FLUOROMONOMERS MANUFACTURING PROCESS VE SOUTH CARBON BED REMOVAL EFFICIENCY AND EMISSIONS TEST REPORT TEST DATES: 19-20 FEBRUARY 2020

THE CHEMOURS COMPANY FAYETTEVILLE, NORTH CAROLINA

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THE CHEMOURS COMPANY

FLOROMONOMERS MANUFACTURING PROCESS
VE SOUTH CARBON BED REMOVAL EFFICIENCY AND
EMISSIONS TEST REPORT

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

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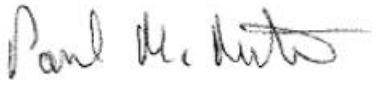

Paul M. Meeter
Weston Solutions, Inc.

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1. INTRODUCTION

1.1 FACILITY AND BACKGROUND INFORMATION

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

Chemours contracted Weston Solutions, Inc. (Weston) to perform HFPO Dimer Acid Fluoride, captured as HFPO Dimer Acid, emission testing on the Vinyl Ethers (VE) South Carbon Bed at the facility. Testing was performed on 19-20 February 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 VE South Carbon Bed inlet and outlet 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 two locations.

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

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

Appendix A includes facility process operations data. Appendix B includes Weston's raw and reduced test data. Appendix C includes the summary reports for the laboratory analytical results. The full laboratory data packages are provided separately in electronic format. Appendix D includes sample calculations. Appendix E includes equipment calibration records. Appendix F includes a list of project participants.

Table 1-1
Sampling Plan for VE South Carbon Bed Testing

Sampling Point & Location	**VE South 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.

2. SUMMARY OF TEST RESULTS

A total of three test runs each were performed on the VE South Carbon Bed inlet and outlet. 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 test results. Research conducted in developing the protocol for emissions 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 VE South Carbon Bed Test Results

	Inlet		Outlet		Removal Efficiency
	g/sec	lb/hr	g/sec	lb/hr	%
R1	1.07E-04	8.48E-04	1.52E-05	1.21E-04	85.7
R2	4.81E-05	3.82E-04	1.48E-05	1.18E-04	69.2
R3	2.84E-05	2.26E-04	1.40E-05	1.12E-04	50.5
Average	6.11E-05	4.85E-04	1.47E-05	1.17E-04	62.7

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.

The VE South Tower HVAC is vented to the carbon bed which then vents to the process stack (NEP-Hdr2). In addition, the following building air systems are vented to this stack:

- RV Catch Pots
- Nitrogen Supply to Catch Tanks
- Catalyst Feed Tank Pot Charge Vent

As of December 2019, process emissions from VE South are directed to the Thermal Oxidizer. Therefore, only Tower HVAC air is now directed to the carbon bed.

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 South	PMVE/PEVE	Semi-continuous – Condensation is continuous. Two Agitated Bed Reactors are batch for 30-40 mins at end of each run. Refining (ether column) is batch

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

- Fluoromonomers Processes
  - VES Condensation Feed Rate
  - VES ABR Feed Rate

4. DESCRIPTION OF TEST LOCATIONS

4.1 VE SOUTH CARBON BED INLET AND OUTLET

The fiberglass reinforced plastic (FRP) duct at the inlet of the carbon bed is 36-inch ID. The stainless steel duct at the outlet of the carbon bed is 41.5-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. Figures 4-2 and 4-3 provide schematics of the Carbon Bed inlet and Carbon Bed outlet test port and traverse port locations, respectively.

Location	Distance from Flow Disturbance	
	Downstream (B)	Upstream (A)
Carbon Bed Inlet	35 inches > 0.97 duct diameters	41 inches > 1.1 duct diameters
Carbon Bed Outlet	12.5 feet > 4.2 duct diameters	31 feet > 10.3 duct diameters

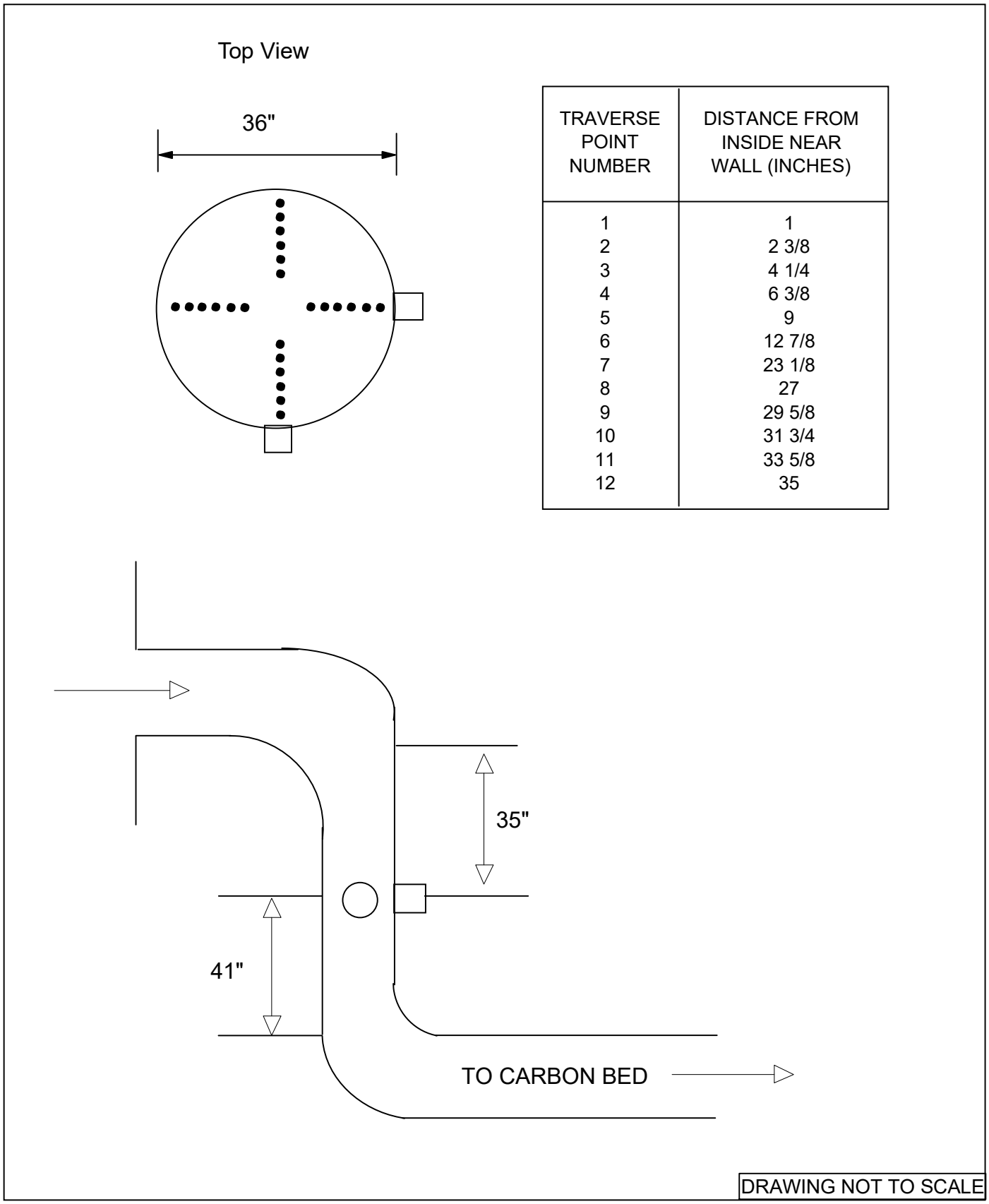
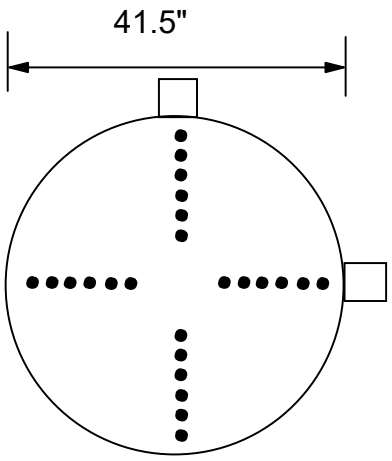
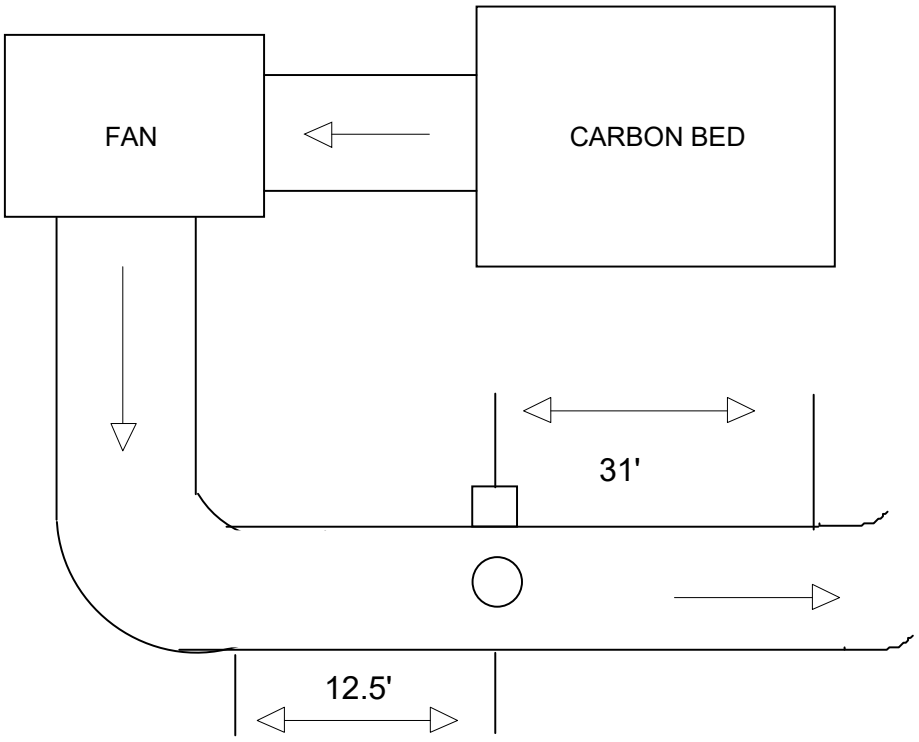


FIGURE 4-1
VE SOUTH CARBON BED INLET SCHEMATIC

Side View



TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1
2	2 3/4
3	4 7/8
4	7 3/8
5	10 3/8
6	14 3/4
7	26 3/4
8	31 1/8
9	34 1/8
10	36 5/8
11	38 3/4
12	40 1/2



DRAWING NOT TO SCALE

FIGURE 4-2
VE SOUTH CARBON BED OUTLET SCHEMATIC

IASDATA\CHEMOURS\15418.002.022\FIGURE 4-1 VE SOUTH CB OUTLET SCHEMATIC

5. SAMPLING AND ANALYTICAL METHODS

5.1 STACK GAS SAMPLING PROCEDURES

The purpose of this section is to describe the process gas sampling trains and to provide details of the emissions 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. 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 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 EMISSION PARAMETERS

5.2.1 EPA Method 0010

The sampling train utilized to perform the HFPO Dimer Acid sampling at both 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 sample gas 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.

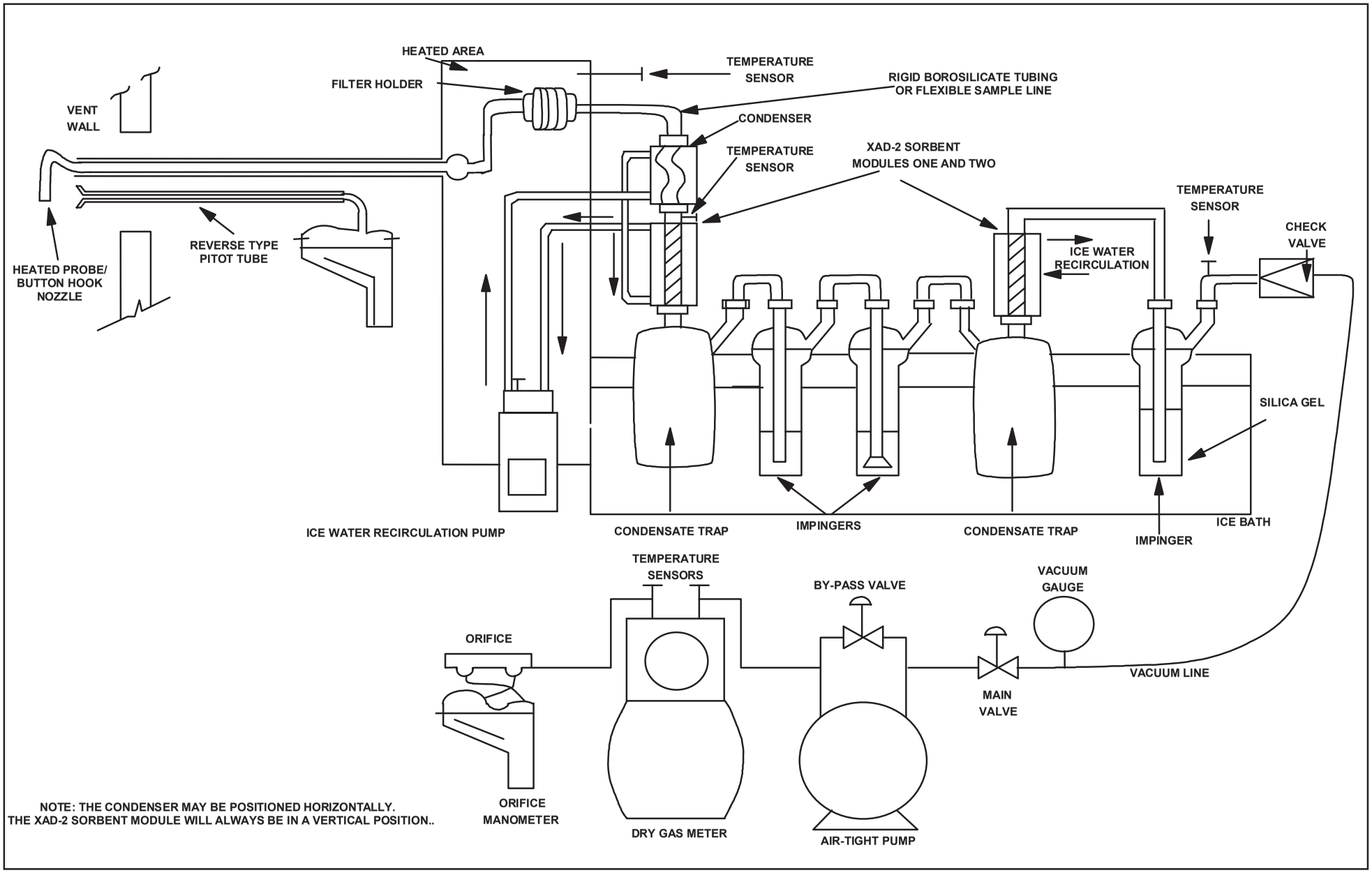


FIGURE 5-1
EPA METHOD 0010 SAMPLING TRAIN

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 sample 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 sorbent modules (1 and 2) were covered to minimize light degradation, 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 tandem mass spectronomy (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.

