None	Leaching Procedure	TAL SOP	TAL DEN
None	Leaching Procedure for Condensate	TAL SOP	TAL DEN
None	Leaching Procedure for XAD	TAL SOP	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL DEN = Eurofins TestAmerica, Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

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

Job ID: 140-17854-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17854-1	M-2637,2638 DIV VEN CARBON BED OUTLET R1 M0010 FH	Air	01/06/20 00:00	01/08/20 15:06	
140-17854-2	M-2639,2640,2642 DIV VEN CARBON BED OUTLET R1 M0010 BH	Air	01/06/20 00:00	01/08/20 15:06	
140-17854-3	M-2641 DIV VEN CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE	Air	01/06/20 00:00	01/08/20 15:06	
140-17854-4	M-2643 DIV VEN CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/06/20 00:00	01/08/20 15:06	
140-17854-5	M-2644,2645 DIV VEN CARBON BED OUTLET R2 M0010 FH	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-6	M-2646,2647,2649 DIV VEN CARBON BED OUTLET R2 M0010 BH	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-7	M-2648 DIV VEN CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-8	M-2650 DIV VEN CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-9	M-2651,2652 DIV VEN CARBON BED OUTLET R3 M0010 FH	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-10	M-2653,2654,2656 DIV VEN CARBON BED OUTLET R3 M0010 BH	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-11	M-2655 DIV VEN CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE	Air	01/07/20 00:00	01/08/20 15:06	
140-17854-12	M-2657 DIV VEN CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/07/20 00:00	01/08/20 15:06	

Job Narrative
140-17854-1

Sample Receipt

The samples were received on January 8, 2020 at 3:06 PM in good condition and properly preserved. The temperature of the cooler at receipt was 0.0º 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 Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample.

LCMS

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

Organic Prep

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

LCMS

Analysis Batch: 481729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-481729/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 483119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17854-2	M-2639,2640,2642 DIV VEN CARBON BED OUT	Total/NA	Air	None	
140-17854-4	M-2643 DIV VEN CARBON BED OUTLET R1 M(	Total/NA	Air	None	
140-17854-6	M-2646,2647,2649 DIV VEN CARBON BED OUT	Total/NA	Air	None	
140-17854-8	M-2650 DIV VEN CARBON BED OUTLET R2 M(	Total/NA	Air	None	
140-17854-10	M-2653,2654,2656 DIV VEN CARBON BED OUT	Total/NA	Air	None	
140-17854-12	M-2657 DIV VEN CARBON BED OUTLET R3 M(	Total/NA	Air	None	
MB 280-483119/14-A	Method Blank	Total/NA	Air	None	
MB 280-483119/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483119/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483119/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483248

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17854-1	M-2637,2638 DIV VEN CARBON BED OUTLET I	Total/NA	Air	None	
140-17854-5	M-2644,2645 DIV VEN CARBON BED OUTLET I	Total/NA	Air	None	
140-17854-9	M-2651,2652 DIV VEN CARBON BED OUTLET I	Total/NA	Air	None	
MB 280-483248/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483248/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483248/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483335

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17854-3	M-2641 DIV VEN CARBON BED OUTLET R1 M(	Total/NA	Air	None	
140-17854-7	M-2648 DIV VEN CARBON BED OUTLET R2 M(	Total/NA	Air	None	
140-17854-11	M-2655 DIV VEN CARBON BED OUTLET R3 M(	Total/NA	Air	None	
MB 280-483335/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483335/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483335/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Analysis Batch: 483830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17854-2	M-2639,2640,2642 DIV VEN CARBON BED OUT	Total/NA	Air	8321A	483119
140-17854-4	M-2643 DIV VEN CARBON BED OUTLET R1 M(	Total/NA	Air	8321A	483119
140-17854-6	M-2646,2647,2649 DIV VEN CARBON BED OUT	Total/NA	Air	8321A	483119
140-17854-8	M-2650 DIV VEN CARBON BED OUTLET R2 M(	Total/NA	Air	8321A	483119
140-17854-10	M-2653,2654,2656 DIV VEN CARBON BED OUT	Total/NA	Air	8321A	483119
140-17854-12	M-2657 DIV VEN CARBON BED OUTLET R3 M(	Total/NA	Air	8321A	483119
MB 280-483119/14-A	Method Blank	Total/NA	Air	8321A	483119
MB 280-483119/1-A	Method Blank	Total/NA	Air	8321A	483119
LCS 280-483119/2-A	Lab Control Sample	Total/NA	Air	8321A	483119
LCSD 280-483119/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483119

Analysis Batch: 483831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17854-1	M-2637,2638 DIV VEN CARBON BED OUTLET I	Total/NA	Air	8321A	483248
140-17854-5	M-2644,2645 DIV VEN CARBON BED OUTLET I	Total/NA	Air	8321A	483248
140-17854-9	M-2651,2652 DIV VEN CARBON BED OUTLET I	Total/NA	Air	8321A	483248

LCMS (Continued)

Analysis Batch: 483831 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 280-483248/1-A	Method Blank	Total/NA	Air	8321A	483248
LCS 280-483248/2-A	Lab Control Sample	Total/NA	Air	8321A	483248
LCSD 280-483248/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483248

Analysis Batch: 483832

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17854-3	M-2641 DIV VEN CARBON BED OUTLET R1 M(	Total/NA	Air	8321A	483335
140-17854-7	M-2648 DIV VEN CARBON BED OUTLET R2 M(	Total/NA	Air	8321A	483335
140-17854-11	M-2655 DIV VEN CARBON BED OUTLET R3 M(	Total/NA	Air	8321A	483335
MB 280-483335/1-A	Method Blank	Total/NA	Air	8321A	483335
LCS 280-483335/2-A	Lab Control Sample	Total/NA	Air	8321A	483335
LCSD 280-483335/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483335

