FLUOROMONOMERS
MANUFACTURING PROCESS
VINYL ETHERS NORTH CARBON BED
REMOVAL EFFICIENCY TEST REPORT
TEST DATES: 16 AND 17 JANUARY 2019

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1. INTRODUCTION

1.1 FACILITY AND BACKGROUND INFORMATION

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

Chemours contracted Weston Solutions, Inc. (Weston) to perform HFPO Dimer Acid Fluoride, captured as HFPO Dimer Acid, emission testing on the Vinyl Ethers North (VEN) Carbon Bed at the facility. Testing was performed on 16 and 17 January 2019 and generally followed the "Emission Test Protocol" reviewed and approved by the North Carolina Department of Environmental Quality (NCDEQ). This report provides the results from the emission test program.

1.2 TEST OBJECTIVES

The specific objectives for this test program were as follows:

- Measure the emissions concentrations and mass emissions rates of HFPO Dimer Acid Fluoride from the Carbon Bed inlet and outlet 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 C includes the summary reports for the laboratory analytical results. The full laboratory data packages are provided in electronic format and on CD with each hard copy.

Table 1-1
Sampling Plan for VEN Carbon Bed Testing

Sampling Point & Location	**VE North 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	Carbon Dioxide	Oxygen	Water Content
Sampling or Monitoring Method	EPA M-0010	EPA M1, M2, M3A, and M4 in conjunction with M-0010 tests	EPA M3/3A		EPA M4 in conjunction with M-0010 tests
Sample Extraction/ Analysis Method(s):	LC/MS/MS	NA[6]	NA		NA
Sample Size	≥ 1.5m[3]	NA	NA	NA	NA
Total Number of Samples Collected[1]	6	6	6	6	6
Reagent Blanks (Solvents, Resins)[1]	1 set	0	0	0	0
Field Blank Trains[1]	1 per source	0	0	0	0
Proof Blanks[1]	1 per train	0	0	0	0
Trip Blanks[1,2]	1 set	0	0	0	
Lab Blanks	1 per fraction[3]	0	0	0	0
Laboratory or Batch Control Spike Samples (LCS)	1 per fraction[3]	0	0	0	0
Laboratory or Batch Control Spike Sample Duplicate (LCSD)	1 per fraction[3]	0	0	0	0
Media Blanks	1 set[4]	0	0	0	0
Isotope Dilution Internal Standard Spikes	Each sample	0	0	0	0
Total No. of Samples	10[5]	6	6	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 VEN 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 stack test results. Research conducted in developing the protocol for stack testing HFPO Dimer Acid Fluoride, HFPO Dimer Acid Ammonium Salt and HFPO Dimer Acid realized that the resulting testing, including collection of the air samples and extraction of the various fraction of the sampling train, would result in all three compounds being expressed as simply the HFPO Dimer Acid. However, it should be understood that the total HFPO Dimer Acid results provided on Table 2-1 and in this report include a percentage of each of the three compounds.

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

	Inlet		Outlet		Removal Efficiency
	g/sec	lb/hr	g/sec	lb/hr	%
R1	1.69E-03	1.34E-02	1.27E-04	1.01E-03	92.5
R2	3.03E-03	2.40E-02	1.40E-04	1.11E-03	95.4
R3	2.92E-03	2.32E-02	1.75E-04	1.39E-03	94.0
Average	2.54E-03	2.02E-02	1.47E-04	1.17E-03	93.9

3. PROCESS DESCRIPTIONS

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

3.1 FLUOROMONOMERS

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

Process emissions are vented to the Division waste gas scrubber system (which includes the secondary scrubber) and vents to the Carbon Bed and then to the Division Stack.

The VE North building air systems are vented to the carbon bed and connected to the Tower Exhaust Blower.

3.2 PROCESS OPERATIONS AND PARAMETERS

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

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

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

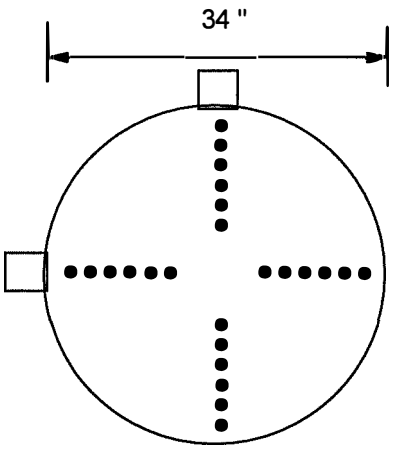
- Fluoromonomers Process
  - VEN Precurser Rate
  - VEN Condensation Rate
  - VEN ABR Rate
  - HFPO

4. DESCRIPTION OF TEST LOCATIONS

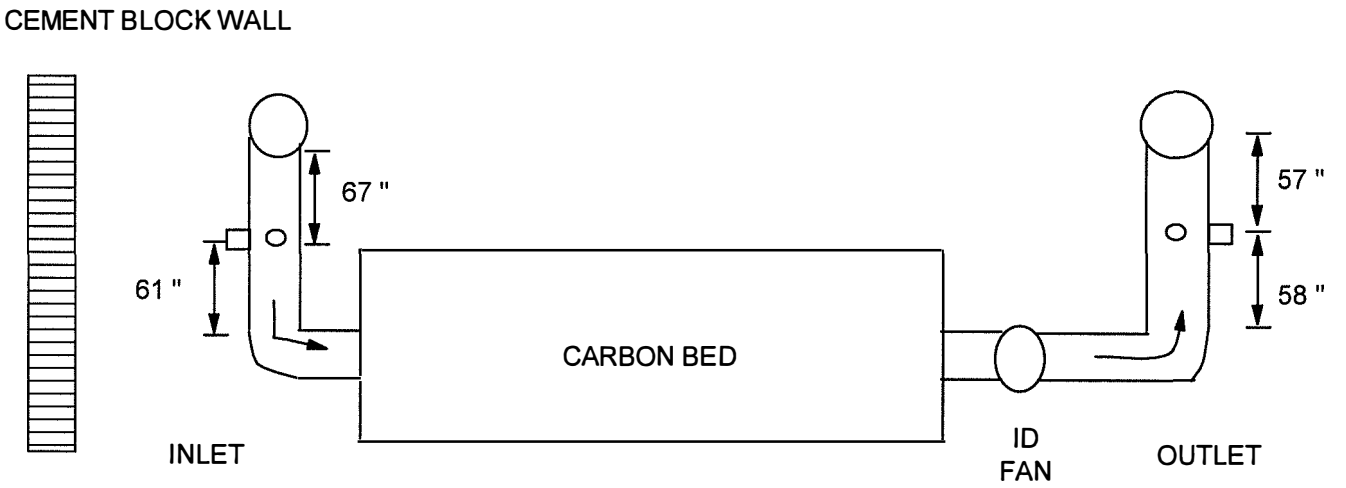
4.1 VINYL ETHERS NORTH CARBON BED INLET AND OUTLET

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

Location	Distance from Flow Disturbance	
	Downstream (B)	Upstream (A)
Carbon Bed Inlet	67 inches > 1.9 duct diameters	61 inches > 1.8 duct diameters
Carbon Bed Outlet	58 inches > 1.7 duct diameters	57 inches > 1.5 duct diameters