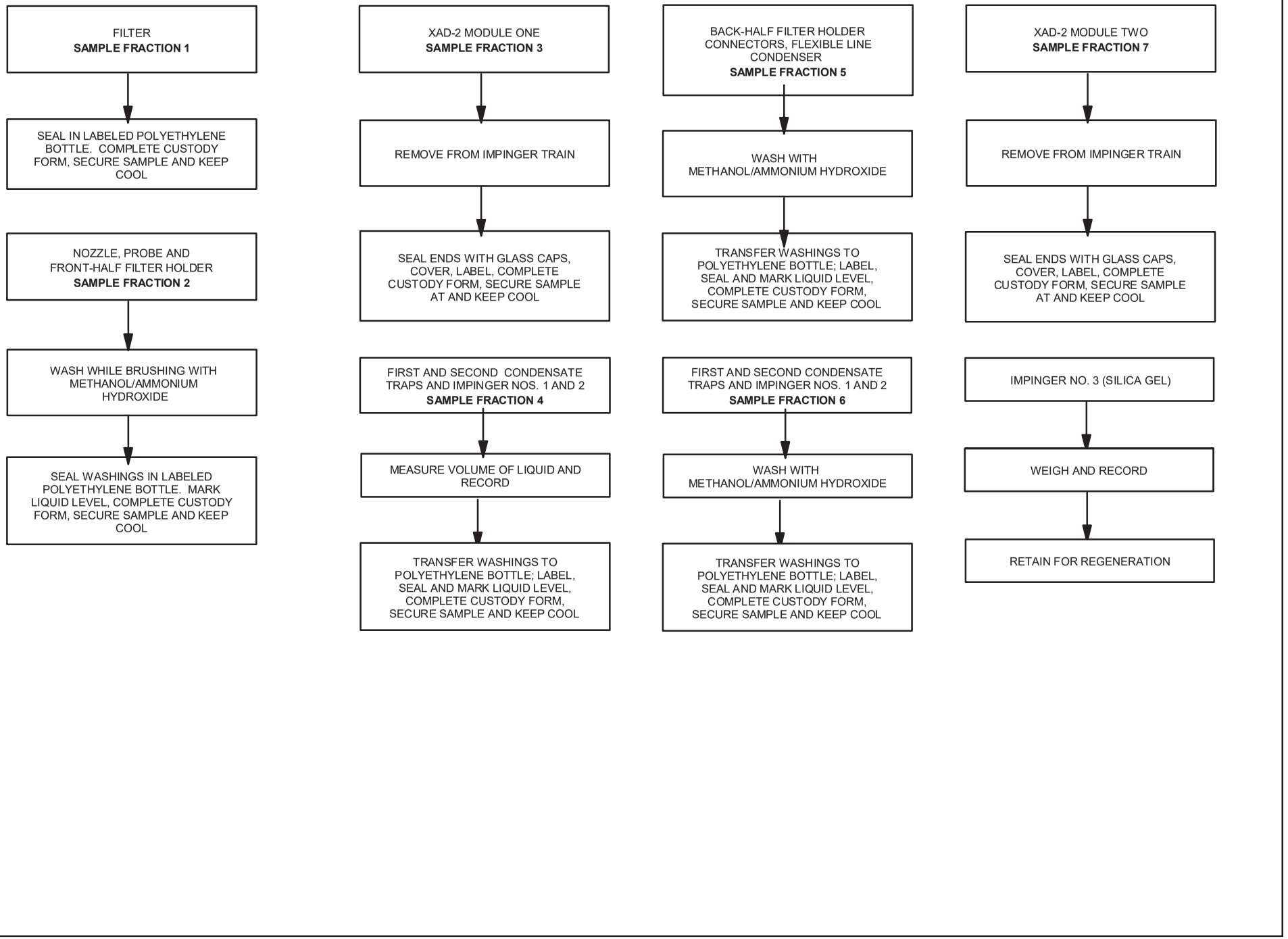


FIGURE 5-2
HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010

IASDATA\CHEMOURS\15418.002.022\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.

The fixed gases (CO_2 and O_2) sampling train was utilized in accordance with the EPA Reference Method 3 specifications. The fixed gases were collected utilizing a diaphragm pump with a flow rotometer and Tedlar® sample bag.

The gas stream composition samples were collected from the exhaust of the control console calibrated orifice at a constant rate of ~0.5L per minute. This provided an integrated, conditioned (dry) sample. The gas passing through the control console orifice was conditioned by the impinge train. The sample was integrated with respect to time and sample probe location in the stack.

Analysis of the Tedlar® bag samples was performed using EPA Reference Method 3A analytical procedures to determine O_2/CO_2 concentrations and confirm ambient air concentrations. The conditioned Tedlar® bag samples were analyzed directly by calibrated analyzers such as a paramagnetic O_2 analyzer and a non-dispersive infrared (NDIR) CO_2 analyzer. The O_2 and CO_2 analyzers were configured and calibrated in accordance with the gas analyzer requirements outlined in EPA Reference Method 3A. The dry molecular weight of the gas stream was calculated using the measured O_2 and CO_2 concentrations. The balance of the gas stream was assumed to be nitrogen. The dry molecular weight of the gas stream was used to calculate the stack gas volumetric flow rate.

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 O_2 and CO_2 content of the sample 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 O_2 content. A Servomex Model 4900 analyzer (or equivalent) was used to measure CO_2 content of the sample 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.

6. DETAILED TEST RESULTS AND DISCUSSION

Each test was a minimum of 96 minutes in duration. A total of three test runs were performed simultaneously at each location.

Tables 6-1 and 6-2 provide detailed test data and test results for the VE South Carbon Bed inlet and the Carbon Bed outlet, 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 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
VES CARBON BED INLET

Test Data			
Run number	1	2	3
Location	VES CBed Inlet	VES CBed Inlet	VES CBed Inlet
Date	2/19/2020	2/19/2020	2/20/2020
Time period	1020-1218	1351-1544	0852-1049
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	30.18	30.34	30.38
Avg. orifice press. diff., in H_2O	0.96	0.97	0.97
Avg. dry gas meter temp., deg F	60.0	57.6	50.6
Avg. abs. dry gas meter temp., deg. R	520	518	511
Total liquid collected by train, ml	28.5	21.8	19.1
Std. vol. of H_2O vapor coll., cu.ft.	1.34	1.03	0.90
Dry gas meter calibration factor	0.9966	0.9966	0.9966
Sample vol. at meter cond., dcf	49.411	49.895	49.545
Sample vol. at std. cond., dscf [(1)]	50.529	51.539	51.947
Percent of isokinetic sampling	101.5	103.2	101.3
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.	0.026	0.020	0.017
Mole fraction of dry gas	0.974	0.980	0.983
Molecular wt. of wet gas, lb/lb mole	28.56	28.62	28.65
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-5.60	-5.80	-5.70
Absolute pressure, in. Hg	29.77	29.91	29.96
Avg. temperature, deg. F	65	66	66
Avg. absolute temperature, deg.R	525	526	526
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	63.5	63.2	64.6
Stack/duct cross sectional area, sq.ft.	7.07	7.07	7.07
Avg. gas stream volumetric flow, wacf/min.	26947	26782	27385
Avg. gas stream volumetric flow, dscf/min.	26255	26350	27060

[(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
VES CARBON BED INLET

TEST DATA			
Run number	1	2	3
Location	VES CBed Inlet	VES CBed Inlet	VES CBed Inlet
Date	2/19/2020	2/19/2020	2/20/2020
Time period	1020-1218	1351-1544	0852-1049
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	12.34	5.64	3.27
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	8.62	3.87	2.23
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	5.38E-10	2.41E-10	1.39E-10
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	8.48E-04	3.82E-04	2.26E-04
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.07E-04	4.81E-05	2.84E-05

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

Test Data			
Run number	1	2	3
Location	VES CBed Outlet	VES CBed Outlet	VES CBed Outlet
Date	2/19/2020	2/19/2020	2/20/2020
Time period	1020-1218	1351-1544	0852-1049
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.200	0.200	0.200
Cross sectional nozzle area, sq.ft.	0.000218	0.000218	0.000218
Barometric pressure, in. Hg	30.18	30.34	30.38
Avg. orifice press. diff., in H_2O	1.20	1.18	1.17
Avg. dry gas meter temp., deg F	55.8	54.8	48.6
Avg. abs. dry gas meter temp., deg. R	516	515	509
Total liquid collected by train, ml	23.2	19.9	23.6
Std. vol. of H_2O vapor coll., cu.ft.	1.09	0.94	1.11
Dry gas meter calibration factor	0.9834	0.9834	0.9834
Sample vol. at meter cond., dcf	59.501	58.777	58.300
Sample vol. at std. cond., dscf [(1)]	60.575	60.264	60.583
Percent of isokinetic sampling	99.1	99.1	99.8
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.	0.018	0.015	0.018
Mole fraction of dry gas	0.982	0.985	0.982
Molecular wt. of wet gas, lb/lb mole	28.64	28.67	28.64
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	2.70	2.70	2.70
Absolute pressure, in. Hg	30.38	30.54	30.58
Avg. temperature, deg. F	68	68	67
Avg. absolute temperature, deg.R	528	528	527
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	48.7	48.2	48.1
Stack/duct cross sectional area, sq.ft.	9.39	9.39	9.39
Avg. gas stream volumetric flow, wacf/min.	27463	27159	27073
Avg. gas stream volumetric flow, dscf/min.	27398	27268	27232

[(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
VES CARBON BED OUTLET

TEST DATA			
Run number	1	2	3
Location	VES CBed Outlet	VES CBed Outlet	VES CBed Outlet
Date	2/19/2020	2/19/2020	2/20/2020
Time period	1020-1218	1351-1544	0852-1049
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	2.02	1.97	1.88
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	1.18	1.15	1.09
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	7.36E-11	7.20E-11	6.83E-11
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	1.21E-04	1.18E-04	1.12E-04
HFPO Dimer Acid (From Inlet Data)	8.48E-04	3.82E-04	2.26E-04
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.52E-05	1.48E-05	1.40E-05
Carbon Bed Removal Efficiency, %	85.7	69.2	50.5

APPENDIX A
PROCESS OPERATIONS DATA

Date	2/19/2020																																	
Time	900				1000				1100				1200				1300				1400				1500				1600				1700			
Stack Testing						RUN 1: 1020-1218													RUN 2: 1351-1544																
VES Product	PM/PE																																	
VES Precursor																																		
VES Condensation (HFPO)																																		
VES ABR (East)																																		
VES ABR (West)																															Burnout			
VES Refining																																		
Dimer ISO Venting																																		

Date 2/20/2020

Time	700				800			900			1000			1100			1200			
Stack Testing								RUN 3: 852-1049												
VES Product	PM/PE																			
VES Precursor																				
VES Condensation (HFPO)																				
VES ABR (East)																				
VES ABR (West)																				
VES Refining																				
Dimer ISO Venting																				

APPENDIX B
RAW AND REDUCED TEST DATA

Sample and Velocity Traverse Point Data Sheet - Method 1

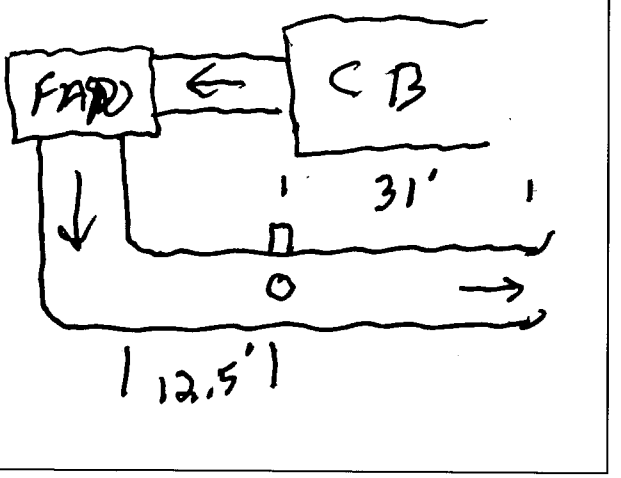
Client: Chemours
Loaction/Plant: Fayetteville
Source: UES CB Out
Operator: DMD/SMA/PG
Date: 7-16-19
W.O. Number:

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	55.5
Port Depth (in.) = D	14
Depth of Duct, diameter (in.) = C-D	~~55.5~~ 41.5
Area of Duct (ft^2)	9.39
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)	31'
Downstream - B (ft)	12'6"
Upstream - A (duct diameters)	10.3
Downstream - B (duct diameters)	4.2

Diagram of Stack



Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)	
1	.021	0.875	14.875	15
2	.067	2.78	16.78	16 3/4
3	.118	4.89	18.89	18 7/8
4	.177	7.35	21.35	21 3/8
5	.250	10.375	24.375	24 3/8
6	.356	14.77	28.77	28 3/4
7	.644	26.73	40.73	40 3/4
8	.750	31.125	45.125	45 1/8
9	.823	34.155	48.155	48 1/8
10	.882	36.60	50.6	50 5/8
11	.933	38.72	52.72	52 3/4
12	.979	40.63	54.63	54 5/8

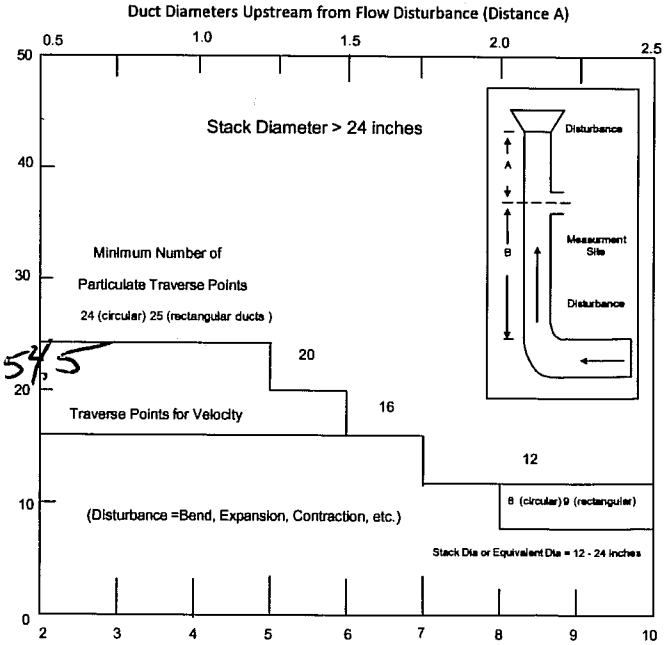
52.72

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

Sample and Velocity Traverse Point Data Sheet - Method 1

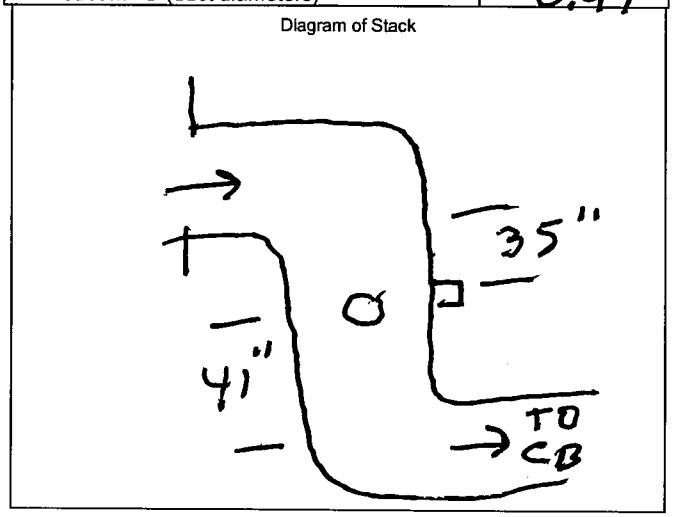
Client: Chemours
Loaction/Plant: Fayetteville
Source: VES CB Inlet
Operator:
Date: 7-16-19
W.O. Number:

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	49.5
Port Depth (in.) = D	9.5+4 = 13.5
Depth of Duct, diameter (in.) = C-D	36
Area of Duct (ft^2)	7.063
Total Traverse Points	24
Total Traverse Points per Port	12
Port Diameter (in.) ---(Flange-Threaded-Hole)	
Monorail Length	9'
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	X
Total Ports (rectangular duct only)	X
Equivalent Diameter = (2*L*W)/(L+W)	X

Flow Disturbances	
Upstream - A (ft)	41
Downstream - B (ft)	35
Upstream - A (duct diameters)	1.14
Downstream - B (duct diameters)	0.97

Diagram of Stack

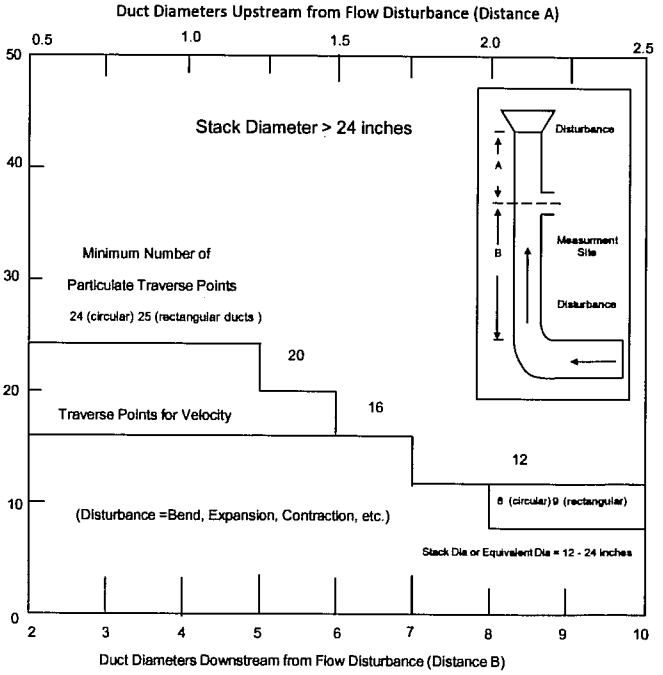


Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	.021	1	14 1/2
2	.067	2 3/8	15 7/8
3	.118	4 1/4	17 3/4
4	.177	6 3/8	19 7/8
5	.250	9	22 1/2
6	.356	12 7/8	26 3/8
7	.644	23 1/8	36 5/8
8	.75	27	40 1/2
9	.823	29 5/8	43
10	.882	31 3/4	45 1/4
11	.933	33 5/8	47
12	.979	35	48 1/2
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	Location	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	Location	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

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

Test Data			
Run number	1	2	3
Location	VES CBed Inlet	VES CBed Inlet	VES CBed Inlet
Date	2/19/2020	2/19/2020	2/20/2020
Time period	1020-1218	1351-1544	0852-1049
Operator	CW/NG	CW/NG	CW/NG
Inputs For Calcs.			
Sq. rt. delta P	1.12593	1.12220	1.14901
Delta H	0.9617	0.9725	0.9713
Stack temp. (deg.F)	65.0	65.8	65.8
Meter temp. (deg.F)	60.0	57.6	50.6
Sample volume (act.)	49.411	49.895	49.545
Barometric press. (in.Hg)	30.18	30.34	30.38
Volume H_2O imp. (ml)	18.0	10.0	8.0
Weight change sil. gel (g)	10.5	11.8	11.1
% 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.)	7.068	7.068	7.068
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	-5.60	-5.80	-5.70
Nozzle dia. (in.)	0.160	0.160	0.160
Meter box cal.	0.9966	0.9966	0.9966
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

Page 1 of 1

		Stack Conditions				
Client	Chemours		Assumed	Actual	Meter Box ID	WC 31
W.O.#	15418.002.022				Meter Box Y	0.9946 ✓
Project ID	Chemours	% Moisture	3		Meter Box Del H	1.4954
Mode/Source ID	VES	Impinger Vol (ml)		18 ✓	Probe ID / Length	P696
Samp. Loc. ID	CB IN	Silica gel (g)		10 ✓ ✓	Probe Material	Boro
Run No.ID	1	CO2, % by Vol	0.0	0.0 ✓	Pitot / Thermocouple ID	P696
Test Method ID	M0010	O2, % by Vol	20.9	20.9 ✓	Pitot Coefficient	0.84 ✓
Date ID	FEB2020	Temperature (°F)	75		Nozzle ID	0.160
Source/Location	VE South CB Inlet	Meter Temp (°F)	60		Nozzle Measurements	0.160 / 0.160 / 0.159
Sample Date	2/19/20 ✓	Static Press (in H_2O)	-5.0	-5.6 ✓	Avg Nozzle Dia (in)	0.160 ✓
Baro. Press (in Hg)	30.18 ✓				Area of Stack (ft^2)	7.125 ✓
Operator	EW/NG ✓	Ambient Temp (°F)		54	Sample Time	96 ✓
					Total Traverse Pts	24 ✓

K Factor 6.72

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.020	0.005	0.005
Leak Check @ (in Hg)	15	4	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	59		55
Reference Temp	55.5		54.2
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

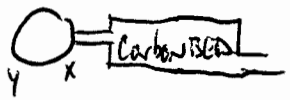
TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1020 ✓			465.228									
X 1	4		1.6	1.15	467.5	66	58	119	122	49	3.0	47		
2	8		1.6	1.15	469.7	66	58	120	122	45	3.0	43		
3	12		1.7	1.22	472.2	66	58	120	122	45	3.0	43		
4	16		1.7	1.22	474.5	66	59	121	123	47	3.0	44		
5	20		1.6	1.15	476.8	66	59	119	121	48	3.0	44		
6	24		1.5	1.08	478.9	66	60	119	121	48	3.0	43		23.723
7	28		1.4	1.01	481.1	65	60	119	121	48	3.0	44		
8	32		1.3	0.94	483.2	65	60	121	121	48	3.0	45		
9	36		1.3	0.94	485.2	65	60	119	121	48	3.0	44		
10	40		1.1	0.80	487.4	64	60	119	121	48	2.5	45		
11	44		1.0	0.72	489.1	63	60	120	120	48	2.5	45		
12	48	1108	1.0	0.72	490.951	63	60	120	121	48	2.5	44		
		1130			491.045									
✓ 1	52		2.3	1.66	493.6	65	60	120	121	48	4.0	47		
2	56		2.4	1.73	496.5	65	60	120	121	46	4.0	45		
3	60		2.3	1.66	499.2	65	60	121	121	48	4.0	45		
4	64		2.1	1.51	502.0	65	61	119	121	49	4.0	46		23.688
5	68		1.5	1.08	504.2	65	61	119	120	50	3.5	45		
6	72		1.1	0.80	506.2	65	61	119	120	49	2.5	45		
7	76		0.85	0.61	507.9	65	61	121	120	50	2.0	45		
8	80		0.72	0.50	509.5	65	61	120	120	50	2.0	45		
9	84		0.61	0.44	510.9	65	61	118	121	50	2.0	45		
10	88		0.50	0.36	512.2	65	61	118	120	50	1.5	45		
11	92		0.44	0.32	513.6	65	61	119	121	50	1.5	45		
12	96	1218	0.43	0.31	514.733	64	61	120	120	50	1.5	46		
			Avg Delta P ✓	Avg Delta H	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.33542	0.96125	49.411 ✓	65.0 ✓	60.04 ✓	118/121	120/123	50	4.0	43/47		
			Avg Sqrt Delta P ✓	Avg Sqrt Del H										
			1.12593	0.95513										

Comments:

EPA Method 0010 from EPA SW-846

0.96167

0.95540



PT1 All way IN

amd

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions							
Client	Chemours		Assumed	Actual	Meter Box ID	WC31		K Factor	0.73
W.O.#	15418.002.022				Meter Box Y	0.9966 ✓			
Project ID	Chemours	% Moisture	2.5		Meter Box Del H	1.9959			
Mode/Source ID	VES	Impinger Vol (ml)		10 ✓	Probe ID / Length	P696	Sample Train (ft³)	Initial: 0.015	Mid-Point: 0.010	Final: 0.015
Samp. Loc. ID	CB IN	Silica gel (g)		11.8 ✓	Probe Material	Boro	Leak Check @ (in Hg)	15	4	5
Run No.ID	2	CO2, % by Vol	0.0	0.0 ✓	Pitot / Thermocouple ID	P696	Pitot leak check good	(yes) / no	(yes) / no	(yes) / no
Test Method ID	M0010	O2, % by Vol	20.9	20.9 ✓	Pitot Coefficient	0.84 ✓	Pitot Inspection good	(yes) / no	yes / no	(yes) / no
Date ID	FEB2020	Temperature (°F)	65		Nozzle ID	B - 0.160	Method 3 System good	~~yes / no~~	~~yes / no~~	~~yes / no~~
Source/Location	VE South CB Inlet	Meter Temp (°F)	60		Nozzle Measurements	0.166 / 0160 / 0.154	**Temp Check**	Pre-Test Set		Post-Test Set
Sample Date	2/19/20 ✓	Static Press (in H_2O)	-5.6	-5.8 ✓	Avg Nozzle Dia (in)	0.160 ✓	Meter Box Temp	49		48
Baro. Press (in Hg)	30.34 ✓				Area of Stack (ft²)	7.068 ✓	Reference Temp	48.7		47.2
Operator	CW/NG	Ambient Temp (°F)	49		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 (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	1351 ✓			515.084									
X 1	4		1.6	1.17	517.3	66	56	119	121	46	4.0	39		
2	8		1.6	1.17	519.6	66	56	120	121	45	4.0	38		
3	12		1.7	1.24	522.0	66	56	119	121	43	4.0	38		
4	16		1.7	1.24	524.4	66	56	119	120	43	4.0	38		
5	20		1.6	1.17	526.7	67	57	119	121	44	4.0	38		
6	24		1.5	1.10	528.9	67	57	119	120	44	4.0	39		26.123
7	28		1.4	1.02	531.2	67	57	120	121	45	3.5	39		
8	32		1.3	0.95	533.8	67	57	118	121	46	3.5	39		
9	36		1.3	0.95	535.5	66	57	119	120	46	3.5	39		
10	40		1.2	0.88	537.7	65	58	120	121	46	3.5	39		
11	44		1.0	0.73	539.3	64	58	121	121	45	3.0	39		
12	48	1439	1.0	0.73	541.707	64	58	118	121	45	3.0	39		
		1456			541.335									
Y 1	52	1	2.5	1.83	544.0	65	58	120	121	47	4.5	42		
2	56		2.4	1.75	547.0	66	58	119	121	45	4.5	41		
3	60		2.3	1.68	549.7	66	58	120	121	44	4.5	40		
4	64		2.1	1.53	552.4	66	58	119	121	45	4.5	39		
5	68		1.4	1.02	554.9	67	59	118	120	46	3.5	40		23.772
6	72		0.92	0.67	557.7	67	59	119	121	46	2.5	40		
7	76		0.81	0.59	558.3	66	58	121	121	45	2.5	40		
8	80		0.70	0.51	559.9	66	58	118	121	45	2.5	40		
9	84		0.60	0.44	561.3	66	58	118	121	45	2.5	40		
10	88		0.47	0.34	562.6	65	58	120	121	45	2.0	40		
11	92		0.44	0.32	563.9	65	58	121	121	46	2.0	40		
12	96	1544 ✓	0.42	0.31	565.107	64	59	120	121	46	2.0	40		
			Avg Delta P ✓	Avg Delta H ✓	Total Volume ✓	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.33167	0.97250	49.895	65.83	57.58	118/121	120/121	47	4.5	38/42		
			Avg Sqrt Delta P ✓	Avg Sqrt Del H ✓	Comments:									
			1.17220	0.95898										

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

PT 1 ALL WAY IN

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ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

			Stack Conditions	
Client	Chemours		Assumed	Actual
W.O.#	15418.002.022			
Project ID	Chemours	% Moisture	2.0	
Mode/Source ID	VES	Impinger Vol (ml)		8 J
Samp. Loc. ID	CB IN	Silica gel (g)		11.0 J
Run No.ID	3	CO2, % by Vol	0.0	0.0 ✓
Test Method ID	M0010	O2, % by Vol	20.9	20.9 ✓
Date ID	FEB2020	Temperature (°F)	65	
Source/Location	VE South CB Inlet	Meter Temp (°F)	100	
Sample Date	2/20/19 ✓	Static Press (in H_2O)	-5.6	-5.7 J
Baro. Press (in Hg)	30.38 ✓			
Operator	ELW/BG ✓	Ambient Temp (°F)	48	

Meter Box ID	WC31	
Meter Box Y	0.9966 ✓	
Meter Box Del H	1.9959	
Probe ID / Length	P696	Sample Train (ft³)
Probe Material	Boro	Leak Check @ (in Hg)
Pitot / Thermocouple ID	P696	Pitot leak check good
Pitot Coefficient	0.84 ✓	Pitot Inspection good
Nozzle ID	B - 0.160	Method 3 System good
Nozzle Measurements	0.160 / 0.160 / 0.159	**Temp Check**
Avg Nozzle Dia (in)	0.160 ✓	Meter Box Temp
Area of Stack (ft²)	7.963 ✓	Reference Temp
Sample Time	96 ✓	Pass/Fail (+/- 2°)
Total Traverse Pts	24 ✓	Temp Change Response ?

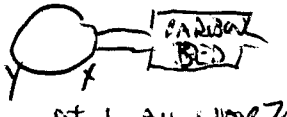
K Factor 0.7

Initial	Mid-Point	Final
0.010	0.000	0.010
15	5	5
yes / no	yes / no	yes / no
yes / no	yes / no	yes / no
yes / no	yes / no	yes / no
	Pre-Test Set	Post-Test Set
	48	50
	47.3	49.4
	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	0857 ✓			565.507									
X 1	4		1.6	1.12	567.6	65	48	119	121	37	3.5	36		
2	8		1.6	1.12	570.0	66	48	119	122	35	3.5	35		
3	12		1.7	1.19	5774	66	48	120	122	35	3.5	36		
4	16		1.8	1.26	5746	66	49	121	121	40	3.5	36		
5	20		1.6	1.12	576.9	67	49	120	122	41	3.5	36		
6	24		1.5	1.05	579.0	67	49	119	121	41	3.5	36		26.131
7	28		1.5	1.05	581.4	67	50	119	120	41	3.5	36		
8	32		1.4	0.98	583.4	66	50	120	121	41	3.5	36		
9	36		1.4	0.98	585.5	65	50	121	121	42	3.5	36		
10	40		1.3	0.91	587.7	64	50	121	122	42	3.5	37		
11	44		1.2	0.84	589.6	63	51	119	121	43	3.0	37		
12	48	0940	1.1	0.77	591.552	62	51	119	121	43	3.0	37		
		1001			591.638									
Y 1	52		2.5	1.75	594.3	67	51	119	121	42	4.5	38		
2	56		2.4	1.68	597.3	67	51	121	122	41	4.5	37		
3	60		2.3	1.61	599.9	67	51	120	121	41	4.5	38		
4	64		2.1	1.47	602.6	67	52	119	121	43	4.5	38		23.500
5	68		1.5	1.05	604.9	67	52	119	121	43	3.5	38		
6	72		1.1	0.77	606.8	67	52	120	121	43	3.0	38		
7	76		0.88	0.62	608.3	67	52	120	121	43	3.0	38		
8	80		0.80	0.56	609.7	66	52	121	121	43	3.0	39		
9	84		0.66	0.46	611.2	66	52	119	121	43	3.0	39		
10	88		0.54	0.38	612.6	65	52	118	121	42	2.0	39		
11	92		0.43	0.34	613.9	64	52	120	121	42	2.0	39		
12	96	1049 ✓	0.44	0.31	615.138	64 ✓	52	120	121	42	2.0	39		
			Avg Delta P ✓	Avg Delta H ✓	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.38667	0.97125	49.631	65.75	50.58	118/121	120/122	43	4.5	35/39		
			Avg Sqrt Delta P ✓	Avg Sqrt Del H ✓	Comments:									
			1.14901	0.96875	49.545									

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846



pt 1 all way 2N

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.022
Location/Plant	Fayetteville, NC	Source & Location	VE South CB Inlet

Run No. 1 — Sample Date 2/19/2020 — Recovery Date 2/19/2020

Sample I.D. Chemours - VES - CB IN - 1 - M0010 - — Analyst CH — 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	4	102	102	10				218	310.5	
Initial	0	100	100	0				200	300	
Gain	4	102	2	10				18 ✓	10.5 ✓	+8

Impinger Color Clear — Labeled? ✓

Silica Gel Condition good — Sealed?