Client Sample ID: M-2637,2638 DIV VEN CARBON BED OUTLET R1 M0010 FH

Lab Sample ID: 140-17854-1

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	2.55	B	0.150	0.0162	ug/Sample		01/17/20 13:55	01/22/20 13:58	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*100*		*50 - 200*	*01/17/20 13:55*	*01/22/20 13:58*	*1*

Client Sample ID: M-2639,2640,2642 DIV VEN CARBON BED OUTLET R1 M0010 BH

Lab Sample ID: 140-17854-2

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	12.5		0.300	0.0600	ug/Sample		01/17/20 11:30	01/22/20 12:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*79*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:03*	*1*

Client Sample ID: M-2641 DIV VEN CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17854-3

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0429	J H	0.200	0.0102	ug/Sample		01/20/20 11:15	01/22/20 15:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*83*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:05*	*1*

Client Sample ID: M-2643 DIV VEN CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17854-4

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*60*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:07*	*1*

Client Sample ID: M-2644,2645 DIV VEN CARBON BED OUTLET R2 M0010 FH

Lab Sample ID: 140-17854-5

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	5.75	B	0.100	0.0108	ug/Sample		01/17/20 13:55	01/22/20 14:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*98*		*50 - 200*	*01/17/20 13:55*	*01/22/20 14:02*	*1*

Client Sample ID: M-2646,2647,2649 DIV VEN CARBON BED OUTLET R2 M0010 BH

Lab Sample ID: 140-17854-6

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	12.4		0.250	0.0500	ug/Sample		01/17/20 11:30	01/22/20 12:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*64*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:53*	*1*

Client Sample ID: M-2648 DIV VEN CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17854-7

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0236	J	0.191	0.00974	ug/Sample		01/20/20 11:15	01/22/20 15:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*86*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:09*	*1*

Client Sample ID: M-2650 DIV VEN CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17854-8

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 15:06
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*63*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:57*	*1*

Client Sample ID: M-2651,2652 DIV VEN CARBON BED OUTLET R3 M0010 FH

Lab Sample ID: 140-17854-9

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 15:06
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.26	B	0.125	0.0135	ug/Sample		01/17/20 13:55	01/22/20 14:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*97*		*50 - 200*	*01/17/20 13:55*	*01/22/20 14:06*	*1*

Client Sample ID: M-2653,2654,2656 DIV VEN CARBON BED OUTLET R3 M0010 BH

Lab Sample ID: 140-17854-10

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 15:06
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	16.0		0.275	0.0550	ug/Sample		01/17/20 11:30	01/22/20 13:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*72*		*50 - 200*	*01/17/20 11:30*	*01/22/20 13:01*	*1*

Client Sample ID: M-2655 DIV VEN CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-17854-11

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 15:06
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0147	J	0.196	0.00999	ug/Sample		01/20/20 11:15	01/22/20 15:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*89*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:13*	*1*

Client Sample ID: M-2657 DIV VEN CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-17854-12

Date Collected: 01/07/20 00:00
Date Received: 01/08/20 15:06
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 13:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*56*		*50 - 200*	*01/17/20 11:30*	*01/22/20 13:05*	*1*

Default Detection Limits

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

Job ID: 140-17854-1

Method: 8321A - HFPO-DA

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.00250	0.00128	ug/Sample

Method: 8321A - PFOA and PFOS

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.0250	0.00270	ug/Sample
HFPO-DA	0.100	0.0200	ug/Sample

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ANALYTICAL REPORT

Job Number: 140-17857-1

Job Description: VEN Stack - 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
1/27/2020 10:07 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
01/27/2020

Table of Contents

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Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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
Job ID: 140-17857-1
Project/Site: VEN Stack - M0010

Method	Method Description	Protocol	Laboratory
8321A	HFPO-DA	SW846	TAL DEN
8321A	PFOA and PFOS	SW846	TAL DEN
None	Leaching Procedure	TAL SOP	TAL DEN
None	Leaching Procedure for Condensate	TAL SOP	TAL DEN
None	Leaching Procedure for XAD	TAL SOP	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL DEN = Eurofins TestAmerica, Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: VEN Stack - M0010

Job ID: 140-17857-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17857-1	M-1105, 1106 VEN STACK R1 M0010 FH	Air	01/06/20 00:00	01/08/20 13:55	
140-17857-2	M-1107,1108,1110 VEN STACK R1 M0010 BH	Air	01/06/20 00:00	01/08/20 13:55	
140-17857-3	M-1109 VEN STACK R1 M0010 IMP 1,2&3 CONDENSATE	Air	01/06/20 00:00	01/08/20 13:55	
140-17857-4	M-1111 VEN STACK R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/06/20 00:00	01/08/20 13:55	
140-17857-5	M-1112,1113 VEN STACK R2 M0010 FH	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-6	M-1114,1115,1117 VEN STACK R2 M0010 BH	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-7	M-1116 VEN STACK R2 M0010 IMP 1,2&3 CONDENSATE	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-8	M-1118 VEN STACK R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-9	M-1119,1120 VEN STACK R3 M0010 FH	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-10	M-1121,1122,1124 VEN STACK R3 M0010 BH	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-11	M-1123 VEN STACK R3 M0010 IMP 1,2&3 CONDENSATE	Air	01/07/20 00:00	01/08/20 13:55	
140-17857-12	M-1125 VEN STACK R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	01/07/20 00:00	01/08/20 13:55	

Job Narrative
140-17857-1

Sample Receipt

The samples were received on January 8, 2020 at 1:55 PM in good condition and properly preserved. The temperature of the cooler at receipt was 0.0º 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 Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample