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



DRAWING NOT TO SCALE

FIGURE 4-1
VE NORTH PROCESS CARBON BED INLET AND OUTLET SCHEMATIC

IASDATA\CHEMOURS\15418.002.007\FIGURE 4-2 VE NORTH PROCESS SCHEMATIC

5. SAMPLING AND ANALYTICAL METHODS

5.1 STACK GAS SAMPLING PROCEDURES

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

5.1.1 Pre-Test Determinations

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

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

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

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

5.2 STACK PARAMETERS

5.2.1 EPA Method 0010

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

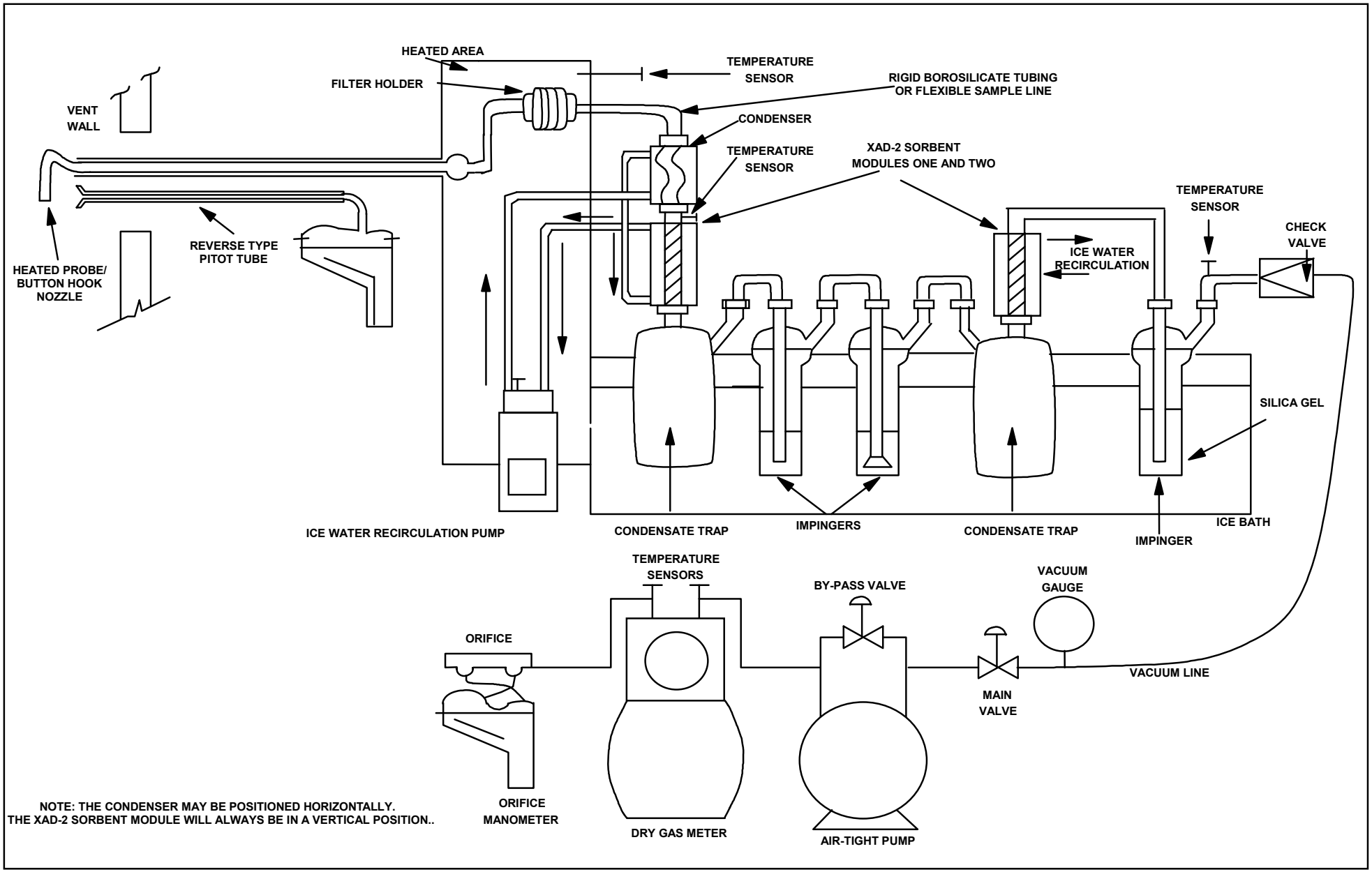


FIGURE 5-1
EPA METHOD 0010 SAMPLING TRAIN

IASDATA\CHEMOURS\15418.002.009\FIGURE 5-1 METHOD 0010

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 milliliters 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 both XAD-2 modules to maintain method-required temperature. A control console with a leakless vacuum pump, a calibrated orifice, and dual inclined manometers was connected to the final impinger via an umbilical cord to complete the sample train.

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

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

5.2.2 EPA Method 0010 Sample Recovery

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

A consistent procedure was employed for sample recovery:

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

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

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

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

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

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

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

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

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

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

During each test campaign, 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 TestAmerica Laboratories, Inc. (TestAmerica) for sample extraction and analysis.

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

5.2.3 EPA Method 0010 – Sample Analysis

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

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

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

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

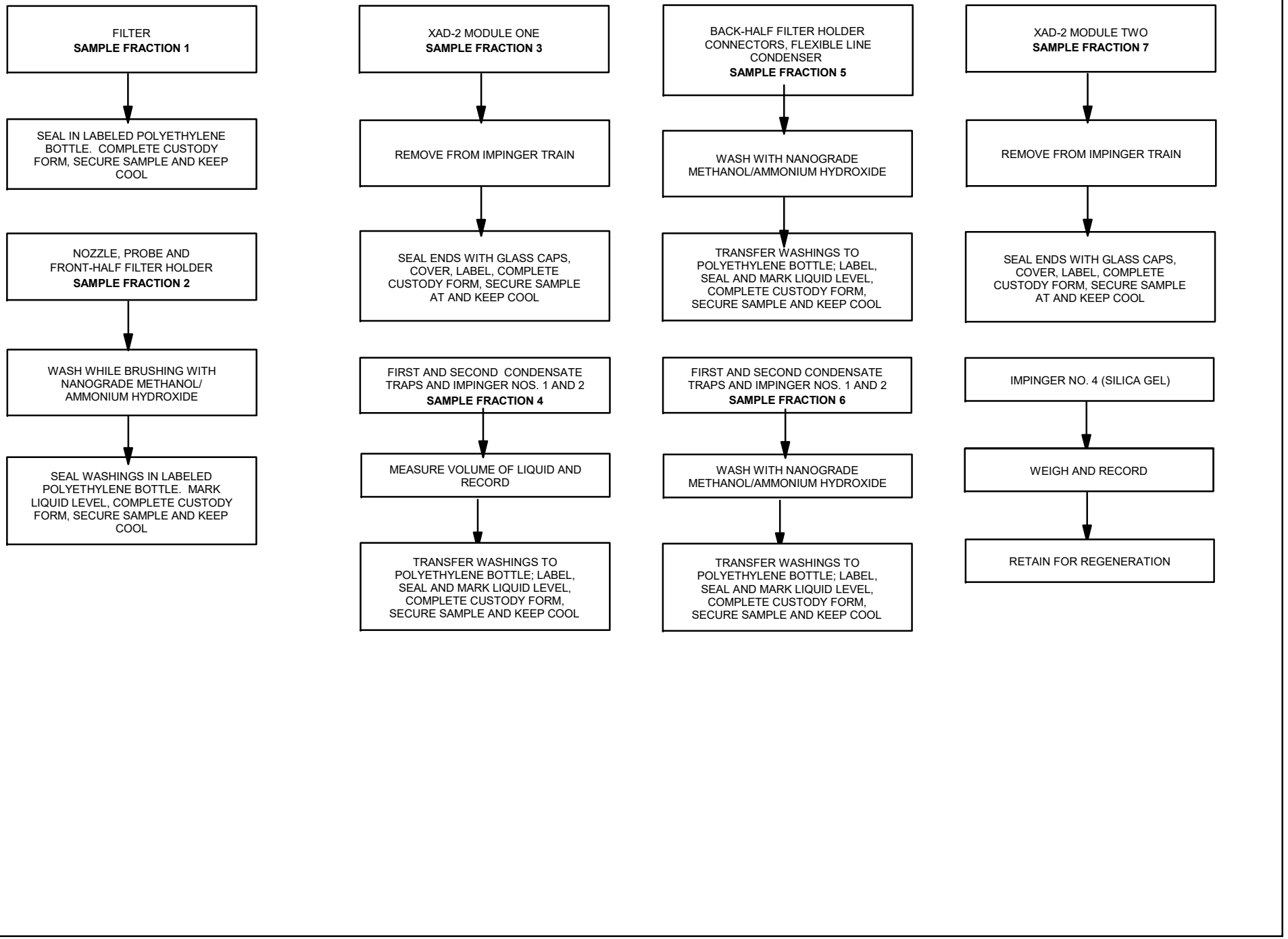


FIGURE 5-2
HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010

IASDATA\CHEMOURS\15418.002.009\FIGURE 5-2 EPA 0010

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

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

5.3 GAS COMPOSITION

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

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

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

The oxygen and carbon dioxide content of each stack gas was measured according to EPA Method 3A procedures which incorporate the latest updates of EPA Method 7E. A Servomex Model 4900 analyzer (or equivalent) was used to measure oxygen content. A Servomex Model 4900 analyzer (or equivalent) was used to measure carbon dioxide content of the stack gas. Both