Run No. 2 — Sample Date 2/19/2020 — Recovery Date 2/19/2020

Sample I.D. Chemours - VES - CB IN - 2 - M0010 - — Analyst CH — 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	4	102	102	2				210	311.8	
Initial	0	100	100	0				200	300	
Gain	4	2	2	2				10 ✓	11.8 ✓	

Impinger Color Clear — Labeled? ✓

Silica Gel Condition good — Sealed? ~

Run No. 3 — Sample Date 2/20/20 — Recovery Date 2/20/20

Sample I.D. Chemours - VES - CB IN - 3 - M0010 - — Analyst CH — 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	102	104	2				208	311.1	
Initial	0	100	100	0				200	300	
Gain	0	2	4	2				8 ✓	11.1 ✓	

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
VES CARBON BED OUTLET

Test Data

Run number	1	2	3
Location	VES CBed Outlet	VES CBed Outlet	VES CBed Outlet
Date	2/19/2020	2/19/2020	2/20/2020
Time period	1020-1218	1351-1544	0852-1049
Operator	JM	JM	JM

Inputs For Calcs.

Sq. rt. delta P	0.87172	0.86414	0.86295
Delta H	1.1958	1.1796	1.1713
Stack temp. (deg.F)	67.6	68.3	66.6
Meter temp. (deg.F)	55.8	54.8	48.6
Sample volume (act.)	59.501	58.777	58.300
Barometric press. (in.Hg)	30.18	30.34	30.38
Volume H_2O imp. (ml)	8.0	6.0	8.0
Weight change sil. gel (g)	15.2	13.9	15.6
% 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.)	9.390	9.390	9.390
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	2.70	2.70	2.70
Nozzle dia. (in.)	0.200	0.200	0.200
Meter box cal.	0.9834	0.9834	0.9834
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

VES CB outlet

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

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			Stack Conditions						
Client	Chemours		Assumed	Actual	Meter Box ID	WC32			
W.O.#	15418.002.022				Meter Box Y	0.9834 ✓			
Project ID	Chemours	% Moisture	2		Meter Box Del H	1.7175			
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		8 ✓	Probe ID / Length	5ft		Sample Train (ft^3)	0.006	0.010	0.006
Samp. Loc. ID	OUT	Silica gel (g)		15.2 ✓	Probe Material	Boro		Leak Check @ (in Hg)	15	8	5
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	FEB2020	Temperature (°F)	75		Nozzle ID			Method 3 System good	~~yes / no~~	~~yes / no~~	~~yes / no~~ N/A
Source/Location	VE South Outlet	Meter Temp (°F)	55		Nozzle Measurements	0.200	0.201	0.200	**Temp Check**	Pre-Test Set	Post-Test Set
Sample Date	2/19/20 ✓	Static Press ($in H_2O$)	+2.4	+2.7 ✓	Avg Nozzle Dia (in)	0.200 ✓			Meter Box Temp	52	49
Baro. Press (in Hg)	30.18 ✓				Area of Stack (ft^2)	9.39 ✓			Reference Temp	51	49
Operator	Mills ✓	Ambient Temp (°F)	50		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				491.368									
1	4	1020 ✓	0.47	0.72	493.3	66	54	120	120	50	1.0	50		
2	8		0.53	0.87	495.4	66	53	121	120	53	1.0	52		
3	12		0.59	0.91	497.6	67	54	122	122	47	2.0	52		
4	16		0.64	0.96	500.0	68	53	121	121	46	2.0	52		
5	20		0.65	1.00	502.2	68	54	122	122	46	2.0	52		
6	24		0.71	1.09	504.6	68	54	124	122	45	2.0	51		
7	28		0.83	1.28	507.2	68	53	122	121	44	3.0	51		
8	32		0.91	1.40	510.0	68	55	121	121	44	3.0	50		
9	36		0.98	1.51	512.6	68	55	121	122	44	3.0	45		
10	40		1.00	1.54	515.5	68	55	119	121	44	3.0	40		
11	44		1.10	1.69	518.4	68	56	122	121	44	3.0	39		
MMM	48	1108	1.15	1.77	521.555	68	56	123	121	44	3.0	39		30.187
	0	1130	—	—	521.780	—	—	—	—	—	—	—		
IN	4		1.10	1.69	524.8	68	56	120	121	46	3.0	40		
2	8		1.05	1.62	527.6	67	56	121	121	43	3.0	37		
3	12		1.00	1.54	530.5	68	56	120	121	44	3.0	38		
4	16		0.98	1.51	533.3	68	57	123	121	44	3.0	38		
5	20		0.91	1.40	536.1	68	57	121	121	44	3.0	38		
6	24		0.86	1.32	538.8	68	57	119	121	45	2.5	38		
7	28		0.85	1.00	540.9	68	56	122	121	45	2.0	37		
8	32		0.61	0.94	543.3	68	57	122	121	45	1.5	37		
9	36		0.55 0.56	0.85 0.86	545.5	68	58	122	121	45	1.0	37		29.314
10	40		0.50	0.77	547.4	67	58	121	121	45	1.0	37		
11	44		0.46	0.71	549.4	67	59	123	121	45	1.0	37		
12 MM	48	0143	0.43	0.66	551.094	67	58	122	121	45	1.0	37		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
WESTON SOLUTIONS		1218 ✓	0.7775 ✓	1.19583 ✓	59.50 ✓	67.62	55.75 ✓	119/124	120/122	53	3.0	52		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:							EPA Method 0010 from EPA SW-846		
			0.871723	1.08106 ✓										

I=99 M=1.77

AM1

VES CB OUTLET

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

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		Stack Conditions					
Client	Chemours		Assumed	Actual	Meter Box ID	WC32	
W.O.#	15418.002.022				Meter Box Y	0.9834 ✓	
Project ID	Chemours	% Moisture	2		Meter Box Del H	1.7125	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		6 ✓	Probe ID / Length	5FT	
Samp. Loc. ID	OUT	Silica gel (g)		13.9 ✓	Probe Material	Boro	
Run No.ID	2	CO2, % by Vol	0		Pitot / Thermocouple ID	P710	
Test Method ID	M0010	O2, % by Vol	20.9		Pitot Coefficient	0.84	
Date ID	FEB2020	Temperature (°F)	68		Nozzle ID	0.200 | 0.201 | 0.200	
Source/Location	VE South Outlet	Meter Temp (°F)	58		Nozzle Measurements		
Sample Date	2/19/20 ✓	Static Press (in H_2O)	+2.7	+2.7 ✓	Avg Nozzle Dia (in)	0.200	
Baro. Press (in Hg)	30.34 ✓				Area of Stack (ft^2)	9.39 ✓	
Operator	MILLS ✓	Ambient Temp (°F)	50		Sample Time	96 ✓	
					Total Traverse Pts	24 ✓	

	Initial	Mid-Point	Final
K Factor 1.54			
Sample Train (ft^3)	0.012	0.003	0.004
Leak Check @ (in Hg)	15	8	6
Pitot leak check good	yes / no	yes / no	yes / no
Pitot Inspection good	yes / no	yes / no	yes / no
Method 3 System good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	49		50
Reference Temp	48		49
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
1	0	1351 ✓			551.455									
2	4		0.44	0.68	553.5	67	52	130	126	47	1.0	47		
3	8		0.48	0.74	555.4	68	52	126	121	46	1.0	47		
4	12		0.55	0.85	557.5	68	53	122	119	46	2.0	44		
5	16		0.61	0.94	559.8	68	53	121	120	47	2.0	44		
6	20		0.65	1.00	562.1	68	53	120	121	47	2.0	44		
7	24		0.68	1.05	564.5	68	54	120	121	46	2.5	45		
8	28		0.82	1.26	567.0	68	54	121	121	46	2.5	40		
9	32	0.88	~~0.95~~ 0.98	~~1.46~~ 1.51	569.7 ~~570.5~~	68	54	121	121	46	3	39		
10	36		1.05	1.62	573.2	69	53	122	119	44	3	39		
11	40		1.10	1.69	576.4	69	55	120	122	44	3.5	39		
12	44	1439	1.15	1.77	581.268	69	55	122	122	43	3.5	38		
	0		—	—	581.463	—	—	—	—	—	—	—		19.813
1	4	1440	1.1	1.69	584.5	69	55	121	122	42	4	39		
2	8		1.05	1.62	587.3	69	53	122	121	42	3.5	39		
3	12		1.0	1.54	590.2	69	55	119	119	42	3.5	39		
4	16		0.96	1.48	593.0	69	55	121	120	42	3.0	38		
5	20		0.93	1.43	595.7	69	55	122	121	43	3.0	39		
6	24		0.84	1.29	598.2	68	56	120	121	43	3.0	39		
7	28		0.64	0.98	600.5	69	56	120	121	43	2.0	39		
8	32		0.58	0.89	602.6	68	56	121	121	44	2.0	39		28.964
9	36		0.53	0.82	604.8	68	56	122	121	43	2.0	39		
10	40		0.49	0.75	606.7	68	57	122	121	44	2.0	39		
11	44	1544 ✓	0.45	0.69	608.6	68	57	121	121	44	1.0	39		
12	48		0.43	0.66	610.427	68	57	121	121	44	1.0	39		
			Avg Delta P ✓	Avg Delta H ✓	Total Volume ✓	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.76625 ✓	1.17958 ✓	58.777 ✓	68.37	54.79 ✓							
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.864143 ✓	1.07214 ✓										

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

amd

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

VES- CBottet

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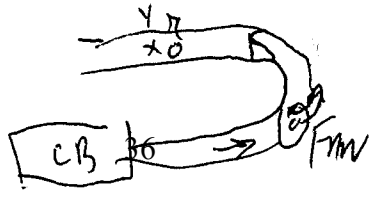
		Stack Conditions							
Client	Chemours		Assumed	Actual	Meter Box ID	UC32		Sample Train (ft^3)	0.010	0.006	0.005
W.O.#	15418.002.022				Meter Box Y	0.9834 ✓		Leak Check @ (in Hg)	15	0	5
Project ID	Chemours	% Moisture	2		Meter Box Del H	1.7175		Pitot leak check good	yes / no	yes / no	yes / no
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		8	Probe ID / Length	5FT		Pitot Inspection good	yes / no	yes / no	yes / no
Sampl. Loc. ID	OUT	Silica gel (g)		15.6	Probe Material	Boro		Method 3 System good	yes / no	yes / no	yes / no
Run No.ID	3	CO2, % by Vol	0		Pitot / Thermocouple ID	P710		**Temp Check**	Pre-Test Set		Post-Test Set
Test Method ID	M0010	O2, % by Vol	20.9		Pitot Coefficient	0.84 ✓		Meter Box Temp	45		44
Date ID	FEB2020	Temperature (°F)	68		Nozzle ID			Reference Temp	45		43
Source/Location	VE South Outlet	Meter Temp (°F)	55		Nozzle Measurements	0.200 / 0.200 / 0.201		Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Sample Date	2/20/20 ✓	Static Press (in H_2O)	+2.7	+2.7 ✓	Avg Nozzle Dia (in)	0.200		Temp Change Response ?	yes / no		yes / no
Baro. Press (in Hg)	30.38				Area of Stack (ft^2)	9.39 ✓					
Operator	MH/HS ✓	Ambient Temp (°F)	45		Sample Time	96 ✓					
					Total Traverse Pts	24 ✓					

K Factor

	Initial	Mid-Point	Final
	0.010	0.006	0.005

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	0850 ✓			610.656									
1	4		0.48	0.74	612.7	65	45	120	124	42	1.0	42		
2	8		0.52	0.80	614.7	66	45	121	119	42	1.0	42		
3	12		0.57	0.88	616.9	66	45	120	123	42	2.0	42		
4	16		0.62	0.95	619.1	66	45	121	119	42	2.5	41		
5	20		0.71	1.09	621.5	66	46	122	120	42	2.5	41		
6	24		0.72	1.10	624.0	67	46	121	120	43	2.5	41		
7	28		0.80	1.23	626.4	67	47	120	122	44	2.5	41		
8	32		0.87	1.34	629.0	67	47	120	122	44	3	41		
9	36		0.97	1.49	631.7	67	48	121	120	44	3.5	42		
10	40		1.0	1.54	634.6	67	48	122	121	45	4	41		
11	44		1.05	1.62	637.3	67	49	122	122	45	4.5	40		
12	48	0940	1.10	1.69	640.342	67	49	121	121	45	4.5	40		
	0		—	—	640.516	—	—	—	—	—	—	—		
1	4	1001	1.05	1.62	643.5	67	49	121	122	42	4.5	40		
2	8		1.05	1.62	646.2	67	50	121	122	40	4.5	40		
3	12		0.97	1.49	649.1	67	50	121	121	40	4	38		
4	16		0.94	1.45	652.0	67	50	120	119	40	4	38		
5	20		0.88	1.35	654.4	67	50	121	122	40	3.5	38		
6	24		0.81	1.25	657.0	67	51	122	120	40	3	38		
7	28		0.67	1.03	659.2	67	51	122	119	40	3	37		
8	32		0.57	0.88	661.4	67	51	120	122	40	2.5	37		
9	36		0.53	0.82	663.3	67	51	121	123	40	2	37		
10	40		0.48	0.74	665.3	66	51	122	122	39	2	37		
11	44		0.46	0.7	667.2	66	51	122	123	39	1.0	37		
12	48	1049 ✓	0.44	0.68	669.130	66	51	122	118	39	1.0	37		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.76083	1.17125	58.300	66.58	48.58	120/122	118/123	45	4.5	37/42		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.86295	1.07073										

EPA Method 0010 from EPA SW-846



SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.022
Location/Plant	Fayetteville, NC	Source & Location	VE South Outlet

Run No. 1 — Sample Date 2/19/20 — Recovery Date 2/19/20

Sample I.D. Chemours - Carbon Bed - OUT - 1 - M0010 - — Analyst KS — 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	4	104	100	0				208	315.2	
Initial	0	100	100	0				200	300	
Gain	4	4	0					8 ✓	15.2 ✓	