LCMS

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

Organic Prep

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

LCMS

Analysis Batch: 481729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-481729/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 483119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17857-2	M-1107,1108,1110 VEN STACK R1 M0010 BH	Total/NA	Air	None	
140-17857-4	M-1111 VEN STACK R1 M0010 BREAKTHROU(	Total/NA	Air	None	
140-17857-6	M-1114,1115,1117 VEN STACK R2 M0010 BH	Total/NA	Air	None	
140-17857-8	M-1118 VEN STACK R2 M0010 BREAKTHROU(	Total/NA	Air	None	
140-17857-10	M-1121,1122,1124 VEN STACK R3 M0010 BH	Total/NA	Air	None	
140-17857-12	M-1125 VEN STACK R3 M0010 BREAKTHROU(	Total/NA	Air	None	
MB 280-483119/14-A	Method Blank	Total/NA	Air	None	
MB 280-483119/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483119/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483119/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483248

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17857-1	M-1105, 1106 VEN STACK R1 M0010 FH	Total/NA	Air	None	
140-17857-5	M-1112,1113 VEN STACK R2 M0010 FH	Total/NA	Air	None	
140-17857-9	M-1119,1120 VEN STACK R3 M0010 FH	Total/NA	Air	None	
MB 280-483248/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483248/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483248/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 483335

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17857-3	M-1109 VEN STACK R1 M0010 IMP 1,2&3 CON	Total/NA	Air	None	
140-17857-7	M-1116 VEN STACK R2 M0010 IMP 1,2&3 CON	Total/NA	Air	None	
140-17857-11	M-1123 VEN STACK R3 M0010 IMP 1,2&3 CON	Total/NA	Air	None	
MB 280-483335/1-A	Method Blank	Total/NA	Air	None	
LCS 280-483335/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-483335/3-A	Lab Control Sample Dup	Total/NA	Air	None	

Analysis Batch: 483830

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17857-2	M-1107,1108,1110 VEN STACK R1 M0010 BH	Total/NA	Air	8321A	483119
140-17857-4	M-1111 VEN STACK R1 M0010 BREAKTHROU(	Total/NA	Air	8321A	483119
140-17857-6	M-1114,1115,1117 VEN STACK R2 M0010 BH	Total/NA	Air	8321A	483119
140-17857-8	M-1118 VEN STACK R2 M0010 BREAKTHROU(	Total/NA	Air	8321A	483119
140-17857-10	M-1121,1122,1124 VEN STACK R3 M0010 BH	Total/NA	Air	8321A	483119
140-17857-12	M-1125 VEN STACK R3 M0010 BREAKTHROU(	Total/NA	Air	8321A	483119
MB 280-483119/14-A	Method Blank	Total/NA	Air	8321A	483119
MB 280-483119/1-A	Method Blank	Total/NA	Air	8321A	483119
LCS 280-483119/2-A	Lab Control Sample	Total/NA	Air	8321A	483119
LCSD 280-483119/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483119

Analysis Batch: 483831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17857-1	M-1105, 1106 VEN STACK R1 M0010 FH	Total/NA	Air	8321A	483248
140-17857-5	M-1112,1113 VEN STACK R2 M0010 FH	Total/NA	Air	8321A	483248
140-17857-9	M-1119,1120 VEN STACK R3 M0010 FH	Total/NA	Air	8321A	483248

LCMS (Continued)

Analysis Batch: 483831 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 280-483248/1-A	Method Blank	Total/NA	Air	8321A	483248
LCS 280-483248/2-A	Lab Control Sample	Total/NA	Air	8321A	483248
LCSD 280-483248/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483248

Analysis Batch: 483832

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17857-3	M-1109 VEN STACK R1 M0010 IMP 1,2&3 CON	Total/NA	Air	8321A	483335
140-17857-7	M-1116 VEN STACK R2 M0010 IMP 1,2&3 CON	Total/NA	Air	8321A	483335
140-17857-11	M-1123 VEN STACK R3 M0010 IMP 1,2&3 CON	Total/NA	Air	8321A	483335
MB 280-483335/1-A	Method Blank	Total/NA	Air	8321A	483335
LCS 280-483335/2-A	Lab Control Sample	Total/NA	Air	8321A	483335
LCSD 280-483335/3-A	Lab Control Sample Dup	Total/NA	Air	8321A	483335

Client Sample ID: M-1105, 1106 VEN STACK R1 M0010 FH
Lab Sample ID: 140-17857-1

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.41	B	0.150	0.0162	ug/Sample		01/17/20 13:55	01/22/20 14:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*97*		*50 - 200*	*01/17/20 13:55*	*01/22/20 14:10*	*1*

Client Sample ID: M-1107,1108,1110 VEN STACK R1 M0010 BH
Lab Sample ID: 140-17857-2

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	16.1		0.375	0.0750	ug/Sample		01/17/20 11:30	01/22/20 12:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*82*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:10*	*1*

Client Sample ID: M-1109 VEN STACK R1 M0010 IMP 1,2&3 CONDENSATE
Lab Sample ID: 140-17857-3

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND	H	0.196	0.00999	ug/Sample		01/20/20 11:15	01/22/20 15:16	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*88*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:16*	*1*

Client Sample ID: M-1111 VEN STACK R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-17857-4

Date Collected: 01/06/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*59*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:14*	*1*

Client Sample ID: M-1112,1113 VEN STACK R2 M0010 FH
Lab Sample ID: 140-17857-5

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.96	B	0.150	0.0162	ug/Sample		01/17/20 13:55	01/22/20 14:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*97*		*50 - 200*	*01/17/20 13:55*	*01/22/20 14:14*	*1*

Client Sample ID: M-1114,1115,1117 VEN STACK R2 M0010 BH
Lab Sample ID: 140-17857-6