analyzers were calibrated with EPA Protocol gases prior to the start of the test program and performance was verified by sample bias checks before and after each test run.

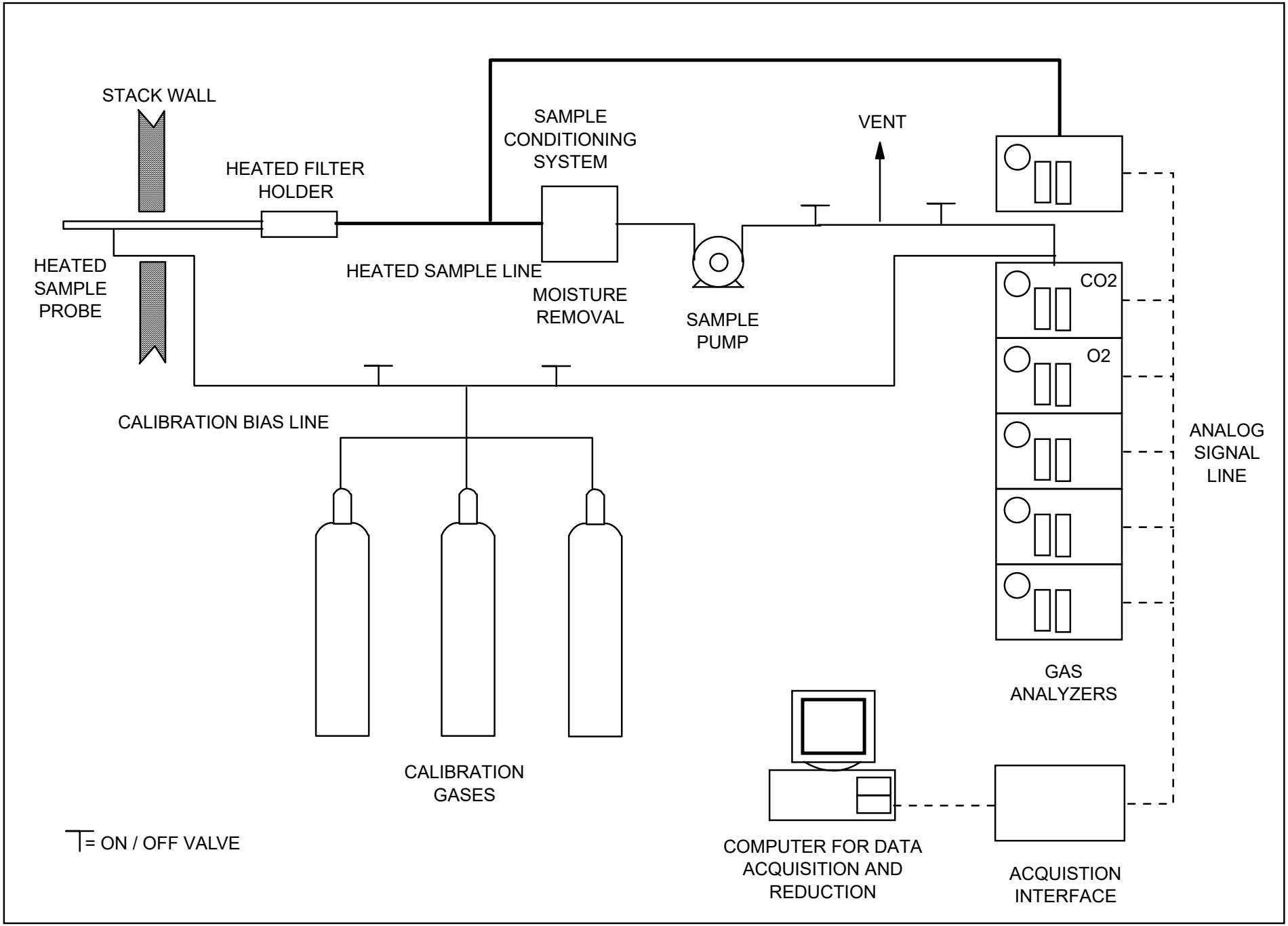


FIGURE 5-3
WESTON SAMPLING SYSTEM

IASDATA\CHEMOURS\15418.002.009\FIGURE 5-3 WESTON SAMPLING SYSTEM

6. DETAILED TEST RESULTS AND DISCUSSION

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

Tables 6-1 and 6-2 provide detailed test data and test results for the Carbon Bed inlet and the Carbon Bed outlet, respectively.

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

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

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

Test Data			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	1/16/2019	1/16/2019	1/17/2019
Time period	0941-1140	1312-1513	0842-1035
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.218	0.216	0.216
Cross sectional nozzle area, sq.ft.	0.000259	0.000254	0.000254
Barometric pressure, in. Hg	30.20	30.16	30.18
Avg. orifice press. diff., in H_2O	1.78	1.76	1.79
Avg. dry gas meter temp., deg F	46.3	55.6	42.7
Avg. abs. dry gas meter temp., deg. R	506	516	503
Total liquid collected by train, ml	16.8	23.0	16.6
Std. vol. of H_2O vapor coll., cu.ft.	0.8	1.1	0.8
Dry gas meter calibration factor	0.9852	0.9852	0.9852
Sample vol. at meter cond., dcf	56.817	59.460	56.171
Sample vol. at std. cond., dscf [1]	59.149	60.708	58.861
Percent of isokinetic sampling	92.5	98.2	93.1
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.	0.013	0.018	0.013
Mole fraction of dry gas	0.987	0.982	0.987
Molecular wt. of wet gas, lb/lb mole	28.69	28.65	28.69
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-6.30	-6.20	-6.20
Absolute pressure, in. Hg	29.74	29.70	29.72
Avg. temperature, deg. F	69	77	66
Avg. absolute temperature, deg.R	529	537	526
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	43.8	44.0	43.8
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	16571	16651	16575
Avg. gas stream volumetric flow, dscf/min.	16202	15961	16320

[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
CARBON BED INLET

TEST DATA			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	1/16/2019	1/16/2019	1/17/2019
Time period	0941-1140	1312-1513	0842-1035
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	369.6120	691.4000	631.4090
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	220.63	402.11	378.74
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	1.38E-08	2.51E-08	2.36E-08
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	1.34E-02	2.40E-02	2.32E-02
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.69E-03	3.03E-03	2.92E-03