Impinger Color Blue — Labeled? Yes

Silica Gel Condition Good — Sealed? Yes

Run No. 2 — Sample Date 2/19/20 — Recovery Date 2/19/20

Sample I.D. Chemours - Carbon Bed - OUT - 2 - M0010 - — Analyst KS — 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	313.9	
Initial	0	100	100	0				200	300	
Gain	2	4	0	0				6 ✓	13.9 ✓	

Impinger Color Blue — Labeled? Yes

Silica Gel Condition Good — Sealed? Yes

Run No. 3 — Sample Date ~~2/20/19~~ 2/20/20 — Recovery Date 2/20/20

Sample I.D. Chemours - Carbon Bed - OUT - 3 - M0010 - — Analyst KS — 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	106	100	0				208	315.6	
Initial	0	100	100	0				200	300	
Gain	2	6	0	0				~~208~~ 8 ✓	15.6 ✓	

Impinger Color Blue — Labeled? Yes

Silica Gel Condition Good — Sealed? Yes

Check COC for Sample IDs of Media Blanks

Balance Check	Known	Actual	
~~2/19/19~~ 2/20/20	500	499.6	KS
2/19/20	500	499.7	KS

SAMPLE RECOVERY FIELD DATA

Client: Chemours — W.O. #: 15418.002.022
Location/Plant: Fayetteville, NC — Source & Location: Blank Train

Run No. 2 — Sample Date 2/19/20 — Recovery Date 2/19/20
Sample I.D. _____ — Analyst CH/LS — Filter Number N/A

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents									Silica Gel	
Final	8	100	100					200	300	
Initial	0	100	100					200	300	
Gain								0	0	

Impinger Color: Blue — Labeled? ✓
Silica Gel Condition: Good — Sealed? _____

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

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

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

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

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

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

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **19 Feb 2020**

File: C:\DATA\Chemours\fayetteville\VES 021920\021920 VE South.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, %	**21.0**

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, %	**17.3**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **19 Feb 2020**

Start Time: 07:32

O_2

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

Calibration Standards

%	**Cylinder ID**
12.0	EB0109777
21.0	XC021800B

Calibration Results

Zero	9 mv
Span, 21.0 %	8002 mv

Curve Coefficients

Slope	**Intercept**
380.8	9

CO_2

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

Calibration Standards

%	**Cylinder ID**
9.1	EB0109777
17.3	XC021800B

Calibration Results

Zero	4 mv
Span, 17.3 %	5755 mv

Curve Coefficients

Slope	**Intercept**
332.6	4

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.022**
Location: **Fayetteville, NC** | Operator: **CMH**
Source: **VE South Stack** | Calibration **1** | Date: **19 Feb 2020**

Start Time: 07:32

O_2
Method: EPA 3A
Span Conc. 21.0 %
Slope 379.9 **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
21.0	21.0	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 17.3 %
Slope 332.6 **Intercept** 4.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
9.1	9.0	-0.1	-0.6	Pass
17.3	17.3	0.0	0.0	Pass

BIAS

Number 1

Client: **Chemours** | Project Number: **15418.002.022**
Location: **Fayetteville, NC** | Operator: **CMH**
Source: **VE South Stack** | Calibration **1** | Date: **19 Feb 2020**

Start Time: 07:48

O_2
Method: EPA 3A
Span Conc. 21.0 %

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. 17.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	9.0	8.8	-0.2	-1.2	Pass

RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Calibration **1**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **19 Feb 2020**

Time	O_2 %	CO_2 %
VE South Run 1 Carbon Bed Bag Sample		
12:21	20.8	0.0
12:22	20.9	0.0
12:23	20.9	0.0
12:24	20.9	0.0
12:25	20.9	0.0
Avgs	**20.9**	**0.0**

RUN SUMMARY

Number 1

Client: **Chemours** | Project Number: **15418.002.022**
Location: **Fayetteville, NC** | Operator: **CMH**
Source: **VE South Stack** | Calibration **1** | Date: **19 Feb 2020**

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

Time: 12:20 to 12:25

Run Averages

20.9	0.0

Pre-run Bias at 07:48

Zero Bias	0.0	0.0
Span Bias	12.0	8.8
Span Gas	12.0	9.1

No Post-run Bias

Run averages corrected for the pre-run bias

20.9	0.0

METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **20 Feb 2020**

File: C:\DATA\Chemours\fayetteville\VES 021920\022020 VE South.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, %	**21.0**

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, %	**17.3**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **20 Feb 2020**

Start Time: 07:54

O_2

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

Calibration Standards

%	Cylinder ID
12.0	EB0109777
21.0	XC021800B`

Calibration Results

Zero	6 mv
Span, 21.0 %	8001 mv

Curve Coefficients

Slope	Intercept
380.9	6

CO_2

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

Calibration Standards

%	Cylinder ID
9.1	EB0109777
17.3	XC021800B

Calibration Results

Zero	-8 mv
Span, 17.3 %	5754 mv

Curve Coefficients

Slope	Intercept
333.3	-8

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.022**
Location: **Fayetteville, NC** | Operator: **CMH**
Source: **VE South Stack** | Calibration **1** | Date: **20 Feb 2020**

Start Time: 07:54

O_2

Method: EPA 3A
Span Conc. 21.0 %
Slope 380.0 **Intercept** 6.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.1	0.1	0.5	Pass
21.0	21.0	0.0	0.0	Pass

CO_2

Method: EPA 3A
Span Conc. 17.3 %
Slope 333.3 **Intercept** -8.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
9.1	9.1	0.0	0.0	Pass
17.3	17.3	0.0	0.0	Pass

RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Calibration **1**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **20 Feb 2020**

Time	O_2 %	CO_2 %
VE South Carbon Bed R2 Bag		
08:00:22	20.9	0.1
08:00:52	20.9	0.1
08:01:22	20.9	0.1
08:01:52	20.9	0.1
08:02:22	20.9	0.1
08:02:52	20.9	0.1
08:03:22	20.9	0.1
08:03:52	20.9	0.1
08:04:22	20.9	0.1
08:04:52	20.9	0.1
08:05:22	20.9	0.1
08:05:52	20.9	0.1
Avgs	**20.9**	**0.1**

RUN SUMMARY

Number 1

Client: **Chemours**			Project Number: **15418.002.022**
Location: **Fayetteville, NC**			Operator: **CMH**
Source: **VE South Stack**	Calibration **1**		Date: **20 Feb 2020**

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

Time: 07:59:52 to 08:05:52

Run Averages

20.9 0.1

No Pre-run Bias

No Post-run Bias

No Bias Corrections

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **VE South Stack**

Calibration **1**

Project Number: **15418.002.022**
Operator: **CMH**
Date: **20 Feb 2020**

Time	O_2 %	CO_2 %
VE South Carbon Bed Bag Sample R3		
10:52:08	21.0	0.1
10:52:38	21.0	0.1
10:53:08	21.0	0.1
10:53:38	21.0	0.1
10:54:08	21.0	0.1
10:54:38	21.0	0.1
10:55:08	21.0	0.1
10:55:38	21.0	0.1
10:56:08	21.0	0.1
10:56:38	21.0	0.1
10:57:08	21.0	0.1
10:57:38	21.0	0.1
10:58:08	21.0	0.1
Avgs	**21.0**	**0.1**

RUN SUMMARY

Number 2

Client: **Chemours**		Project Number:	**15418.002.022**
Location: **Fayetteville, NC**		Operator:	**CMH**
Source: **VE South Stack**	Calibration **1**	Date:	**20 Feb 2020**

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

Time: 10:51:38 to 10:58:08

Run Averages

21.0 0.1

No Pre-run Bias

No Post-run Bias

No Bias Corrections

APPENDIX C
LABORATORY ANALYTICAL REPORT

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Job Number: 140-18337-1

Job Description: VES CB Inlet

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
3/25/2020 4:42 PM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
03/25/2020

Table of Contents

Table of Contents

Definitions/Glossary

Client: The Chemours Company FC, LLC
Job ID: 140-18337-1
Project/Site: VES CB Inlet

Qualifiers

LCMS

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

Glossary

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

Method Summary

Client: The Chemours Company FC, LLC
Job ID: 140-18337-1
Project/Site: VES CB Inlet

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: VES CB Inlet

Job ID: 140-18337-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-18337-1	Z-2805,2806 VES INLET R1 M0010 FH	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-2	Z-2807,2808,2810 VES INLET R1 M0010 BH	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-3	Z-2809 VES INLET R1 M0010 IMP 1,2&3 COND	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-4	Z-2811 VES INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-5	Z-2812,2813 VES INLET R2 M0010 FH	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-6	Z-2814,2815,2817 VES INLET R2 M0010 BH	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-7	Z-2816 VES INLET R2 M0010 IMP 1,2&3 COND	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-8	Z-2818 VES INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	02/19/20 00:00	02/21/20 08:00	
140-18337-9	Z-2819,2820 VES INLET R3 M0010 FH	Air	02/20/20 00:00	02/21/20 08:00	
140-18337-10	Z-2821,2822,2824 VES INLET R3 M0010 BH	Air	02/20/20 00:00	02/21/20 08:00	
140-18337-11	Z-2823 VES INLET R3 M0010 IMP 1,2&3 COND	Air	02/20/20 00:00	02/21/20 08:00	
140-18337-12	Z-2825 VES INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	02/20/20 00:00	02/21/20 08:00	

Job Narrative
140-18337-1

Sample Receipt

The samples were received on February 21, 2020 at 8:00 AM in good condition and properly preserved. The temperature of the cooler at receipt was 0.9º C.

LCMS

Method 537 (modified): The listed samples were double spike with IS due to a reformulation of the standard mixes. The IS recovery will be 2x the normal amount.

Z-2809 VES INLET R1 M0010 IMP 1,2&3 COND (140-18337-3), Z-2811 VES INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-18337-4), Z-2816 VES INLET R2 M0010 IMP 1,2&3 COND (140-18337-7), Z-2818 VES INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-18337-8), Z-2819,2820 VES INLET R3 M0010 FH (140-18337-9), Z-2823 VES INLET R3 M0010 IMP 1,2&3 COND (140-18337-11), Z-2825 VES INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-18337-12), (LCS 140-37810/2-B), (LCS 140-37839/2-B), (LCS 140-37973/2-B), (LCSD 140-37810/3-B), (LCSD 140-37839/3-B), (LCSD 140-37973/3-B), (MB 140-37810/1-B), (MB 140-37839/1-B) and (MB 140-37973/1-B)

Method 537 (modified): The required dilution factor for the following samples were higher than could be achieved by "in vial" dilution, as it would dilute out the Isotope Dilution Analytes (IDA). As such, the dilution was achieved by taking a subsample of the undiluted extract, adding sufficient solvent, and re-spiking the extract with IDA.

Z-2805,2806 VES INLET R1 M0010 FH (140-18337-1), Z-2807,2808,2810 VES INLET R1 M0010 BH (140-18337-2), Z-2812,2813 VES INLET R2 M0010 FH (140-18337-5), Z-2814,2815,2817 VES INLET R2 M0010 BH (140-18337-6) and Z-2821,2822,2824 VES INLET R3 M0010 BH (140-18337-10)

Method 537 (modified): The method blank for 37839 contained Perfluoro(2-propoxypropanoic) acid above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank. However, sample 140-18339-A-9-B (Media Check) was reported as a ND for Perfluoro(2-propoxypropanoic) acid.

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.

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: VES CB Inlet

Job ID: 140-18337-1

LCMS

Prep Batch: 37810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-2	Z-2807,2808,2810 VES INLET R1 M0010 BH	Total/NA	Air	None	
140-18337-4	Z-2811 VES INLET R1 M0010 BREAKTHROUGH	Total/NA	Air	None	
140-18337-6	Z-2814,2815,2817 VES INLET R2 M0010 BH	Total/NA	Air	None	
140-18337-8	Z-2818 VES INLET R2 M0010 BREAKTHROUGH	Total/NA	Air	None	
140-18337-10	Z-2821,2822,2824 VES INLET R3 M0010 BH	Total/NA	Air	None	
140-18337-12	Z-2825 VES INLET R3 M0010 BREAKTHROUGH	Total/NA	Air	None	
MB 140-37810/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 37839

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-1	Z-2805,2806 VES INLET R1 M0010 FH	Total/NA	Air	None	
140-18337-5	Z-2812,2813 VES INLET R2 M0010 FH	Total/NA	Air	None	
140-18337-9	Z-2819,2820 VES INLET R3 M0010 FH	Total/NA	Air	None	
MB 140-37839/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 37874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-1	Z-2805,2806 VES INLET R1 M0010 FH	Total/NA	Air	Split	37839
140-18337-5	Z-2812,2813 VES INLET R2 M0010 FH	Total/NA	Air	Split	37839
140-18337-9	Z-2819,2820 VES INLET R3 M0010 FH	Total/NA	Air	Split	37839
MB 140-37839/1-B	Method Blank	Total/NA	Air	Split	37839
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	Split	37839
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37839

Cleanup Batch: 37875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-2	Z-2807,2808,2810 VES INLET R1 M0010 BH	Total/NA	Air	Split	37810
140-18337-4	Z-2811 VES INLET R1 M0010 BREAKTHROUGH	Total/NA	Air	Split	37810
140-18337-6	Z-2814,2815,2817 VES INLET R2 M0010 BH	Total/NA	Air	Split	37810
140-18337-8	Z-2818 VES INLET R2 M0010 BREAKTHROUGH	Total/NA	Air	Split	37810
140-18337-10	Z-2821,2822,2824 VES INLET R3 M0010 BH	Total/NA	Air	Split	37810
140-18337-12	Z-2825 VES INLET R3 M0010 BREAKTHROUGH	Total/NA	Air	Split	37810
MB 140-37810/1-B	Method Blank	Total/NA	Air	Split	37810
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	Split	37810
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37810

Prep Batch: 37973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-3	Z-2809 VES INLET R1 M0010 IMP 1,2&3 COND	Total/NA	Air	None	
140-18337-7	Z-2816 VES INLET R2 M0010 IMP 1,2&3 COND	Total/NA	Air	None	
140-18337-11	Z-2823 VES INLET R3 M0010 IMP 1,2&3 COND	Total/NA	Air	None	
MB 140-37973/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	None	

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: VES CB Inlet

Job ID: 140-18337-1

LCMS

Cleanup Batch: 37974

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-3	Z-2809 VES INLET R1 M0010 IMP 1,2&3 COND	Total/NA	Air	Split	37973
140-18337-7	Z-2816 VES INLET R2 M0010 IMP 1,2&3 COND	Total/NA	Air	Split	37973
140-18337-11	Z-2823 VES INLET R3 M0010 IMP 1,2&3 COND	Total/NA	Air	Split	37973
MB 140-37973/1-B	Method Blank	Total/NA	Air	Split	37973
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	Split	37973
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37973