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	8.84		0.400	0.0800	ug/Sample		01/17/20 11:30	01/22/20 13:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*76*		*50 - 200*	*01/17/20 11:30*	*01/22/20 13:09*	*1*

Client Sample ID: M-1116 VEN STACK R2 M0010 IMP 1,2&3 CONDENSATE
Lab Sample ID: 140-17857-7

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0102	ug/Sample		01/20/20 11:15	01/22/20 15:20	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*86*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:20*	*1*

Client Sample ID: M-1118 VEN STACK R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-17857-8

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 13:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*60*		*50 - 200*	*01/17/20 11:30*	*01/22/20 13:17*	*1*

Client Sample ID: M-1119,1120 VEN STACK R3 M0010 FH
Lab Sample ID: 140-17857-9

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.94	B	0.125	0.0135	ug/Sample		01/17/20 13:55	01/22/20 14:22	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*91*		*50 - 200*	*01/17/20 13:55*	*01/22/20 14:22*	*1*

Client Sample ID: M-1121,1122,1124 VEN STACK R3 M0010 BH
Lab Sample ID: 140-17857-10

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	7.88		0.300	0.0600	ug/Sample		01/17/20 11:29	01/22/20 13:21	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*75*		*50 - 200*	*01/17/20 11:29*	*01/22/20 13:21*	*1*

Client Sample ID: M-1123 VEN STACK R3 M0010 IMP 1,2&3 CONDENSATE
Lab Sample ID: 140-17857-11

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0126	J	0.196	0.00999	ug/Sample		01/20/20 11:15	01/22/20 15:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*87*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:28*	*1*

Client Sample ID: M-1125 VEN STACK R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-17857-12

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 13:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*60*		*50 - 200*	*01/17/20 11:30*	*01/22/20 13:25*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: VEN Stack - M0010

Job ID: 140-17857-1

Method: 8321A - HFPO-DA

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.00250	0.00128	ug/Sample

Method: 8321A - PFOA and PFOS

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.0250	0.00270	ug/Sample
HFPO-DA	0.100	0.0200	ug/Sample

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Job Number: 140-17852-1

Job Description: VEN 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
1/27/2020 10:01 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
01/27/2020

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Table of Contents

Definitions/Glossary

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

Job ID: 140-17852-1

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
X	Surrogate is outside control limits

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: VEN Field QC - M0010

Job ID: 140-17852-1

Method	Method Description	Protocol	Laboratory
8321A	HFPO-DA	SW846	TAL DEN
8321A	PFOA and PFOS	SW846	TAL DEN
None	Leaching Procedure	TAL SOP	TAL DEN
None	Leaching Procedure for Condensate	TAL SOP	TAL DEN
None	Leaching Procedure for XAD	TAL SOP	TAL DEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL DEN = Eurofins TestAmerica, Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

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

Job ID: 140-17852-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17852-1	R-1777,1778 QC VEN CARBON BED M0010 FH BT	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-2	R-1779,1780,1782 QC VEN CARBON BED M0010 BH BT	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-3	R-1781 QC VEN CARBON BED M0010 IMP 1,28 CONDENSATE BT	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-4	R-1783 QC VEN CARBON BED M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-5	R-1784 QC VEN CARBON BED M0010 DI WATER	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-6	R-1785 QC VEN CARBON BED M0010 MEOH WITH 5% NH4OH RB	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-7	R-1786 QC VEN CARBON BED M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-8	A-6979 MEDIA CHECK XAD	Air	01/07/20 00:00	01/08/20 13:55	
140-17852-9	A-6980 MEDIA CHECK FILTER	Air	01/07/20 00:00	01/08/20 13:55	

Job Narrative
140-17852-1

Sample Receipt

The samples were received on January 8, 2020 at 1:55 PM in good condition and properly preserved. The temperature of the cooler at receipt was 0.7º 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 Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample.

LCMS

Method 8321A: The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: A-6979 MEDIA CHECK XAD (140-17852-8). 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 sample(s). All detection limits are below the lower calibration.

preparation batch 280-483119 and analytical batch 280-483830 HFPO

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

Organic Prep

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

Client Sample ID: R-1777,1778 QC VEN CARBON BED M0010 FH BT
Lab Sample ID: 140-17852-1

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.215	B	0.0250	0.00270	ug/Sample		01/17/20 13:55	01/22/20 13:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*93*		*50 - 200*	*01/17/20 13:55*	*01/22/20 13:50*	*1*

Client Sample ID: R-1779,1780,1782 QC VEN CARBON BED M0010 BH BT
Lab Sample ID: 140-17852-2

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.124	J	0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*59*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:26*	*1*

Client Sample ID: R-1781 QC VEN CARBON BED M0010 IMP 1,2&3 CONDENSATE BT
Lab Sample ID: 140-17852-3

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.00250	0.000128	ug/Sample		01/20/20 11:15	01/22/20 14:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*97*		*50 - 200*	*01/20/20 11:15*	*01/22/20 14:57*	*1*

Client Sample ID: R-1783 QC VEN CARBON BED M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT
Lab Sample ID: 140-17852-4

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0619	J	0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*63*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:34*	*1*

Client Sample ID: R-1784 QC VEN CARBON BED M0010 DI WATER
Lab Sample ID: 140-17852-5

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.00250	0.000128	ug/Sample		01/20/20 11:15	01/22/20 15:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*89*		*50 - 200*	*01/20/20 11:15*	*01/22/20 15:01*	*1*

Client Sample ID: R-1785 QC VEN CARBON BED M0010 MEOH WITH 5% NH4OH RB
Lab Sample ID: 140-17852-6

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0250	0.00500	ug/Sample		01/17/20 11:30	01/22/20 12:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*100*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:38*	*1*