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

Test Data			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	1/16/2019	1/16/2019	1/17/2019
Time period	0941-1140	1312-1513	0842-1035
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.215	0.215	0.215
Cross sectional nozzle area, sq.ft.	0.000252	0.000252	0.000252
Barometric pressure, in. Hg	30.20	30.16	30.18
Avg. orifice press. diff., in H_2O	1.54	1.55	1.53
Avg. dry gas meter temp., deg F	49.8	61.2	45.8
Avg. abs. dry gas meter temp., deg. R	510	521	506
Total liquid collected by train, ml	16.1	22.4	15.2
Std. vol. of H_2O vapor coll., cu.ft.	0.8	1.1	0.7
Dry gas meter calibration factor	0.9916	0.9916	0.9916
Sample vol. at meter cond., dcf	60.326	61.169	59.984
Sample vol. at std. cond., dscf [1]	62.739	62.147	62.834
Percent of isokinetic sampling	98.4	98.5	96.9
GAS STREAM COMPOSITION DATA:			
CO_2, % by volume, dry basis	0.0	0.0	0.0
O_2, % by volume, dry basis	20.9	20.9	20.9
N_2, % by volume, dry basis	79.1	79.1	79.1
Molecular wt. of dry gas, lb/lb mole	28.84	28.84	28.84
H_20 vapor in gas stream, prop. by vol.	0.012	0.017	0.011
Mole fraction of dry gas	0.988	0.983	0.989
Molecular wt. of wet gas, lb/lb mole	28.71	28.65	28.71
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	3.50	3.50	3.50
Absolute pressure, in. Hg	30.46	30.42	30.44
Avg. temperature, deg. F	77	82	76
Avg. absolute temperature, deg.R	537	542	536
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	44.4	44.6	45.1
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	16801	16890	17063
Avg. gas stream volumetric flow, dscf/min.	16607	16437	16891

[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
CARBON BED OUTLET

TEST DATA			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	1/16/2019	1/16/2019	1/17/2019
Time period	0941-1140	1312-1513	0842-1035
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	28.9300	31.6970	39.0000
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	16.28	18.01	21.91
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	1.02E-09	1.12E-09	1.37E-09
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	1.01E-03	1.11E-03	1.39E-03
HFPO Dimer Acid (From Inlet Data)	1.34E-02	2.40E-02	2.32E-02
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.27E-04	1.40E-04	1.75E-04
Carbon Bed Removal Efficiency, %	92.5	95.4	94.0

APPENDIX A
PROCESS OPERATIONS DATA

Date **1/16/2019**

Time	800	900	1000	1100	1200	1300	1400	1500	1600
Stack Testing			RUN 1 941-1140			RUN 2 - 1312-1513			
HFPO									
VEN Product	PSEPVE								
VEN Precursor									
VEN Condensation (HFPO)									
VEN ABR									
VEN Refining									
Stripper Column Vent									
Division WGS Recirculation Flow	14000 kg/h								
Division WGS Inlet Flow	80 kg/h	107 kg/h							

Date **1/17/2019**

Time	800	900	1000	1100
Stack Testing		0842-1035 (Run 3)		
HFPO				
VEN Product	PSEPVE			
VEN Precursor				
VEN Condensation (HFPO)				
VEN ABR				
VEN Refining	Batch			
Stripper Column Vent				
Division WGS Recirculation Flow	14000 kg/h			
Division WGS Inlet Flow	100 kg/h			

APPENDIX B
RAW AND REDUCED TEST DATA

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

Test Data			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	1/16/2019	1/16/2019	1/17/2019
Time period	0941-1140	1312-1513	0842-1035
Operator	JM	JM	JM
Inputs For Calcs.			
Sq. rt. delta P	0.77436	0.77150	0.77725
Delta H	1.7758	1.7633	1.7888
Stack temp. (deg.F)	69.4	77.0	65.5
Meter temp. (deg.F)	46.3	55.6	42.7
Sample volume (act.)	56.817	59.460	56.171
Barometric press. (in.Hg)	30.20	30.16	30.18
Volume H_2O imp. (ml)	2.0	4.0	2.0
Weight change sil. gel (g)	14.8	19.0	14.6
% 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.)	6.305	6.305	6.305
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	-6.30	-6.20	-6.20
Nozzle dia. (in.)	0.218	0.216	0.216
Meter box cal.	0.9852	0.9852	0.9852
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

INLET

Sample and Velocity Traverse Point Data Sheet - Method 1

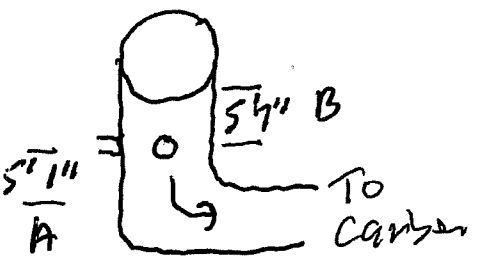
Client Chemours
Location/Plant Fayetteville NC
Source VE North Carbon Inlet
Operator AS
Date 6-13-18
W.O. Number

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

Distance from far wall to outside of port (in.) = C	54 5/4"
Port Depth (in.) = D	20 5/8"
Depth of Duct, diameter (in.) = C-D	34"
Area of Duct (ft²)	6.305
Total Traverse Points	24
Total Traverse Points per Port	12
Port Diameter (in.) ---(Flange-Threaded-Hole)	
Monorail Length	
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	
Equivalent Diameter = (2*L*W)/(L+W)	

Flow Disturbances	
Upstream - A (ft)	5' 7"
Downstream - B (ft)	5' 1"
Upstream - A (duct diameters)	1.97
Downstream - B (duct diameters)	1.80

Diagram of Stack



Traverse Point Locations

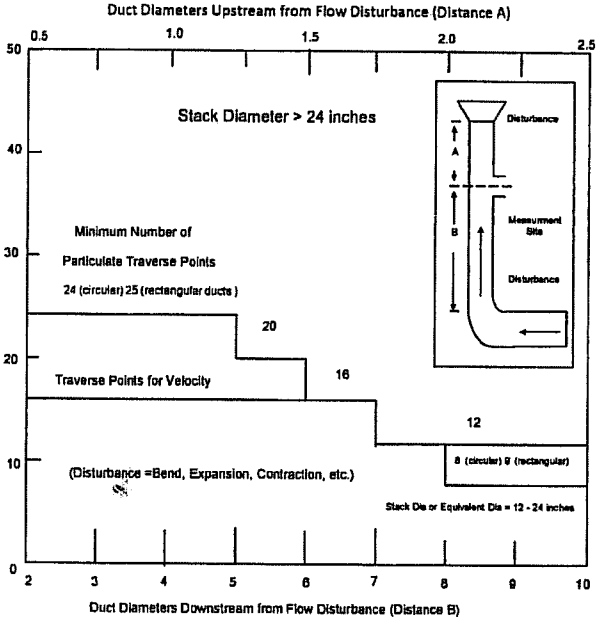
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	.021	3/4	21 3/8
2	.065	2 1/4	22 7/8
3	.118	4	24 5/8
4	.177	6	26 5/8
5	.250	8 1/2	29 1/8
6	.338	12 1/8	32 3/4
7	.644	21 7/8	42 1/2
8	.750	25 1/2	46 1/8
9	.823	28	48 5/8
10	.882	30	50 5/8
11	.933	31 3/4	52 3/8
12	.979	33 1/4	53 7/8