Analysis Batch: 38138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-1	Z-2805,2806 VES INLET R1 M0010 FH	Total/NA	Air	537 (modified)	38139
140-18337-2	Z-2807,2808,2810 VES INLET R1 M0010 BH	Total/NA	Air	537 (modified)	38139
140-18337-3	Z-2809 VES INLET R1 M0010 IMP 1,2&3 COND	Total/NA	Air	537 (modified)	37974
140-18337-4	Z-2811 VES INLET R1 M0010 BREAKTHROUGH	Total/NA	Air	537 (modified)	37875
140-18337-5	Z-2812,2813 VES INLET R2 M0010 FH	Total/NA	Air	537 (modified)	38139
140-18337-6	Z-2814,2815,2817 VES INLET R2 M0010 BH	Total/NA	Air	537 (modified)	38139
140-18337-7	Z-2816 VES INLET R2 M0010 IMP 1,2&3 COND	Total/NA	Air	537 (modified)	37974
140-18337-8	Z-2818 VES INLET R2 M0010 BREAKTHROUGH	Total/NA	Air	537 (modified)	37875
140-18337-9	Z-2819,2820 VES INLET R3 M0010 FH	Total/NA	Air	537 (modified)	37874
140-18337-10	Z-2821,2822,2824 VES INLET R3 M0010 BH	Total/NA	Air	537 (modified)	38139
140-18337-11	Z-2823 VES INLET R3 M0010 IMP 1,2&3 COND	Total/NA	Air	537 (modified)	37974
140-18337-12	Z-2825 VES INLET R3 M0010 BREAKTHROUGH	Total/NA	Air	537 (modified)	37875
MB 140-37810/1-B	Method Blank	Total/NA	Air	537 (modified)	37875
MB 140-37839/1-B	Method Blank	Total/NA	Air	537 (modified)	37874
MB 140-37973/1-B	Method Blank	Total/NA	Air	537 (modified)	37974
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37875
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37874
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37974
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37875
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37874
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37974

Cleanup Batch: 38139

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18337-1	Z-2805,2806 VES INLET R1 M0010 FH	Total/NA	Air	Dilution	37874
140-18337-2	Z-2807,2808,2810 VES INLET R1 M0010 BH	Total/NA	Air	Dilution	37875
140-18337-5	Z-2812,2813 VES INLET R2 M0010 FH	Total/NA	Air	Dilution	37874
140-18337-6	Z-2814,2815,2817 VES INLET R2 M0010 BH	Total/NA	Air	Dilution	37875
140-18337-10	Z-2821,2822,2824 VES INLET R3 M0010 BH	Total/NA	Air	Dilution	37875

Client Sample ID: Z-2805,2806 VES INLET R1 M0010 FH
Lab Sample ID: 140-18337-1
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	2820	B	61.9	61.9	ng/Sample		02/25/20 11:00	03/06/20 20:16	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	93		25 - 150	02/25/20 11:00	03/06/20 20:16	1

Client Sample ID: Z-2807,2808,2810 VES INLET R1 M0010 BH
Lab Sample ID: 140-18337-2
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	8980		400	400	ng/Sample		02/24/20 14:45	03/06/20 22:26	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	87		25 - 150	02/24/20 14:45	03/06/20 22:26	1

Client Sample ID: Z-2809 VES INLET R1 M0010 IMP 1,2&3 COND
Lab Sample ID: 140-18337-3
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	533		37.8	37.8	ng/Sample		03/01/20 08:52	03/06/20 18:06	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	89		25 - 150	03/01/20 08:52	03/06/20 18:06	1

Client Sample ID: Z-2811 VES INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-18337-4
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	5.81		1.60	1.60	ng/Sample		02/24/20 14:45	03/06/20 22:35	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	70		25 - 150	02/24/20 14:45	03/06/20 22:35	1

Client Sample ID: Z-2812,2813 VES INLET R2 M0010 FH
Lab Sample ID: 140-18337-5
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3250	B	61.8	61.8	ng/Sample		02/25/20 11:00	03/06/20 20:26	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	90		25 - 150	02/25/20 11:00	03/06/20 20:26	1

Client Sample ID: Z-2812,2813 VES INLET R2 M0010 FH
Lab Sample ID: 140-18337-5
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 PFOA				*02/25/20 11:00*	*03/06/20 20:26*	*1*
13C8 PFOS				*02/25/20 11:00*	*03/06/20 20:26*	*1*

Client Sample ID: Z-2814,2815,2817 VES INLET R2 M0010 BH
Lab Sample ID: 140-18337-6
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**2390**		200	200	ng/Sample		02/24/20 14:45	03/06/20 22:45	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*89*		*25 - 150*	*02/24/20 14:45*	*03/06/20 22:45*	*1*

Client Sample ID: Z-2816 VES INLET R2 M0010 IMP 1,2&3 COND
Lab Sample ID: 140-18337-7
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		36.0	36.0	ng/Sample		03/01/20 08:52	03/06/20 18:16	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*91*		*25 - 150*	*03/01/20 08:52*	*03/06/20 18:16*	*1*

Client Sample ID: Z-2818 VES INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-18337-8
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**4.43**		1.60	1.60	ng/Sample		02/24/20 14:45	03/06/20 22:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*72*		*25 - 150*	*02/24/20 14:45*	*03/06/20 22:54*	*1*

Client Sample ID: Z-2819,2820 VES INLET R3 M0010 FH
Lab Sample ID: 140-18337-9
Date Collected: 02/20/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**1880**	**B**	25.0	25.0	ng/Sample		02/25/20 11:00	03/06/20 20:35	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*77*		*25 - 150*	*02/25/20 11:00*	*03/06/20 20:35*	*50*

Client Sample ID: Z-2821,2822,2824 VES INLET R3 M0010 BH
Lab Sample ID: 140-18337-10

Date Collected: 02/20/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1390		200	200	ng/Sample		02/24/20 14:45	03/06/20 23:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*86*		*25 - 150*	*02/24/20 14:45*	*03/06/20 23:03*	*1*

Client Sample ID: Z-2823 VES INLET R3 M0010 IMP 1,2&3 COND
Lab Sample ID: 140-18337-11

Date Collected: 02/20/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		36.0	36.0	ng/Sample		03/01/20 08:52	03/06/20 18:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*89*		*25 - 150*	*03/01/20 08:52*	*03/06/20 18:25*	*1*

Client Sample ID: Z-2825 VES INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-18337-12

Date Collected: 02/20/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.80		1.60	1.60	ng/Sample		02/24/20 14:45	03/06/20 23:31	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*61*		*25 - 150*	*02/24/20 14:45*	*03/06/20 23:31*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: VES CB Inlet

Job ID: 140-18337-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.500	0.500	ng/Sample
HFPO-DA	1.60	1.60	ng/Sample
HFPO-DA	0.700	0.700	ng/Sample

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ANALYTICAL REPORT

Job Number: 140-18338-1

Job Description: VES CB Outlet

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
3/25/2020 4:49 PM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
03/25/2020

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Qualifiers

LCMS

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

Glossary

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

Method Summary

Client: The Chemours Company FC, LLC
Project/Site: VES CB Outlet

Job ID: 140-18338-1

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: VES CB Outlet

Job ID: 140-18338-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-18338-1	Q-1912,1913 VES CB OUTLET R1 M0010 FH	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-2	Q-1914,1915,1917 VES CB OUTLET R1 M0010 BH	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-3	Q-1916 VES CB OUTLET R1 M0010 IMP 1,2&3 COND	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-4	Q-1918 VES CB OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-5	Q-1919,1920 VES CB OUTLET R2 M0010 FH	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-6	Q-1921,1922,1924 VES CB OUTLET R2 M0010 BH	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-7	Q-1923 VES CB OUTLET R2 M0010 IMP 1,2&3 COND	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-8	Q-1925 VES CB OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	02/19/20 00:00	02/21/20 08:00	
140-18338-9	Q-1926,1927 VES CB OUTLET R3 M0010 FH	Air	02/20/20 00:00	02/21/20 08:00	
140-18338-10	Q-1928,1929,1931 VES CB OUTLET R3 M0010 BH	Air	02/20/20 00:00	02/21/20 08:00	
140-18338-11	Q-1930 VES CB OUTLET R3 M0010 IMP 1,2&3 COND	Air	02/20/20 00:00	02/21/20 08:00	
140-18338-12	Q-1932 VES CB OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	02/20/20 00:00	02/21/20 08:00	

Job Narrative
140-18338-1

Sample Receipt

The samples were received on February 21, 2020 at 8:00 AM in good condition and properly preserved. The temperature of the cooler at receipt was 0.8º C.

LCMS

Method 537 (modified): The listed samples were double spike with IS due to a reformulation of the standard mixes. The IS recovery will be 2x the normal amount.

Q-1912,1913 VES CB OUTLET R1 M0010 FH (140-18338-1), Q-1914,1915,1917 VES CB OUTLET R1 M0010 BH (140-18338-2), Q-1916 VES CB OUTLET R1 M0010 IMP 1,2&3 COND (140-18338-3), Q-1918 VES CB OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-18338-4), Q-1919,1920 VES CB OUTLET R2 M0010 FH (140-18338-5), Q-1923 VES CB OUTLET R2 M0010 IMP 1,2&3 COND (140-18338-7), Q-1926,1927 VES CB OUTLET R3 M0010 FH (140-18338-9), Q-1930 VES CB OUTLET R3 M0010 IMP 1,2&3 COND (140-18338-11), (LCS 140-37810/2-B), (LCS 140-37839/2-B), (LCS 140-37973/2-B), (LCSD 140-37810/3-B), (LCSD 140-37839/3-B), (LCSD 140-37973/3-B), (MB 140-37810/1-B), (MB 140-37839/1-B) and (MB 140-37973/1-B)

Method 537 (modified): The listed samples were double spike with IS due to a reformulation of the standard mixes. The IS recovery will be 2x the normal amount.

Q-1921,1922,1924 VES CB OUTLET R2 M0010 BH (140-18338-6), Q-1925 VES CB OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-18338-8), Q-1928,1929,1931 VES CB OUTLET R3 M0010 BH (140-18338-10) and Q-1932 VES CB OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE (140-18338-12)

Method 537 (modified): The method blank for 37839 contained Perfluoro(2-propoxypropanoic) acid above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank. However, sample 140-18339-A-9-B (Media Check) was reported as a ND for Perfluoro(2-propoxypropanoic) acid.

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.

LCMS

Prep Batch: 37810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-2	Q-1914,1915,1917 VES CB OUTLET R1 M0010	Total/NA	Air	None	
140-18338-4	Q-1918 VES CB OUTLET R1 M0010 BREAKTHF	Total/NA	Air	None	
140-18338-6	Q-1921,1922,1924 VES CB OUTLET R2 M0010	Total/NA	Air	None	
140-18338-8	Q-1925 VES CB OUTLET R2 M0010 BREAKTHF	Total/NA	Air	None	
140-18338-10	Q-1928,1929,1931 VES CB OUTLET R3 M0010	Total/NA	Air	None	
140-18338-12	Q-1932 VES CB OUTLET R3 M0010 BREAKTHF	Total/NA	Air	None	
MB 140-37810/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 37839

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-1	Q-1912,1913 VES CB OUTLET R1 M0010 FH	Total/NA	Air	None	
140-18338-5	Q-1919,1920 VES CB OUTLET R2 M0010 FH	Total/NA	Air	None	
140-18338-9	Q-1926,1927 VES CB OUTLET R3 M0010 FH	Total/NA	Air	None	
MB 140-37839/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 37874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-1	Q-1912,1913 VES CB OUTLET R1 M0010 FH	Total/NA	Air	Split	37839
140-18338-5	Q-1919,1920 VES CB OUTLET R2 M0010 FH	Total/NA	Air	Split	37839
140-18338-9	Q-1926,1927 VES CB OUTLET R3 M0010 FH	Total/NA	Air	Split	37839
MB 140-37839/1-B	Method Blank	Total/NA	Air	Split	37839
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	Split	37839
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37839

Cleanup Batch: 37875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-2	Q-1914,1915,1917 VES CB OUTLET R1 M0010	Total/NA	Air	Split	37810
140-18338-4	Q-1918 VES CB OUTLET R1 M0010 BREAKTHF	Total/NA	Air	Split	37810
140-18338-6	Q-1921,1922,1924 VES CB OUTLET R2 M0010	Total/NA	Air	Split	37810
140-18338-8	Q-1925 VES CB OUTLET R2 M0010 BREAKTHF	Total/NA	Air	Split	37810
140-18338-10	Q-1928,1929,1931 VES CB OUTLET R3 M0010	Total/NA	Air	Split	37810
140-18338-12	Q-1932 VES CB OUTLET R3 M0010 BREAKTHF	Total/NA	Air	Split	37810
MB 140-37810/1-B	Method Blank	Total/NA	Air	Split	37810
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	Split	37810
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37810

Prep Batch: 37973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-3	Q-1916 VES CB OUTLET R1 M0010 IMP 1,2&3	Total/NA	Air	None	
140-18338-7	Q-1923 VES CB OUTLET R2 M0010 IMP 1,2&3	Total/NA	Air	None	
140-18338-11	Q-1930 VES CB OUTLET R3 M0010 IMP 1,2&3	Total/NA	Air	None	
MB 140-37973/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	None	

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: VES CB Outlet

Job ID: 140-18338-1

LCMS

Cleanup Batch: 37974

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-3	Q-1916 VES CB OUTLET R1 M0010 IMP 1,2&3 (	Total/NA	Air	Split	37973
140-18338-7	Q-1923 VES CB OUTLET R2 M0010 IMP 1,2&3 (	Total/NA	Air	Split	37973
140-18338-11	Q-1930 VES CB OUTLET R3 M0010 IMP 1,2&3 (	Total/NA	Air	Split	37973
MB 140-37973/1-B	Method Blank	Total/NA	Air	Split	37973
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	Split	37973
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37973

Analysis Batch: 38138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-1	Q-1912,1913 VES CB OUTLET R1 M0010 FH	Total/NA	Air	537 (modified)	37874
140-18338-2	Q-1914,1915,1917 VES CB OUTLET R1 M0010	Total/NA	Air	537 (modified)	37875
140-18338-3	Q-1916 VES CB OUTLET R1 M0010 IMP 1,2&3 (	Total/NA	Air	537 (modified)	37974
140-18338-4	Q-1918 VES CB OUTLET R1 M0010 BREAKTHF	Total/NA	Air	537 (modified)	37875
140-18338-5	Q-1919,1920 VES CB OUTLET R2 M0010 FH	Total/NA	Air	537 (modified)	37874
140-18338-7	Q-1923 VES CB OUTLET R2 M0010 IMP 1,2&3 (	Total/NA	Air	537 (modified)	37974
140-18338-9	Q-1926,1927 VES CB OUTLET R3 M0010 FH	Total/NA	Air	537 (modified)	37874
140-18338-11	Q-1930 VES CB OUTLET R3 M0010 IMP 1,2&3 (	Total/NA	Air	537 (modified)	37974
MB 140-37810/1-B	Method Blank	Total/NA	Air	537 (modified)	37875
MB 140-37839/1-B	Method Blank	Total/NA	Air	537 (modified)	37874
MB 140-37973/1-B	Method Blank	Total/NA	Air	537 (modified)	37974
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37875
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37874
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37974
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37875
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37874
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37974

Analysis Batch: 38424

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18338-6	Q-1921,1922,1924 VES CB OUTLET R2 M0010	Total/NA	Air	537 (modified)	37875
140-18338-8	Q-1925 VES CB OUTLET R2 M0010 BREAKTHF	Total/NA	Air	537 (modified)	37875
140-18338-10	Q-1928,1929,1931 VES CB OUTLET R3 M0010	Total/NA	Air	537 (modified)	37875
140-18338-12	Q-1932 VES CB OUTLET R3 M0010 BREAKTHF	Total/NA	Air	537 (modified)	37875

Client Sample ID: Q-1912,1913 VES CB OUTLET R1 M0010 FH
Lab Sample ID: 140-18338-1