Client Sample ID: R-1786 QC VEN CARBON BED M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB
Lab Sample ID: 140-17852-7

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**0.106**		0.0250	0.00500	ug/Sample		01/17/20 11:30	01/22/20 12:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*92*		*50 - 200*	*01/17/20 11:30*	*01/22/20 12:42*	*1*

Client Sample ID: A-6979 MEDIA CHECK XAD
Lab Sample ID: 140-17852-8

Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/17/20 11:30	01/22/20 12:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*41*	*X*	*50 - 200*	*01/17/20 11:30*	*01/22/20 12:49*	*1*

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

Job ID: 140-17852-1

Client Sample ID: A-6980 MEDIA CHECK FILTER
Lab Sample ID: 140-17852-9
Date Collected: 01/07/20 00:00
Matrix: Air
Date Received: 01/08/20 13:55
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0250	0.00270	ug/Sample		01/17/20 13:55	01/22/20 13:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*95*		*50 - 200*	*01/17/20 13:55*	*01/22/20 13:54*	*1*

Default Detection Limits

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

Job ID: 140-17852-1

Method: 8321A - HFPO-DA

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.00250	0.00128	ug/Sample

Method: 8321A - PFOA and PFOS

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.0250	0.00270	ug/Sample
HFPO-DA	0.100	0.0200	ug/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: 1/6/2020
Test Location: VEN-Carbon Bed Inlet	Test Period: 1333-1533

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

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

$$Vm(std) = \frac{17.64 \times 1.0014 \times 61.794 \times \left(30.10 + \frac{1.406}{13.6} \right)}{74.33 + 460} = 61.701$$

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 x Vwc) + (0.04715 x Wwsg)

Vw(std) = (0.04707 x 7.0) + (0.04715 x 16.1) = 1.09

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

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

$$bws = \frac{1.09}{1.09 + 61.701} = 0.017$$

Where:

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

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.017 = 0.983

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 0.983) +(18 (1 - 0.983)) = 28.65

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.

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

$$Vs = 85.49 \times 0.84 \times 0.78479 \times \left(\frac{544}{29.64 \times 28.65} \right)^{\wedge}1/2 = 45.1$$

Where:

Vs = Average gas stream velocity, ft/sec.

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

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.

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

$$Qs(act) = 60 \times 45.1 \times 6.31 = 17066$$

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.

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

$$Qs(std) = 17.64 \times 0.983 \times \frac{29.64}{544.0} \times 17066$$

$$Qs(std) = 16116$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 544 \times 61.701}{45.1 \times 96 \times 29.64 \times 0.983 \times (0.215)^{\wedge}2} = 99.8$$

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), $\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(\text{deg R})(\text{ft}^2)(\text{sec})}$

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 1/6/2020**
Test Location: CBed Inlet | **Test Period: 1333-1533**

1. HFPO Dimer Acid concentration, lbs/dscf.

$$Conc1 = \frac{W \times 2.2046 \times 10^{-9}}{Vm(std)}$$

$$Conc1 = \frac{11057.2 \times 2.2046 \times 10\text{-}9}{61.701}$$

Conc1 = 3.95E-07

Where:

W = Weight of HFPO Dimer Acid collected in sample in ug.

Conc1 = HFPO Dimer Acid concentration, lbs/dscf.

2.2046×10^{-9} = Conversion factor from ug to lbs.

2. HFPO Dimer Acid concentration, ug/dscm.

Conc2 = W / (Vm(std) x 0.02832)

Conc2 = 11057.2 / (61.701 x 0.02832)

Conc2 = 6327.2

Where:

Conc2 = HFPO Dimer Acid concentration, ug/dscm.

0.02832 = Conversion factor from cubic feet to cubic meters.

3. HFPO Dimer Acid mass emission rate, lbs/hr.

$MR1_{(Inlet)}$ = Conc1 x Qs(std) x 60 min/hr

$MR1_{(Inlet)}$ = 3.95E-07 x 16116 x 60

$MR1_{(Inlet)}$ = 3.82E-01

Where:

$MR1_{(Inlet)}$ = HFPO Dimer Acid mass emission rate, lbs/hr.

4. HFPO Dimer Acid mass emission rate, g/sec.

$MR2_{(Inlet)}$ = $MR1_{(Inlet)}$ x 453.59 / 3600

$MR2_{(Inlet)}$ = 3.82E-01 x 453.59 /3600

$MR2_{(Inlet)}$ = 4.81E-02

Where:

$MR2_{(Inlet)}$ = HFPO Dimer Acid mass emission rate, g/sec.

453.59 = Conversion factor from pounds to grams.

3600 = Conversion factor from hours to seconds.

5. HFPO Dimer Acid Removal Efficiency, %

$$RE = \frac{MR1_{(Inlet)} - MR1_{(Outlet)}}{MR1_{(Inlet)}}$$

$$RE = \frac{(3.82E\text{-}01) - (5.20E\text{-}04)}{3.82E\text{-}01}$$

RE = 99.9

Where:

RE = Carbon Bed Removal Efficiency.

$MR1_{(Inlet)}$ = Carbon Bed Inlet HFPO Dimer Acid mass rate, lbs/hr.

$MR1_{(Outlet)}$ = Carbon Bed Outlet HFPO Dimer Acid mass rate, lbs/hr.

EXAMPLE CALCULATIONS FOR
VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 1	Test Date: 1/6/2020
Test Location: Division Stack	Test Period: 1333-1533

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

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

$$Vm(std) = \frac{17.64 \times 0.9834 \times 56.635 \times \left(30.08 + \frac{1.047}{13.6} \right)}{64.13 + 460} = 56.528$$

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 x Vwc) + (0.04715 x Wwsg)

Vw(std) = (0.04707 x -2.0) + (0.04715 x 16.8) = 0.70

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

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

$$bws = \frac{0.70}{0.70 + 56.528} = 0.012$$

Where:

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

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.012 = 0.988

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 0.988) +(18 (1 - 0.988)) = 28.70

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.