3/8
3/4

CEM 3 Point(Long Measurment Line) Stratificaton Point Locations

1	0.167		
2	0.50		
3	0.833		

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



Traverse Point Location Percent of Stack -Circular

Traverse Point 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

WESTON MANAGERS DESIGNERS/CONSULTANTS

ISOKINETIC FIELD DATA SHEET

Method 0010 HFPO Dimer Acid

Client	Chemours	**Stack Conditions**	Assumed	Actual	Meter Box ID	WC 23
W.O.#	15418.002.009.0001				Meter Box Y	0.9852 ✓
Project ID	Chemours	% Moisture	2		Meter Box Del H	2.3537
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		2	Probe ID / Length	5'
Samp. Loc. ID	IN	Silica gel (g)		14.8	Probe Material	Boro
Run No.ID	1	CO2, % by Vol	0 ✓	0	Pitot / Thermocouple ID	P711
Test Method ID	M 0010 HFPO Dimer Acid	O2, % by Vol	20.9 ✓	20.9	Pitot Coefficient	0.84 ✓
Date ID	9JAN2019	Temperature (°F)	68		Nozzle ID	✓ 0.218
Source/Location	Carbon Bed , Inlet ✓	Meter Temp (°F)	45		Avg Nozzle Dia (in)	0.218 / 0.217 / 0.218
Sample Date	01/16/19 ✓	Static Press (in H_2O)	-6.5	-6.3 ✓	Area of Stack (ft²)	6.305 ✓
Baro. Press (in Hg)	30.20 ✓				Sample Time	96 ✓
Operator	Mills ✓	Ambient Temp (°F)	46		Total Traverse Pts	24 ✓

K Factor 2.95

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft³)	0.002	0.002	0.002
Leak Check @ (in Hg)	15	8	6
Pitot good	(yes) / no	yes / no	(yes) / no
Orsat good	~~yes / no~~ NA	~~yes / no~~	~~yes / no~~

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp	35	48
Reference Temp	32	48
Pass/Fail (+/- 2°)	(Pass) / Fail	(Pass) / Fail
Temp Change Response	(yes) / no	(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD INLET °F	COMMENTS
	0	0941			237.057									
1	4		0.75	2.21	239.7	65	NA	40	108	107	39	5	35	
X 2	8		0.78	2.30	242.3	66		39	108	107	39	5	34	
3	12		0.74	2.18	245.0	66		40	108	106	38	5	34	
4	16		0.69	2.03	247.4	67		42	108	110	38	5	33	
5	20		0.64	1.90	249.9	67		42	108	110	39	5	34	
6	24		0.58	1.71	252.3	68		44	108	107	39	4	34	
7	28		0.58	1.71	254.5	68		44	108	107	38	4	34	
8	32		0.54	1.59	256.7	67		45	108	109	40	4	34	✓
9	36		0.56	1.65	258.9	69		47	108	109	41	4	34	28,250
10	40		0.54	1.59	261.1	67		46	108	107	38	4	34	
11	44		0.48	1.42	263.2	69		46	108	107	40	4	35	
12	48	1029	0.48	1.42	265.307	68		46	108	108	40	4	35	
	0		—	—	265.493	—		—	—	—	—	—	—	
1	4	1052	0.59	1.74	267.9	71		48	108	109	44	4	38	
Y 2	8		0.57	1.68	270.4	71		48	108	108	42	4	37	
3	12		0.56	1.65	272.6	71		48	108	108	41	4	36	
4	16		0.53	1.56	274.7	71		49	108	109	41	3.5	35	
5	20		0.53	1.56	277.0	71		49	108	108	42	3.5	35	
6	24		0.55	1.62	279.2	72		49	108	107	43	3.5	35	
7	28		0.63	1.86	281.7	72		49	108	108	43	4	35	
8	32		0.66	1.95	284.2	72		50	108	109	43	4	35	✓
9	36		0.65	1.92	286.7	72		50	108	108	44	4	36	28.567
10	40		0.63	1.86	289.1	72		50	108	108	44	4	36	
11	44		0.61	1.80	291.7	72		50	108	108	45	4	36	
12	48	1140	0.58	1.71	294.060	72		51	108	109	45	4	36	
			Avg Sqrt Delta P 0.774362 ✓	Avg Delta H 1.77583 ✓	Total Volume 56.817 ✓	Avg Ts 69.42 ✓	Avg Tm 46.33 ✓		Min/Max 108/108	Min/Max 106/110	Max Temp 45	Max Vac 5	Max Temp 38	
			Avg = 0.602083	Avg Sqrt Del H 1.32989 ✓	Comments:									

WESTON SOLUTIONS

I = 92.6 ✓
Qs = 16203 ✓
Ws = 59.186
M = 1.32

X → 0Y XTP

ISOKINETIC FIELD DATA SHEET

Method 0010 HFPO Dimer Acid

Page 1 of 1

		Stack Conditions	Assumed	Actual			Leak Checks	Initial	Mid-Point	Final
Client	Chemours				Meter Box ID	WC 23				
W.O.#	15418.002.009.0001				Meter Box Y	0.9852 ✓				
Project ID	Chemours	% Moisture	2		Meter Box Del H	2.3534	Sample Train (ft^3)	0.002	0.008	0.002
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		4	Probe ID / Length	6'	Leak Check @ (in Hg)	15	10	9
Samp. Loc. ID	IN	Silica gel (g)		19	Probe Material	Borp	Pitot good	yes / no	yes / no	yes / no
Run No.ID	2	CO2, % by Vol	0 ✓	0	Pitot / Thermocouple ID	P11	Orsat good	~~yes / no~~	~~yes / no~~	~~yes / no~~
Test Method ID	M 0010 HFPO Dimer Acid	O2, % by Vol	20.9 ✓	20.9	Pitot Coefficient	0.84 ✓	**Temp Check**	NA		
Date ID	9JAN2019	Temperature (°F)	70		Nozzle ID	0.216		Pre-Test Set		Post-Test Set
Source/Location	Carbon Bed Inlet ✓	Meter Temp (°F)	55		Avg Nozzle Dia (in)	✓ 0.215/0.217/0.216	Meter Box Temp	51		53
Sample Date	01/16/19 ✓	Static Press (in H_2O)	-6.3	-6.2 ✓	Area of Stack (ft^2)	6.305 ✓	Reference Temp	52		56
Baro. Press (in Hg)	30.16 ✓				Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail		~~Pass~~ / Fail
Operator	Mills ✓	Ambient Temp (°F)	53		Total Traverse Pts	24 ✓	Temp Change Response	yes / no		yes / no

K Factor 2.95

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 INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD Inlet Temp	COMMENTS
	0	1312			294.358									
X 1	4		0.76	2.24	297.3	75	NA	53	108	109	52	6	51	
2	8		0.77	2.27	300.3	76		54	108	108	52	6	53	
3	12		0.74	2.19	302.8	76		54	108	108	54	6	50	
4	16		0.68	2.00	305.6	76		54	108	108	53	6	42	
5	20		0.63	1.86	308.0	76		54	108	110	56	5	37	
6	24		0.58	1.71	310.5	76		54	108	109	60	5	36	29.900
7	28		0.56	1.65	313.0	76		55	108	107	56	5	36	
8	32		0.53	1.56	315.2	76		55	108	107	54	5	35	
9	36		0.56	1.65	317.6	77		55	108	107	51	5	36	
10	40		0.53	1.56	320.0	77		55	108	108	50	5	35	
11	44	0.48	~~0.55~~	~~1.62~~	322.1	76		55	108	107	48	5	36	
12	48	1400	0.46	1.36	324.258	77		55	108	109	51	4	37	
	0	1405	—	—	324.415	—		—	—	—	—	—	—	
Y 1	4		0.60	~~1.77~~ 1.93	326.9	78		56	108	111	51	5	42	
2	8		0.58	1.71	329.4	77		55	108	108	45	5	38	
3	12		0.55	1.62	331.7	78		56	108	110	47	5	40	
4	16		0.53	1.56	334.1	78		55	108	106	46	5	38	
5	20		0.51	1.50	336.3	77		56	108	108	48	5	37	
6	24		0.54	1.59	338.7	79		57	108	109	46	5	38	
7	28		0.65	1.92	341.3	78		57	108	109	49	5	38	
8	32		0.66	1.95	343.9	79		58	108	104	49	5	38	
9	36		0.66	1.95	346.6	78		57	109	107	50	5	39	
10	40		0.62	1.83	349.2	79		57	109	108	50	5	41	29.56
11	44		0.59	1.74	351.6	77		58	108	108	50	5	42	
12	48	1513	0.58	1.71	353.975	77		59	108	108	51	5	40	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts		Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			0.77507 ✓	1.76733 ✓	~~59.500~~	77.04 ✓		55.58 ✓	108/109	104/111	60	6	53	
			AVG=0.579917 ✓	Avg Sqrt Del H 1.32489 ✓	Comments: 59.460 ✓									