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1150	B	24.7	24.7	ng/Sample		02/25/20 11:00	03/06/20 20:44	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*82*		*25 - 150*	*02/25/20 11:00*	*03/06/20 20:44*	*50*

Client Sample ID: Q-1914,1915,1917 VES CB OUTLET R1 M0010 BH
Lab Sample ID: 140-18338-2

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	807		8.00	8.00	ng/Sample		02/24/20 14:45	03/06/20 23:40	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*81*		*25 - 150*	*02/24/20 14:45*	*03/06/20 23:40*	*5*

Client Sample ID: Q-1916 VES CB OUTLET R1 M0010 IMP 1,2&3 COND
Lab Sample ID: 140-18338-3

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	49.3		35.2	35.2	ng/Sample		03/01/20 08:52	03/06/20 18:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*91*		*25 - 150*	*03/01/20 08:52*	*03/06/20 18:34*	*1*

Client Sample ID: Q-1918 VES CB OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-18338-4

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	16.7		1.60	1.60	ng/Sample		02/24/20 14:45	03/06/20 23:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*64*		*25 - 150*	*02/24/20 14:45*	*03/06/20 23:50*	*1*

Client Sample ID: Q-1919,1920 VES CB OUTLET R2 M0010 FH
Lab Sample ID: 140-18338-5

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1330	B	5.00	5.00	ng/Sample		02/25/20 11:00	03/06/20 20:53	10

Client Sample ID: Q-1919,1920 VES CB OUTLET R2 M0010 FH
Lab Sample ID: 140-18338-5

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	75		25 - 150	02/25/20 11:00	03/06/20 20:53	10

Client Sample ID: Q-1921,1922,1924 VES CB OUTLET R2 M0010 BH
Lab Sample ID: 140-18338-6

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	582		16.0	16.0	ng/Sample		02/24/20 14:45	03/17/20 16:46	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	84		25 - 150	02/24/20 14:45	03/17/20 16:46	10

Client Sample ID: Q-1923 VES CB OUTLET R2 M0010 IMP 1,2&3 COND
Lab Sample ID: 140-18338-7

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	47.2		34.3	34.3	ng/Sample		03/01/20 08:52	03/06/20 18:43	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	90		25 - 150	03/01/20 08:52	03/06/20 18:43	1

Client Sample ID: Q-1925 VES CB OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-18338-8

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	8.24		1.60	1.60	ng/Sample		02/24/20 14:45	03/17/20 16:56	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	65		25 - 150	02/24/20 14:45	03/17/20 16:56	1

Client Sample ID: Q-1926,1927 VES CB OUTLET R3 M0010 FH
Lab Sample ID: 140-18338-9

Date Collected: 02/20/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1140	B	25.0	25.0	ng/Sample		02/25/20 11:00	03/06/20 21:03	50

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	84		25 - 150	02/25/20 11:00	03/06/20 21:03	50

Client Sample ID: Q-1928,1929,1931 VES CB OUTLET R3 M0010 BH

Lab Sample ID: 140-18338-10

Date Collected: 02/20/20 00:00
Date Received: 02/21/20 08:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	662		15.9	15.9	ng/Sample		02/24/20 14:45	03/17/20 17:05	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*87*		*25 - 150*	*02/24/20 14:45*	*03/17/20 17:05*	*10*

Client Sample ID: Q-1930 VES CB OUTLET R3 M0010 IMP 1,2&3 COND

Lab Sample ID: 140-18338-11

Date Collected: 02/20/20 00:00
Date Received: 02/21/20 08:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	65.3		35.2	35.2	ng/Sample		03/01/20 08:52	03/06/20 18:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*90*		*25 - 150*	*03/01/20 08:52*	*03/06/20 18:53*	*1*

Client Sample ID: Q-1932 VES CB OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-18338-12

Date Collected: 02/20/20 00:00
Date Received: 02/21/20 08:00
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	9.24		1.60	1.60	ng/Sample		02/24/20 14:45	03/17/20 17:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*64*		*25 - 150*	*02/24/20 14:45*	*03/17/20 17:14*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: VES CB Outlet

Job ID: 140-18338-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.500	0.500	ng/Sample
HFPO-DA	1.60	1.60	ng/Sample
HFPO-DA	0.700	0.700	ng/Sample

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ANALYTICAL REPORT

Job Number: 140-18339-1

Job Description: VES Field QC

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
3/24/2020 5:50 PM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
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03/24/2020

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Definitions/Glossary

Client: The Chemours Company FC, LLC
Job ID: 140-18339-1
Project/Site: VES Field QC

Qualifiers

LCMS

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

Glossary

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

Method Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Field QC

Job ID: 140-18339-1

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Field QC

Job ID: 140-18339-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-18339-1	A-5801,5802 VES QC M0010 FH BT	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-2	A-5803,5804,5806 VES QC M0010 BH BT	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-3	A-5805 VES QC M0010 IMP 1,2&3 COND BT	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-4	A-5807 VES QC M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-5	A-5808 VES QC M0010 DI WATER RB	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-6	A-5809 VES QC M0010 MEOH WITH 5% NH4OH RB	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-7	A-5810 VES QC M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-8	A-7004 MEDIA CHECK XAD	Air	02/19/20 00:00	02/21/20 08:00	
140-18339-9	A-7005 MEDIA CHECK FILTER	Air	02/19/20 00:00	02/21/20 08:00	

Job Narrative
140-18339-1

Sample Receipt

The samples were received on February 21, 2020 at 8:00 AM in good condition and properly preserved. The temperature of the cooler at receipt was 0.9º 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.

LCMS

Method 537 (modified): The listed samples were double spike with IS due to a reformulation of the standard mixes. The IS recovery will be 2x the normal amount.

A-5801,5802 VES QC M0010 FH BT (140-18339-1), A-5803,5804,5806 VES QC M0010 BH BT (140-18339-2), A-5805 VES QC M0010 IMP 1,2&3 COND BT (140-18339-3), A-5807 VES QC M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT (140-18339-4), A-5808 VES QC M0010 DI WATER RB (140-18339-5), A-7005 MEDIA CHECK FILTER (140-18339-9), (LCS 140-37810/2-B), (LCS 140-37839/2-B), (LCS 140-37973/2-B), (LCSD 140-37810/3-B), (LCSD 140-37839/3-B), (LCSD 140-37973/3-B), (MB 140-37810/1-B), (MB 140-37810/14-B), (MB 140-37839/1-B) and (MB 140-37973/1-B)

Method 537 (modified): The listed samples were double spike with IS due to a reformulation of the standard mixes. The IS recovery will be 2x the normal amount.

A-5809 VES QC M0010 MEOH WITH 5% NH4OH RB (140-18339-6), A-5810 VES QC M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB (140-18339-7) and A-7004 MEDIA CHECK XAD (140-18339-8)

Method 537 (modified): The method blank for 37839 contained Perfluoro(2-propoxypropanoic) acid above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank. However, sample 140-18339-A-9-B (Media Check) was reported as a ND for Perfluoro(2-propoxypropanoic) acid.

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.

QC Association Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Field QC

Job ID: 140-18339-1

LCMS

Prep Batch: 37810

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-2	A-5803,5804,5806 VES QC M0010 BH BT	Total/NA	Air	None	
140-18339-4	A-5807 VES QC M0010 BREAKTHROUGH XAD	Total/NA	Air	None	
140-18339-6	A-5809 VES QC M0010 MEOH WITH 5% NH4OH	Total/NA	Air	None	
140-18339-7	A-5810 VES QC M0010 COMBINED GLASSWAR	Total/NA	Air	None	
140-18339-8	A-7004 MEDIA CHECK XAD	Total/NA	Air	None	
MB 140-37810/14-B	Method Blank	Total/NA	Air	None	
MB 140-37810/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 37839

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-1	A-5801,5802 VES QC M0010 FH BT	Total/NA	Air	None	
140-18339-9	A-7005 MEDIA CHECK FILTER	Total/NA	Air	None	
MB 140-37839/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 37874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-1	A-5801,5802 VES QC M0010 FH BT	Total/NA	Air	Split	37839
140-18339-9	A-7005 MEDIA CHECK FILTER	Total/NA	Air	Split	37839
MB 140-37839/1-B	Method Blank	Total/NA	Air	Split	37839
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	Split	37839
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37839

Cleanup Batch: 37875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-2	A-5803,5804,5806 VES QC M0010 BH BT	Total/NA	Air	Split	37810
140-18339-4	A-5807 VES QC M0010 BREAKTHROUGH XAD	Total/NA	Air	Split	37810
140-18339-6	A-5809 VES QC M0010 MEOH WITH 5% NH4OH	Total/NA	Air	Split	37810
140-18339-7	A-5810 VES QC M0010 COMBINED GLASSWAR	Total/NA	Air	Split	37810
140-18339-8	A-7004 MEDIA CHECK XAD	Total/NA	Air	Split	37810
MB 140-37810/14-B	Method Blank	Total/NA	Air	Split	37810
MB 140-37810/1-B	Method Blank	Total/NA	Air	Split	37810
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	Split	37810
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37810

Prep Batch: 37973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-3	A-5805 VES QC M0010 IMP 1,2&3 COND BT	Total/NA	Air	None	
140-18339-5	A-5808 VES QC M0010 DI WATER RB	Total/NA	Air	None	
MB 140-37973/1-B	Method Blank	Total/NA	Air	None	
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 37974

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-3	A-5805 VES QC M0010 IMP 1,2&3 COND BT	Total/NA	Air	Split	37973
140-18339-5	A-5808 VES QC M0010 DI WATER RB	Total/NA	Air	Split	37973
MB 140-37973/1-B	Method Blank	Total/NA	Air	Split	37973

LCMS (Continued)

Cleanup Batch: 37974 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	Split	37973
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	Split	37973

Analysis Batch: 38138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-1	A-5801,5802 VES QC M0010 FH BT	Total/NA	Air	537 (modified)	37874
140-18339-2	A-5803,5804,5806 VES QC M0010 BH BT	Total/NA	Air	537 (modified)	37875
140-18339-3	A-5805 VES QC M0010 IMP 1,2&3 COND BT	Total/NA	Air	537 (modified)	37974
140-18339-4	A-5807 VES QC M0010 BREAKTHROUGH XAD	Total/NA	Air	537 (modified)	37875
140-18339-5	A-5808 VES QC M0010 DI WATER RB	Total/NA	Air	537 (modified)	37974
140-18339-9	A-7005 MEDIA CHECK FILTER	Total/NA	Air	537 (modified)	37874
MB 140-37810/14-B	Method Blank	Total/NA	Air	537 (modified)	37875
MB 140-37810/1-B	Method Blank	Total/NA	Air	537 (modified)	37875
MB 140-37839/1-B	Method Blank	Total/NA	Air	537 (modified)	37874
MB 140-37973/1-B	Method Blank	Total/NA	Air	537 (modified)	37974
LCS 140-37810/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37875
LCS 140-37839/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37874
LCS 140-37973/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	37974
LCSD 140-37810/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37875
LCSD 140-37839/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37874
LCSD 140-37973/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	37974

Analysis Batch: 38424

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-18339-6	A-5809 VES QC M0010 MEOH WITH 5% NH4OH	Total/NA	Air	537 (modified)	37875
140-18339-7	A-5810 VES QC M0010 COMBINED GLASSWAR	Total/NA	Air	537 (modified)	37875
140-18339-8	A-7004 MEDIA CHECK XAD	Total/NA	Air	537 (modified)	37875

Client Sample ID: A-5801,5802 VES QC M0010 FH BT
Lab Sample ID: 140-18339-1
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	89.6	B	0.500	0.500	ng/Sample		02/25/20 11:00	03/06/20 21:30	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	76		25 - 150	02/25/20 11:00	03/06/20 21:30	1

Client Sample ID: A-5803,5804,5806 VES QC M0010 BH BT
Lab Sample ID: 140-18339-2
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	133		1.60	1.60	ng/Sample		02/24/20 14:45	03/07/20 00:46	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	62		25 - 150	02/24/20 14:45	03/07/20 00:46	1

Client Sample ID: A-5805 VES QC M0010 IMP 1,2&3 COND BT
Lab Sample ID: 140-18339-3
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.49		0.350	0.350	ng/Sample		03/01/20 08:52	03/06/20 19:02	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	87		25 - 150	03/01/20 08:52	03/06/20 19:02	1

Client Sample ID: A-5807 VES QC M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT
Lab Sample ID: 140-18339-4
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	14.6		1.60	1.60	ng/Sample		02/24/20 14:45	03/07/20 00:55	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	63		25 - 150	02/24/20 14:45	03/07/20 00:55	1

Client Sample ID: A-5808 VES QC M0010 DI WATER RB
Lab Sample ID: 140-18339-5
Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.350	0.350	ng/Sample		03/01/20 08:52	03/06/20 19:30	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	87		25 - 150	03/01/20 08:52	03/06/20 19:30	1

Client Sample ID: A-5809 VES QC M0010 MEOH WITH 5% NH4OH RB
Lab Sample ID: 140-18339-6

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		1.60	1.60	ng/Sample		02/24/20 14:45	03/17/20 17:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*86*		*25 - 150*	*02/24/20 14:45*	*03/17/20 17:24*	*1*

Client Sample ID: A-5810 VES QC M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB
Lab Sample ID: 140-18339-7

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**280**		6.40	6.40	ng/Sample		02/24/20 14:45	03/17/20 17:33	4

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*81*		*25 - 150*	*02/24/20 14:45*	*03/17/20 17:33*	*4*

Client Sample ID: A-7004 MEDIA CHECK XAD
Lab Sample ID: 140-18339-8

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		1.60	1.60	ng/Sample		02/24/20 14:45	03/17/20 17:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*74*		*25 - 150*	*02/24/20 14:45*	*03/17/20 17:42*	*1*

Client Sample ID: A-7005 MEDIA CHECK FILTER
Lab Sample ID: 140-18339-9

Date Collected: 02/19/20 00:00
Matrix: Air
Date Received: 02/21/20 08:00
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.500	0.500	ng/Sample		02/25/20 11:00	03/06/20 21:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*75*		*25 - 150*	*02/25/20 11:00*	*03/06/20 21:40*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Project/Site: VES Field QC

Job ID: 140-18339-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.500	0.500	ng/Sample
HFPO-DA	1.60	1.60	ng/Sample
HFPO-DA	0.700	0.700	ng/Sample

APPENDIX D
SAMPLE CALCULATIONS

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 2/19/2020**
Test Location: VES CBed Inlet | **Test Period: 1020-1218**

1. HFPO Dimer Acid concentration, lbs/dscf.

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

$$Conc1 = \frac{12.34 \times 2.2046 \times 10\text{-}9}{50.529}$$

Conc1 = 5.38E-10

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 = 12.34 / (50.529 x 0.02832)

Conc2 = 8.62

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

$MR1_{(Inlet)}$ = 5.38E-10 x 26255 x 60

$MR1_{(Inlet)}$ = 8.48E-04

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

$MR2_{(Inlet)}$ = 8.48E-04 x 453.59 /3600

$MR2_{(Inlet)}$ = 1.07E-04

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, %

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

$$RE = \frac{(8.48E\text{-}04) - (1.21E\text{-}04)}{8.48E\text{-}04}$$

RE = 85.7

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: 2/19/2020
Test Location: VES-Carbon Bed Inlet	Test Period: 1020-1218

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

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

$$Vm(std) = \frac{17.64 \times 0.9966 \times 49.411 \times \left(30.18 + \frac{0.962}{13.6} \right)}{60.04 + 460} = 50.529$$

Where:

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

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

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

$$Vw(std) = (0.04707 \times 18.0) + (0.04715 \times 10.5) = 1.34$$

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

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

$$bws = \frac{1.34}{1.34 + 50.529} = 0.026$$

Where:

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

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.026 = 0.974

Where:

Md = Mole fraction of dry gas, dimensionless.