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

$$Vs = 85.49 \times 0.84 \times 1.28787 \times \left(\frac{538}{30.03 \times 28.70} \right)^{\wedge}1/2 = 73.0$$

Where:

Vs = Average gas stream velocity, ft/sec.

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

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.

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

$$Qs(act) = 60 \times 73.0 \times 7.07 = 30981$$

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.

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

$$Qs(std) = 17.64 \times 0.988 \times \frac{30.03}{537.6} \times 30981$$

$$Qs(std) = 30158$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 538 \times 56.528}{73.0 \times 96 \times 30.03 \times 0.988 \times (0.160)^{\wedge}2} = 98.9$$

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), $\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(\text{deg R})(\text{ft}^2)(\text{sec})}$

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 1/6/2020**
Test Location: Divison Stack | **Test Period: 1333-1533**

1. HFPO Dimer Acid concentration, lbs/dscf.

$$Conc1 = \frac{W \times 2.2046 \times 10^{-9}}{Vm(std)}$$

$$Conc1 = \frac{20.5 \times 2.2046 \times 10\text{-}9}{56.528}$$

Conc1 = 8.00E-10

Where:

W = Weight of HFPO Dimer Acid collected in sample in ug.

Conc1 = Division Stack HFPO Dimer Acid concentration, lbs/dscf.

2.2046×10^{-9} = Conversion factor from ug to lbs.

2. HFPO Dimer Acid concentration, ug/dscm.

Conc2 = W / (Vm(std) x 0.02832)

Conc2 = 20.5 / (56.528 x 0.02832)

Conc2 = 1.28E+01

Where:

Conc2 = Division Stack HFPO Dimer Acid concentration, ug/dscm.

0.02832 = Conversion factor from cubic feet to cubic meters.

3. HFPO Dimer Acid mass emission rate, lbs/hr.

$MR1_{(Outlet)}$ = Conc1 x Qs(std) x 60 min/hr

$MR1_{(Outlet)}$ = 8.00E-10 x 30158 x 60

$MR1_{(Outlet)}$ = 1.45E-03

Where:

$MR1_{(Outlet)}$ = Division Stack HFPO Dimer Acid mass emission rate, lbs/hr.

4. HFPO Dimer Acid mass emission rate, g/sec.

$MR2_{(Outlet)}$ = PMR1 x 453.59 / 3600

$MR2_{(Outlet)}$ = 1.45E-03 x 453.59 /3600

$MR2_{(Outlet)}$ = 1.82E-04

Where:

$MR2_{(Outlet)}$ = Division Stack HFPO Dimer Acid mass emission rate, g/sec.

453.6 = Conversion factor from pounds to grams.

3600 = Conversion factor from hours to seconds.

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

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-700**

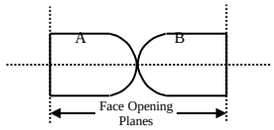
Inspection Date 2/19/19 Individual Conducting Inspection ks

If all Criteria PASS
Cp is equal to 0.84

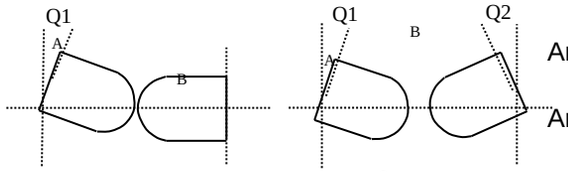
		PASS/FAIL
Distance to A Plane (PA) - inches	0.459	PASS
Distance to B Plane (PB) - inches	0.459	PASS
Pitot OD (D_t) - inches	0.375	

$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB

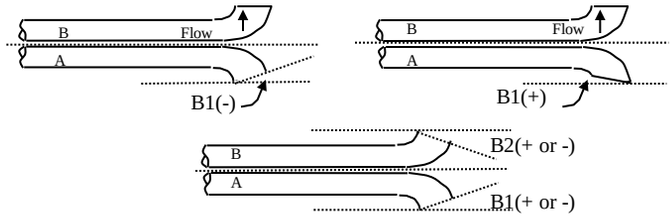


Are Open Faces Aligned Perpendicular to the Tube Axis — (●) YES ( ) NO — PASS



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 $\leq 10^o$

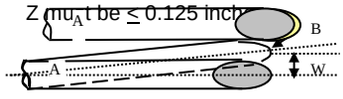


Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

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

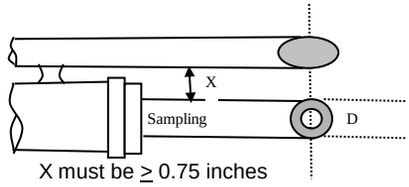
Horizontal offset between A and B Tubes (Z) - inches	0.003	PASS

Z must be $\leq$ 0.125 inch



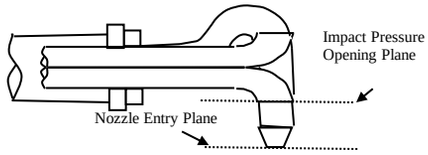
Vertical offset between A and B Tubes (W) - inches	0.012	PASS