WESTON SOLUTIONS

$T = 98.2$ ✓
$Qs = 1596$ ✓
$M = 1.75$
V_m 100.75

ISOKINETIC FIELD DATA SHEET

Method 0010 HFPO Dimer Acid

		Stack Conditions	Assumed	Actual			Leak Checks	Initial	Mid-Point	Final
Client	Chemours				Meter Box ID	WC23				
W.O.#	15418.002.009.0001				Meter Box Y	0.9852				
Project ID	Chemours	% Moisture	2		Meter Box Del H	2.3554	Sample Train (ft^3)	0.006	0.002	0.002
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		216	Probe ID / Length	5'	Leak Check @ (in Hg)	15	8	9
Samp. Loc. ID	IN	Silica gel (g)		14	Probe Material	Boro	Pitot good	yes / no	yes / no	yes / no
Run No.ID	3	CO2, % by Vol	0 ✓	0	Pitot / Thermocouple ID	P711	Orsat good	yes / no	yes / no	yes / no
Test Method ID	M 0010 HFPO Dimer Acid	O2, % by Vol	20.9 ✓	20.9	Pitot Coefficient	0.84 ✓		NA		
Date ID	9JAN2019	Temperature (°F)	65		Nozzle ID	0.2166	**Temp Check**	Pre-Test Set		Post-Test Set
Source/Location	Carbon Bed Inlet ✓	Meter Temp (°F)	45		Avg Nozzle Dia (in)	0.215 / 0.217 / 0.216 ✓	Meter Box Temp	37		46
Sample Date	01/17/19 ✓	Static Press (in H_2O)	-6.2	-6.2 ✓	Area of Stack (ft^2)	6.365 ✓	Reference Temp	38		46
Baro. Press (in Hg)	30.18 ✓				Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	Mills ✓	Ambient Temp (°F)			Total Traverse Pts	24 ✓	Temp Change Response	yes / no		yes / no

K Factor 2.95

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 INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD Inlet Temp °F	COMMENTS
	0	0842			354.192									
X 1	4		0.75	2.21	356.7	64	NA	38	108	108	35	6	35	
2	8		0.76	2.24	359.4	64		39	108	110	35	6	35	
3	12		0.75	2.21	362.0	64		39	108	107	38	6	34	
4	16		0.71	2.09	364.6	65		39	108	108	38	6	34	
5	20		0.68	2.00	367.0	65		40	108	107	38	6	34	
6	24		0.61	1.80	369.4	65		40	108	108	38	5.5	33	
7	28		0.56	1.65	371.7	65		40	108	109	37	5	34	
8	32		0.56	1.65	373.8	65		40	107	107	37	5	36	
9	36		0.53	1.56	376.0	65		41	108	108	37	5	36	
10	40		0.52	1.53	378.1	65		41	108	109	37	5	35	
11	44		0.48	1.42	380.2	65		42	108	109	37	5	35	27,996
12	48	0930	0.47	1.39	382.158	65		42	108	109	37	4.5	34	
	0	0947	—	—	382.288	—		—	—	—	—	—	—	
Y 1	4		0.60	1.77	384.6	64		43	107	110	38	5	36	
2	8		0.56	1.65	386.9	66		43	108	109	37	5	34	
3	12		0.55	1.62	389.1	66		44	108	109	36	5	34	
4	16		0.53	1.56	391.3	66		44	108	107	38	5	34	
5	20		0.51	1.50	393.5	65		46	108	109	38	5	35	
6	24		0.55	1.62	395.7	64		45	108	109	37	5	35	
7	28		0.68	2.00	398.4	66		45	108	108	38	5.5	35	
8	32		0.68	2.00	400.8	68		47	108	108	38	5.5	36	
9	36		0.68	2.00	403.4	68		46	108	108	40	5.5	36	
10	40		0.64	1.89	405.6	68		47	108	108	41	5.5	37	28,175
11	44		0.61	1.80	408.5	68		47	108	110	41	5	37	
12	48	1035	0.60	1.77	410.463	67		47	106	108	42	5	37	
			Avg Sqrt Delta P ✓ 0.777253	Avg Delta H ✓ 1.78875	Total Volume ✓ 56.171	Avg Ts ✓ 65.54	Avg Tm ✓ 42.71		Min/Max 107/108	Min/Max 107/110	Max Temp 42	Max Vac 6	Max Temp 37	

WESTON SOLUTIONS

Avg Sqrt Del H ✓ 1.33419

Comments:

04

SAMPLE RECOVERY FIELD DATA

Method 0010 HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.009.0001
Location/Plant	Fayetteville, NC	Source & Location	Carbon Bed Inlet

Run No. 1 Sample Date 1/16/19 Recovery Date 1/16/19

Sample I.D. Chemours - Carbon Bed - IN - 1 - M 0010 HFPO Dimer / Analyst WF Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	H_2O	H_2O	Empty					SG	
Final	0	98	104	0					314.8	
Initial	0	100	100	0					300	
Gain	0	-2	4	0				2.0	14.8	

Impinger Color clear Labeled? ✓ ✓ ✓

Silica Gel Condition 95% Blue Sealed? ✓

Run No. 2 Sample Date 1/16/19 Recovery Date 1/16/19

Sample I.D. Chemours - Carbon Bed - IN - 2 - M 0010 HFPO Dimer / Analyst SR Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents									SG	
Final	0	98	106	0				204	319.0	
Initial	0	100	100	0				200	300	
Gain	0	-2	6	0				4	19.0	

Impinger Color clear Labeled? ✓ ✓ ✓

Silica Gel Condition 95% Blue Sealed? ✓

Run No. 3 Sample Date 1/~~15~~ 17/19 Recovery Date 1/~~15~~ 17/19

Sample I.D. Chemours - Carbon Bed - IN - 3 - M 0010 HFPO Dimer / Analyst SR Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents									SG	
Final	0	100	102	0				202	314.6	
Initial	0	100	100	0				200	300.0	
Gain	0	0	2	0				2	14.6	

Impinger Color Clear Labeled? ✓ ✓ ✓

Silica Gel Condition 95% Blue Sealed? ✓

Check COC for Sample IDs of Media Blanks

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

Test Data			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	1/16/2019	1/16/2019	1/17/2019
Time period	0941-1140	1312-1513	0842-1035
Operator	KA/AS	KA/AS	KA/AS
Inputs For Calcs.			
Sq. rt. delta P	0.78910	0.78832	0.80182
Delta H	1.5358	1.5463	1.5263
Stack temp. (deg.F)	77.0	82.1	76.3
Meter temp. (deg.F)	49.8	61.2	45.8
Sample volume (act.)	60.326	61.169	59.984
Barometric press. (in.Hg)	30.20	30.16	30.18
Volume H_2O imp. (ml)	2.0	2.0	1.0
Weight change sil. gel (g)	14.1	20.4	14.2
% CO_2	0.0	0.0	0.0
% O_2	20.9	20.9	20.9
% N_2	79.1	79.1	79.1
Area of stack (sq.ft.)	6.305	6.305	6.305
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	3.50	3.50	3.50
Nozzle dia. (in.)	0.215	0.215	0.215
Meter box cal.	0.9916	0.9916	0.9916
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