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

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

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

MWd = 28.84

Where:

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

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

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

MWs = (28.84 x 0.974) +(18 (1 - 0.974)) = 28.56

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.

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

$$Vs = 85.49 \times 0.84 \times 1.12593 \times \left(\frac{525}{29.77 \times 28.56} \right)^{\wedge}1/2 = 63.5$$

Where:

Vs = Average gas stream velocity, ft/sec.

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

Cp = Pitot tube coefficient, dimensionless.

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

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

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

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

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

$$Qs(act) = 60 \times 63.5 \times 7.07 = 26947$$

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.

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

$$Qs(std) = 17.64 \times 0.974 \times \frac{29.77}{525.0} \times 26947$$

$$Qs(std) = 26255$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 525 \times 50.529}{63.5 \times 96 \times 29.77 \times 0.974 \times (0.160)\text{^}2} = 101.5$$

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: 2/19/2020**
Test Location: VES CBed Outlet | **Test Period: 1020-1218**

1. HFPO Dimer Acid concentration, lbs/dscf.

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

$$Conc1 = \frac{2.02 \times 2.2046 \times 10\text{-}9}{60.575}$$

Conc1 = 7.36E-11

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 = 2.02 / (60.575 x 0.02832)

Conc2 = 1.18

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

$MR1_{(Inlet)}$ = 7.36E-11 x 27398 x 60

$MR1_{(Inlet)}$ = 1.21E-04

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

$MR2_{(Inlet)}$ = 1.21E-04 x 453.59 /3600

$MR2_{(Inlet)}$ = 1.52E-05

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, %

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

$$RE = \frac{(8.48E\text{-}04) - (1.21E\text{-}04)}{8.48E\text{-}04}$$

RE = 85.7

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: 2/19/2020
Test Location: VES-Carbon Bed Outlet	Test Period: 1020-1218

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

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

$$Vm(std) = \frac{17.64 \times 0.9834 \times 59.501 \times \left(30.18 + \frac{1.196}{13.6} \right)}{55.75 + 460} = 60.575$$

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 8.0) + (0.04715 x 15.2) = 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

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

$$bws = \frac{1.09}{1.09 + 60.575} = 0.018$$

Where:

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

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.018 = 0.982

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 0.982) +(18 (1 - 0.982)) = 28.64

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.

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

$$Vs = 85.49 \times 0.84 \times 0.87172 \times \left(\frac{528}{30.38 \times 28.64} \right)^{\wedge}1/2 = 48.7$$

Where:

Vs = Average gas stream velocity, ft/sec.

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

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.

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

$$Qs(act) = 60 \times 48.7 \times 9.39 = 27463$$

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.

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

$$Qs(std) = 17.64 \times 0.982 \times \frac{30.38}{527.6} \times 27463$$

$$Qs(std) = 27398$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 528 \times 60.575}{48.7 \times 96 \times 30.38 \times 0.982 \times (0.200)\text{^}2} = 99.1$$

Where:

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

APPENDIX E
EQUIPMENT CALIBRATION RECORDS

INTERFERENCE CHECK

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

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

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

Chad Walker

INTERFERENCE CHECK

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

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

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

Chad Walker

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:	160-401643970-1
Cylinder Number:	EB0109777	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:	Nov 04, 2019

Expiration Date: Nov 04, 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 %	9.108 %	G1	+/- 0.5% NIST Traceable	11/04/2019
OXYGEN	12.00 %	12.00 %	G1	+/- 0.3% NIST Traceable	11/04/2019
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	120620	CC367413	22.883 % OXYGEN/NITROGEN	+/- 0.2%	May 14, 2026

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA VA5011 T5V6VU9P NDIR CO2	NDIR	Oct 10, 2019
SIEMENS OXYMAT 6 - W5951 - O2	PARAMAGNETIC	Oct 22, 2019

Triad Data Available Upon Request

Signature on file
Approved for Release

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:	E03NI62E15A0224	Reference Number:	160-401596463-1
Cylinder Number:	XC021800B	Cylinder Volume:	157.2 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Sep 16, 2019

Expiration Date: Sep 16, 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	17.00 %	17.29 %	G1	+/- 0.5% NIST Traceable	09/16/2019
OXYGEN	21.00 %	20.99 %	G1	+/- 0.3% NIST Traceable	09/16/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	120101	K021622	17.97 % CARBON DIOXIDE/NITROGEN	+/-0.5%	Jan 11, 2024
NTRM	120620	CC367413	22.883 % OXYGEN/NITROGEN	+/- 0.2%	May 14, 2026

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

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

Calibrator: MDW | Meter Box Number: 31 | Ambient Temp: 72

Date: 22-Jan-20 | Wet Test Meter Number: P-2952 | Temp Reference Source: Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number: 17485128

Baro Press, in Hg (Pb)	30.27

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)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	406.872	70.0	72.00	72.5	13.1	1.0001	1.8961
		411.889		73.00				
		5.017		72.50				
1.0	5.0	412.900	70.0	74.00	74.0	9.6	0.9971	2.0308
		417.940		74.00				
		5.040		74.00				
1.5	10.0	419.945	70.0	74.00	74.5	15.6	0.9914	2.0091
		430.080		75.00				
		10.135		74.50				
2.0	12.0	433.130	70.0	76.00	76.0	16.5	0.9963	2.0752
		445.252		76.00				
		12.122		76.00				
3.0	10.2	446.490	68.0	76.00	76.5	11.2	0.9980	1.9683
		456.800		77.00				
		10.310		76.50				
						Average	0.9966	1.9959

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
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	213	212	212	212	212		212.2	0.0%
932	933	933	933	932	932		932.6	0.0%
1832	1833	1832	1832	1833	1832		1832.4	0.0%

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

2 - Acceptable Temperature Difference less than 1.5 %

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

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN
VES CARBON BED INLET
METER BOX NO. 31
02/19/2020 and 02/20/2020

	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.	60.0	57.6	50.6

$$Tma = Ts + 460$$

$$Tma = 60.04 + 460$$

Tma =	520.04	517.58	510.58

Ps = Absolute meter pressure, inches Hg.			
13.60 = Specific gravity of mercury.			
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	0.96	0.97	0.97
Pb = Barometric Pressure, in Hg.	30.18	30.34	30.38

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

$$Pm = 30.18 + (0.961666666666667 / 13.6)$$

Pm =	30.25	30.41	30.45

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.	49.411	49.895	49.545
Y = Dry gas meter calibration factor (based on full calibration)	0.9966	0.9966	0.9966
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.9959	1.9959	1.9959
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	0.9554	0.9590	0.9618
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 49.41) * SQRT (0.0319 * 520.04 * 29) / (2.00 * 30.25 * 28.84) * 0.96$$

$$Yqa = 1.943 * SQRT 481.091 / 1,741.002 * 0.96$$

Yqa =	0.976	0.965	0.967

Diff = Absolute difference between Yqa and Y	2.07	3.17	2.97

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

$$Diff = ((0.9966 - 0.976) / 0.9966) * 100$$

Average Diff = 2.74

Allowable = 5.0

Environmental Supply Company, Inc.
Quality Source Sampling Systems & Accessories

DRY GAS METER CALIBRATION REPORT
BOX 32

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:

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

708 E. Club Blvd., Durham, North Carolina 27704 www.environsupply.com 919-956-9688 FAX: 919-682-0333

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN
VES CARBON BED OUTLET
METER BOX NO. 32
02/19/2020 and 02/20/2020

	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.	55.8	54.8	48.6

$$Tma = Ts + 460$$

$$Tma = 55.75 + 460$$

Tma =	515.75	514.79	508.58

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	1.20	1.18	1.17
Pb = Barometric Pressure, in Hg.	30.18	30.34	30.38

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

$$Pm = 30.18 + (1.19583333333333 / 13.6)$$

Pm =	30.27	30.43	30.47

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.	59.501	58.777	58.300
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	1.0811	1.0722	1.0707
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 59.50) * SQRT (0.0319 * 515.75 * 29) / (1.72 * 30.27 * 28.84) * 1.08$$

$$Yqa = 1.613 * SQRT\ 477.120 / 1,499.147 * 1.08$$

Yqa =	0.984	0.984	0.984

Diff = Absolute difference between Yqa and Y	0.06	0.06	0.06

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

$$Diff = ((0.9834 - 0.984) / 0.9834) * 100$$

Average Diff = 0.06

Allowable = 5.0

Type S Pitot Tube Inspection Data Form

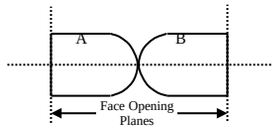
Pitot Tube Identification Number: **P-696**

Inspection Date 1/22/20 Individual Conducting Inspection NG

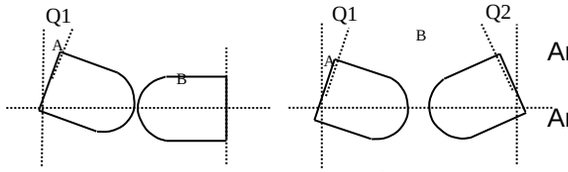
If all Criteria PASS
Cp is equal to 0.84

		PASS/FAIL
Distance to A Plane (PA) - inches	0.46	PASS
Distance to B Plane (PB) - inches	0.46	PASS
Pitot OD (D_t) - inches	0.375	

1.05 D_t < P < 1.5 D_t PA must Equal PB

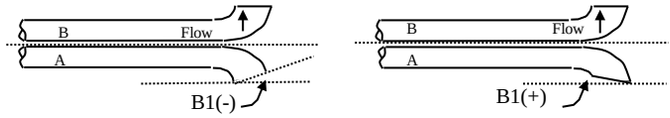


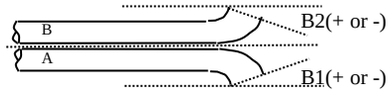
Are Open Faces Aligned Perpendicular to the Tube Axis — (●) YES ( ) NO — PASS



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

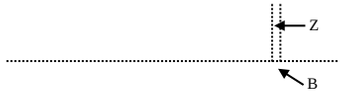
Q1 and Q2 must be ≤ 10°





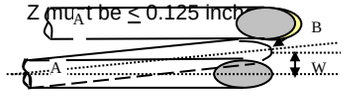
Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

B1 or B2 must be ≤ 5°



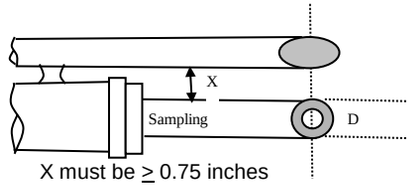
Horizontal offset between A and B Tubes (Z) - inches: 0 — PASS

Z must be ≤ 0.125 inch



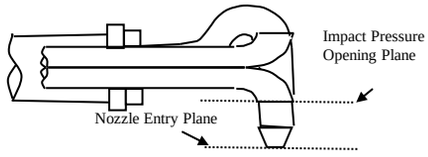
Vertical offset between A and B Tubes (W) - inches: 0.013 — PASS

W must be ≤ 0.03125 inches

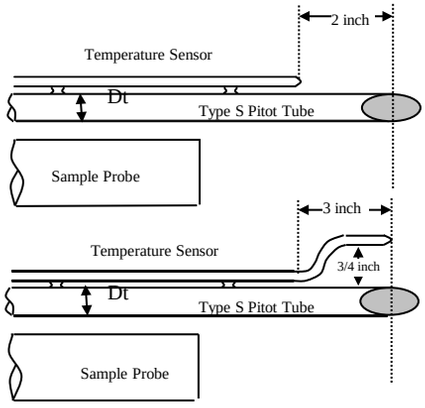


Distance between Sample Nozzle and Pitot (X) - inches: 0.82 — PASS

X must be ≥ 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

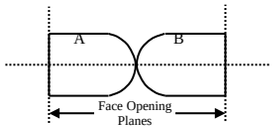
Pitot Tube Identification Number: **P-710**

Inspection Date 2/19/19 Individual Conducting Inspection ks

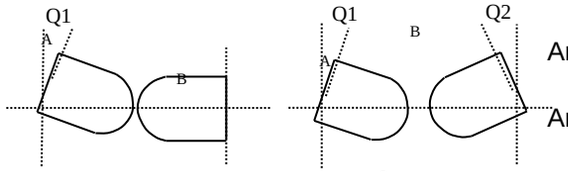
If all Criteria PASS
Cp is equal to 0.84

		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

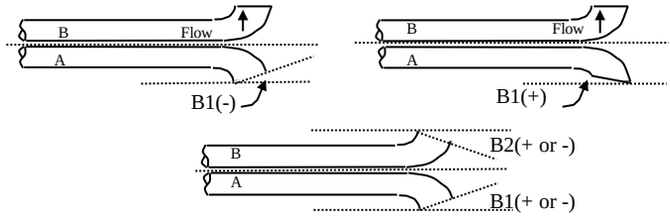


Are Open Faces Aligned Perpendicular to the Tube Axis — ◉ YES ○ NO — PASS



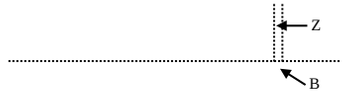
Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	0	PASS

Q1 and Q2 must be ≤ 10°



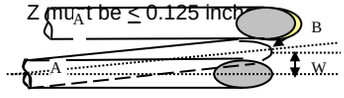
Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

B1 or B2 must be ≤ 5°



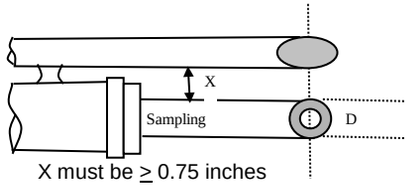
Horizontal offset between A and B Tubes (Z) - inches	0.012	PASS

Z must be ≤ 0.125 inch



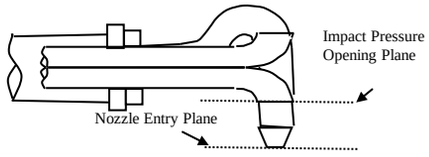
Vertical offset between A and B Tubes (W) - inches	0.022	PASS

W must be ≤ 0.03125 inches

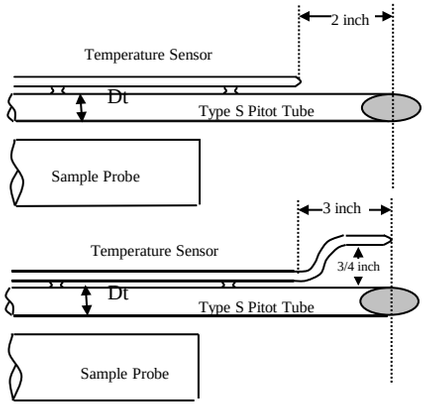


Distance between Sample Nozzle and Pitot (X) - inches	0.87	PASS

X must be ≥ 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

APPENDIX F
LIST OF PROJECT PARTICIPANTS

The following WESTON employees participated in this project.

Paul Meeter	Senior Project Manager
Jack Mills	Team Member
Steve Rathfon	Team Member
Kyle Schweitzer	Team Member
Chris Hartsky	Team Member
Chad Walker	Team Member
Nick Guarino	Team Member