W must be $\leq$ 0.03125 inches

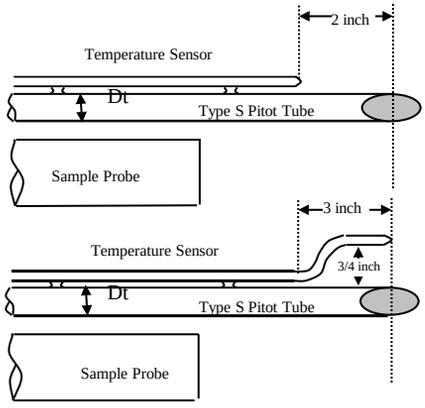


Distance between Sample Nozzle and Pitot (X) - inches	0.93	PASS

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-710**

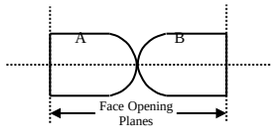
Inspection Date 2/19/19 Individual Conducting Inspection ks

If all Criteria PASS
Cp is equal to 0.84

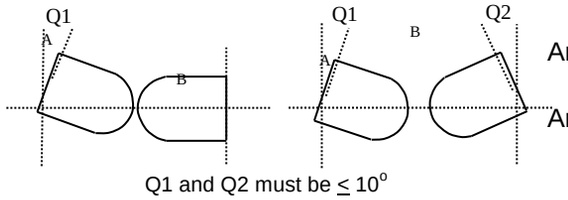
		PASS/FAIL
Distance to A Plane (PA) - inches	0.453	PASS
Distance to B Plane (PB) - inches	0.453	PASS
Pitot OD (D_t) - inches	0.375	

$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB

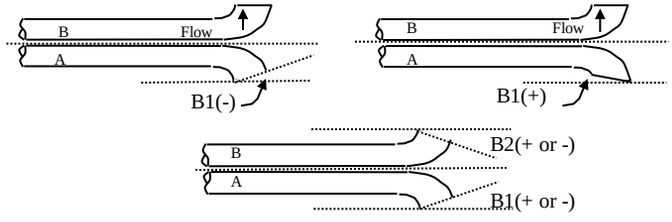


Are Open Faces Aligned Perpendicular to the Tube Axis — (●) YES ( ) NO — PASS



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 $\leq 10^o$

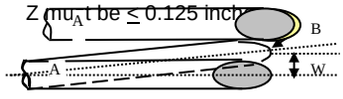


Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

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

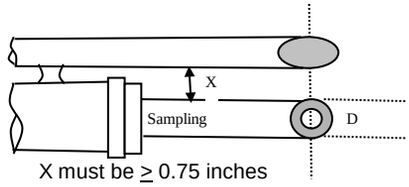
Horizontal offset between A and B Tubes (Z) - inches	0.012	PASS

Z must be $\leq$ 0.125 inch



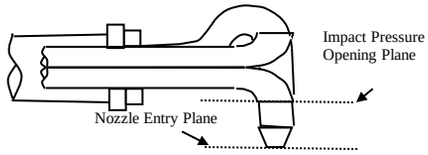
Vertical offset between A and B Tubes (W) - inches	0.022	PASS

W must be $\leq$ 0.03125 inches

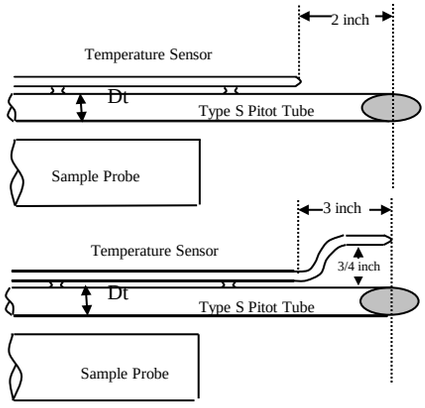


Distance between Sample Nozzle and Pitot (X) - inches	0.87	PASS

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-711**

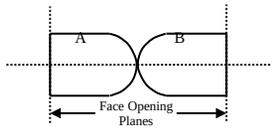
If all Criteria PASS
Cp is equal to 0.84

Inspection Date 1/30/19 Individual Conducting Inspection CH

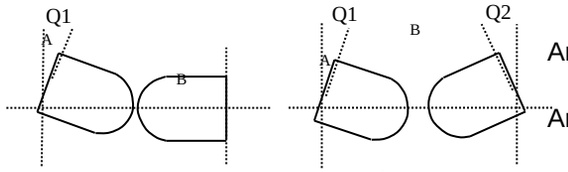
		PASS/FAIL
Distance to A Plane (PA) - inches	0.458	PASS
Distance to B Plane (PB) - inches	0.458	PASS
Pitot OD (D_t) - inches	0.375	

$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB

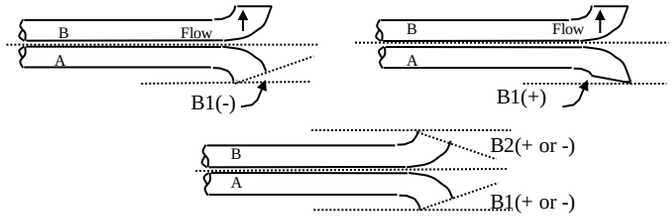


Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



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 $\leq 10^o$

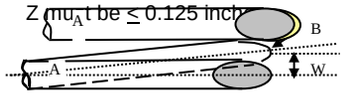


Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

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

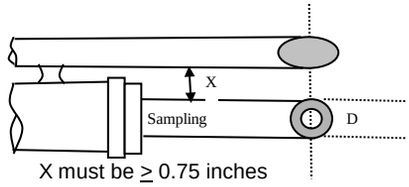
Horizontal offset between A and B Tubes (Z) - inches	0.009	PASS

Z must be $\leq$ 0.125 inch



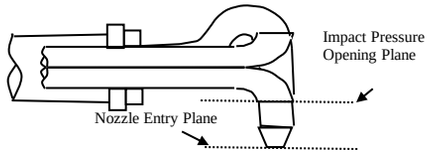
Vertical offset between A and B Tubes (W) - inches	0.026	PASS