OUTLET

Sample and Velocity Traverse Point Data Sheet - Method 1

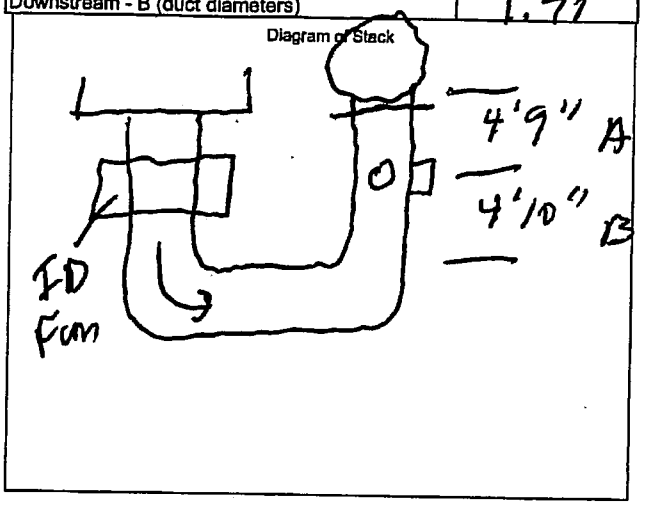
Client: Chemours
Location/Plant: Fayetteville NC
Source: WE North Carbon Outlet
Operator: NS
Date: 6/13/18
W.O. Number:

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

Distance from far wall to outside of port (in.) = C	54 5/8
Port Depth (in.) = D	20 7/8
Depth of Duct, diameter (in.) = C-D	34
Area of Duct (ft²)	6.305
Total Traverse Points	24
Total Traverse Points per Port	12
Port Diameter (in.) ---(Flange-Threaded-Hole)	
Monorail Length	
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	
Equivalent Diameter = (2*L*W)/(L+W)	

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

Diagram of Stack



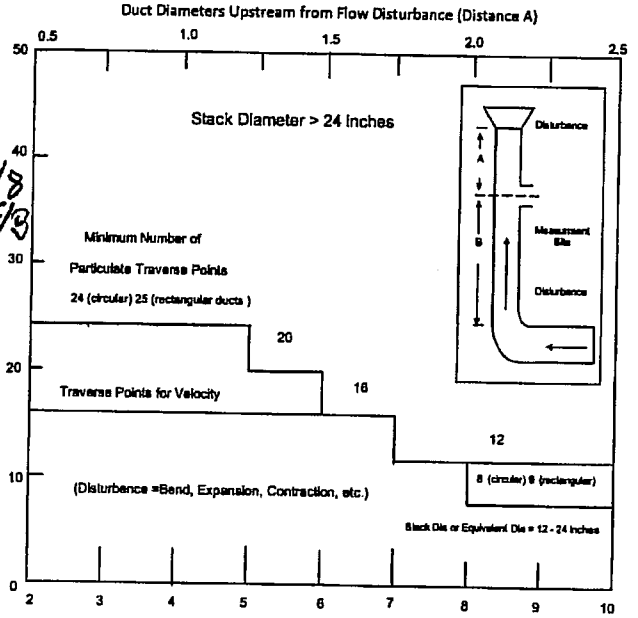
Traverse Point Locations

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

CEM 3 Point(Long Measurment Line) Stratificaton Point Locations

1	0.167		
2	0.50		
3	0.833		

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



Traverse Point Location Percent of Stack -Circular

Traverse Point	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75.5
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

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

ISOKINETIC FIELD DATA SHEET

Method 0010 HFPO Dimer Acid

			Stack Conditions					
Client	Chemours		Assumed	Actual	Meter Box ID	31		
W.O.#	15418.002.009.0001				Meter Box Y	0.9916 ✓		
Project ID	Chemours	% Moisture	4		Meter Box Del H	2.0587		
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		2	Probe ID / Length	P710 6'	Leak Checks	Initial / Mid-Point / Final
Samp. Loc. ID	OUT	Silica gel (g)		14.1	Probe Material	Boro	Sample Train (ft³)	0.000 / 0.000 / 0.010
Run No.ID	1	CO2, % by Vol	0.0	0	Pitot / Thermocouple ID	P710	Leak Check @ (in Hg)	12" / 10" / 10"
Test Method ID	M 0010 HFPO Dimer Acid	O2, % by Vol	20.9	20.9	Pitot Coefficient	0.84 ✓	Pitot good	yes / no / yes / no / yes / no
Date ID	9JAN2019	Temperature (°F) KA	45 75	77.042	Nozzle ID	✓ .215	Orsat good	yes / no / yes / no / yes / no
Source/Location	Carbon Bed Outlet ✓	Meter Temp (°F)	50	49.833	Avg Nozzle Dia (in)	.215/.215/.215	Temp Check	Pre-Test Set / Post-Test Set
Sample Date	1/16/19 ✓	Static Press (in H_2O)	3.5	3.5 ✓	Area of Stack (ft²)	0.305 ✓	Meter Box Temp	
Baro. Press (in Hg)	30.20 ✓				Sample Time	96 ✓ ✓	Reference Temp	
Operator	KA/AS ✓	Ambient Temp (°F)	38		Total Traverse Pts	24 ✓	Pass/Fail (+/- 2°)	Pass / Fail / Pass / Fail
							Temp Change Response	yes / no / yes / no

K Factor 2.4

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 INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD Exit Temp	COMMENTS
	0	0941			358.447									
A 1	4		.68	1.6	361.0	75		43	100	101	41	5	41	
2	8		.66	1.6	363.6	75		43	100	98	40	5	40	
3	12		.67	1.6	366.2	75		43	100	100	40	5	40	
4	16		.69	1.7	369.0	76		45	100	100	39	5	39	
5	20		.69	1.7	371.5	76		45	99	100	40	5	40	
6	24		.66	1.6	374.1	76		46	99	100	41	5	41	
7	28		.56	1.3	376.6	76		47	100	101	41	4	41	
8	32		.55	1.3	378.8	76		47	101	99	40	4	41	
9	36		.50	1.2	381.2	76		48	101	101	41	4	41	
10	40		.48	1.2	383.4	76		48	100	99	40	4	40	
11	44		.46	1.1	385.6	76		49	100	101	41	4	40	
12	48	1029	.45 ✓	1.1	387.825	76		49	100	100	41	4	41	387.985 LC
					389.7									.06
B 1	KA 4	1052	.35	.84	KA ~~387.82~~	74		52	100	101	46	3	47	
2	8		.35	.84	391.7	77		52	100	99	43	3	43	
3	12		.37	.89	393.6	78		52	99	103	43	3	43	
4	16		.37	.89	395.7	79		53	100	98	42	3	42	
5	20		KA ~~.41~~ .43	1.0	397.7	79		53	100	102	42	3	42	
6	24		.52	1.2	400.1	79		53	100	101	42	4	42	
7	28		.93	1.9	402.8	79		54	99	98	43	5	43	
8	32		.97	2.3	405.9	79		54	99	102	43	6	43	
9	36		KA ~~1.1~~ 1.0	2.4	409.0	79		54	99	100	44	6	44	
10	40		1.1	2.6	412.3	79		55	100	98	44	7	44	
11	44		1.1	2.6	415.6	79		55	101	103	46	7	46	
12	48	1140	1.0 ✓	2.4	418.833	79		56	101	98	47	6	48	
			Avg Sqrt Delta P/ ~~.789~~ .789	Avg Delta H ~~1.538~~ 1.536 ✓	Total Volume 60.326 ✓	Avg Ts ✓ 77.042		Avg Tm ✓ 49.833	Min/Max 99/101	Min/Max 98/103	Max Temp 47	Max Vac 7	Max Temp 48	
				Avg Sqrt Del H 1.220 ✓	Comments:									