W must be $\leq$ 0.03125 inches

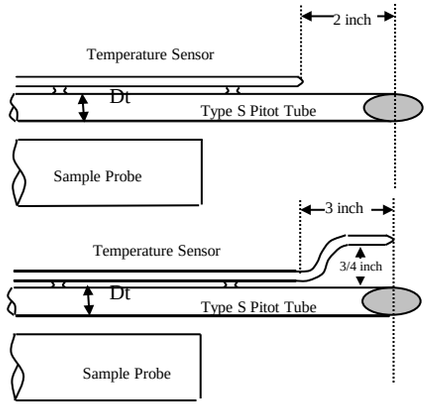


Distance between Sample Nozzle and Pitot (X) - inches	0.87	PASS

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

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

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

Calibrator MDW **Meter Box Number** 24 **Ambient Temp** 72

Date 5-Nov-19 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 17087363

Baro Press, in Hg (Pb)	29.99

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	5.00	266.195	70.0	71.00	71.00	71.5	12.8	1.0006	1.8305
		271.200		72.00	72.00				
		5.005		71.50	71.50				
1.0	5.0	272.200	70.0	75.00	75.00	75.5	9.2	1.0059	1.8772
		277.210		76.00	76.00				
		5.010		75.50	75.50				
1.5	10.0	278.217	70.0	76.00	76.00	76.5	15.1	1.0050	1.8928
		288.252		77.00	77.00				
		10.035		76.50	76.50				
2.0	11.0	290.270	70.0	77.00	77.00	77.5	14.4	1.0006	1.8933
		301.365		78.00	78.00				
		11.095		77.50	77.50				
3.0	10.0	302.366	70.0	76.00	76.00	76.5	10.7	0.9949	1.9009
		312.466		77.00	77.00				
		10.100		76.50	76.50				
							Average	1.0014	1.8790

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	212	212	212	212		212.0	0.0%
932	931	930	928	930	928		929.4	0.2%
1832	1828	1831	1832	1828	1830		1829.8	0.1%

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
CARBON BED INLET
METER BOX NO. 24
1/6/2020 and 1/7/2020

	Run 1	Run 3	Run 2
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.	74.3	65.7	73.5

$$Tma = Ts + 460$$

$$Tma = 74.33 + 460$$

Tma =	534.33	525.71	533.54

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	1.41	1.47	1.36
Pb = Barometric Pressure, in Hg.	30.10	30.00	29.93

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

$$Pm = 30.1 + (1.40583333333333 / 13.6)$$

Pm =	30.20	30.11	30.03

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.	61.794	62.395	61.085
Y = Dry gas meter calibration factor (based on full calibration)	1.0014	1.0014	1.0014
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.8790	1.8790	1.8790
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.1829	1.2094	1.1620
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 61.79) * SQRT (0.0319 * 534.33 * 29) / (1.88 * 30.20 * 28.84) * 1.18$$

$$Yqa = 1.554 * SQRT\ 494.312 / 1,636.322 * 1.18$$

Yqa =	1.010	1.016	1.006

Diff = Absolute difference between Yqa and Y	0.86	1.46	0.46

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

$$Diff = ((1.0014 - 1.010) / 1.0014) * 100$$

Average Diff = 0.93

Allowable = 5.0

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
CARBON BED OUTLET
METER BOX NO. WC 30
1/6/2020 + 1/7/2020

	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.	65.1	53.9	66.9

$$Tma = Ts + 460$$

$$Tma = 65.13 + 460$$

Tma =	525.13	513.92	526.92

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	1.50	1.49	1.48
Pb = Barometric Pressure, in Hg.	30.10	30.00	29.93

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

$$Pm = 30.1 + (1.50208333333333 / 13.6)$$

Pm =	30.21	30.11	30.04

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.	62.920	62.221	63.095
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	1.2064	1.2014	1.2000
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 62.92) * SQRT (0.0319 * 525.13 * 29) / (1.87 * 30.21 * 28.84) * 1.21$$

$$Yqa = 1.526 * SQRT 485.793 / 1,630.330 * 1.21$$

Yqa =	1.0048	1.0026	1.0012

Diff = Absolute difference between Yqa and Y	0.76	0.54	0.40

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

$$Diff = ((0.9972 - 1.005) / 0.9972) * 100$$

Average Diff = 0.57

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

DIVISION STACK

METER BOX NO. 32

1/6/2020 + 1/7/2020

	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.	64.1	65.1	61.3

$$Tma = Ts + 460$$

$$Tma = 64.13 + 460$$

Tma =	524.13	525.08	521.29

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	1.05	1.06	1.09
Pb = Barometric Pressure, in Hg.	30.08	29.90	29.83

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

$$Pm = 30.08 + (1.047375 / 13.6)$$

Pm =	30.16	29.98	29.91

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.	56.635	56.380	56.882
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	1.0209	1.0255	1.0438
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 56.64) * SQRT (0.0319 * 524.13 * 29) / (1.72 * 30.16 * 28.84) * 1.02$$

$$Yqa = 1.695 * SQRT 484.868 / 1,493.699 * 1.02$$

Yqa =	0.9860	0.9987	1.0051

Diff = Absolute difference between Yqa and Y	0.26	1.56	2.21

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

$$Diff = ((0.9834 - 0.986) / 0.9834) * 100$$

Average Diff = 1.34

Allowable = 5.0

APPENDIX F
LIST OF PROJECT PARTICIPANTS

The following WESTON employees participated in this project.

Paul Meeter	Senior Project Manager
Wes Fritz	Senior Project Manager
Jack Mills	Team Member
Nick Guarino	Team Member
Chris Hartsky	Team Member
Austin Squires	Team Member
Matt Winkeler	Team Member
Steve Rathfon	Team Member