WESTON SOLUTIONS

Avg. 0.64333

Avg $\sqrt{\Delta P}$ = 0.78910 ✓

1.21957 ✓

ISO 98.5
ΔVS 1.2
Flow 16605
Vs 62.743

ISOKINETIC FIELD DATA SHEET

Method 0010 HFPO Dimer Acid

Page 1 of 1

		Stack Conditions	Assumed	Actual					
Client	Chemours				Meter Box ID	31		K Factor 2.4	
W.O.#	15418.002.009.0001				Meter Box Y	0.9916 ✓			
Project ID	Chemours	% Moisture	4		Meter Box Del H	2.0587	**Leak Checks**	Initial	Mid-Point / Final
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		2	Probe ID / Length	#710 16'	Sample Train (ft^3)	0.016	0.010 / 0.017
Samp. Loc. ID	OUT	Silica gel (g)		20.4	Probe Material	Boro	Leak Check @ (in Hg)	13"	10" / 9"
Run No.ID	2	CO2, % by Vol	0.0	0	Pitot / Thermocouple ID	#710	Pitot good	yes / no	yes / no / yes / no
Test Method ID	M 0010 HFPO Dimer Acid	O2, % by Vol	20.9	20.9	Pitot Coefficient	0.84	Orsat good	yes / no	yes / no / yes / no
Date ID	9JAN2019	Temperature (°F)	77	82.125	Nozzle ID	✓ .215	**Temp Check**	Pre-Test Set	Post-Test Set
Source/Location	Carbon Bed Outlet ✓	Meter Temp (°F)	58	61.209	Avg Nozzle Dia (in)	.215/.215/.215	Meter Box Temp		
Sample Date	1/16/19 ✓	Static Press (in H_2O)	3.5	3.5	Area of Stack (ft^2)	0.305 ✓	Reference Temp		
Baro. Press (in Hg)	30.20/KA 30.16 ✓				Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	KA/AS ✓	Ambient Temp (°F)	~~75~~KA 57		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 INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD Exit Temp	COMMENTS
	0	1312			419.224 / 419.079									
A 1	4		.64	1.5	421.8	81		60	100	100	54	5	54	
2	8		.65	1.6	424.4	81		59	100	100	54	5	54	
3	12		.66	1.6	427.0	81		60	101	101	55	5	55	
4	16		.65	1.6	429.7	81		60	101	100	55	5	56	
5	20		.67	1.6	432.4	81		60	100	98	57	5	57	
6	24		.67	1.6	435.1	81		60	100	102	56	5	56	
7	28		.56	1.3	437.5	82		61	100	100	54	5	54	
8	32		.53	1.3	439.9	82		61	100	99	52	5	52	
9	36		.50	1.2	442.2	82		61	100	100	51	5	51	
10	40		.48	1.2	444.4	82		61	101	102	51	4	51	
11	44		.45	1.1	446.7	81		61	99	100	51	4	51	
12	48	1400	.45	1.1	448.886	81		61	99	99	50	4	50	449.098 LC .212
B 1	4	1425	.35	.84	451.0	80		61	100	102	54	3	55	
2	8		.35	.84	452.8	82		61	100	102	51	3	51	
3	12		.37	.89	454.8	83		61	100	98	49	3	49	
4	16		.39	.94	456.8	83		62	101	102	49	4	49	
5	20		.45	1.1	459.0	83		62	100	99	48	4	48	
6	24		.53	1.3	461.4	83		62	100	101	48	5	48	
7	28		.86	2.1	464.4	83		62	101	101	48	6	48	
8	32		1.0	2.4	467.0	83		62	101	99	50	7	50	
9	36		1.1	2.6	470	83		62	101	100	52	7	52	
10	40		1.1	2.6	474.2	84		63	99	100	54	7	54	
11	44		1.0	2.4	477.5	84		63	100	99	56	7	56	
12	48	1513	1.0	2.4	480.605	84		63	100	101	57	7	57	
			Avg Sqrt Delta P .78832	Avg Delta H 1.54625	Total Volume 61.169 ✓	Avg Ts 82.125		Avg Tm 61.209	Min/Max 99/101	Min/Max 98/102	Max Temp 57	Max Vac 7	Max Temp 57	
				Avg Sqrt Del H 1.224 ✓	Comments:									

Avg. 0.64208

1.22315 ✓

ISOKINETIC FIELD DATA SHEET

Method 0010 HFPO Dimer Acid

		Stack Conditions	Assumed	Actual			Leak Checks	Initial	Mid-Point	Final
Client	Chemours				Meter Box ID	31				
W.O.#	15418.002.009.0001				Meter Box Y	0.9916 ✓				
Project ID	Chemours	% Moisture	4		Meter Box Del H	2.0587	Sample Train (ft^3)	0.009	0.005	0.009
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		1	Probe ID / Length	P710 / 6'	Leak Check @ (in Hg)	12"	10"	10"
Samp. Loc. ID	OUT	Silica gel (g)		14.2	Probe Material	Boro	Pitot good	yes / no	yes / no	yes / no
Run No.ID	3	CO2, % by Vol	0.0	0	Pitot / Thermocouple ID	P710	Orsat good	yes / no	yes / no	yes / no
Test Method ID	M 0010 HFPO Dimer Acid	O2, % by Vol	20.9	20.9	Pitot Coefficient	0.84				
Date ID	9JAN2019	Temperature (°F)	76	76.250	Nozzle ID	.215	**Temp Check**	Pre-Test Set		Post-Test Set
Source/Location	Carbon Bed Outlet ✓	Meter Temp (°F)	53	45.833	Avg Nozzle Dia (in)	✓ .215/.215/.215	Meter Box Temp			
Sample Date	1/17/19 ✓	Static Press (in H_2O)	3.6	3.5	Area of Stack (ft^2)	0.305 ✓	Reference Temp			
Baro. Press (in Hg)	30.18 ✓				Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	KA/AS ✓	Ambient Temp (°F)	35		Total Traverse Pts	24 ✓	Temp Change Response	yes / no		yes / no

K Factor 0.4 2.3

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 INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	XAD Exit Temp	COMMENTS
	0	0842			481.151									
A 1	4		.75	1.7	483.8	74		40	100	101	39	6	39	
2	8		.71	1.6	486.4	74		42	100	99	41	6	41	
3	12		.72	1.7	489.1	74		41	101	100	41	6	41	
4	16		.65	1.5	491.5	74		41	101	101	41	5	41	
5	20		.65	1.5	494.1	74		42	100	100	40	5	40	
6	24		.64	1.5	496.6	75		43	99	100	39	5	39	
7	28		.58	1.3	499.0	75		43	99	100	40	4	40	
8	32		.54	1.2	501.2	75		44	102	101	39	4	40	
9	36		.52	1.2	503.5	75		44	99	100	39	4	40	
10	40		.50	1.2	505.8	75		44	99	99	39	4	39	
11	44		.47	1.1	508.0	75		45	99	100	39	4	39	
12	48	0930	.45	1.0	510.047	75		45	100	100	40	3	40	510.325L
							ICA	47	99	100	42			.278
B 1	4	0947	.35	.81	512.2	77		47	99	100	42	2	42	
2	8		.35	.81	514.0	77		47	100	100	41	2	41	
3	12		.38	.87	516.0	77		47	101	100	40	3	40	
4	16		.41	.94	518.0	78		48	101	101	39	4	39	
5	20		.46	1.1	520.2	78		48	100	101	39	4	39	
6	24		.55	1.3	522.5	78		48	100	100	40	4	40	
7	28		.88	2.0	525.4	78		49	99	102	41	6	41	
8	32		1.0	2.3	528.5	78		49	99	99	42	6	42	
9	36		1.1	2.5	531.7	79		50	101	101	42	8	42	
10	40		1.1	2.5	535.0	79		51	102	101	44	8	44	
11	44		1.1	2.5	538.2	79		51	101	101	45	8	45	
12	48	1035	1.1	2.5	541.413	78		51	100	101	45	8	45	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts ✓		Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.802 ✓	1.5625	59.984 ✓	76.25 ✓		✓45.833	99/102	99/102	45	8	45	
				Avg Sqrt Del H	Comments:									
				1.215 ✓										

Avg. 0.0650

Avg $\sqrt{\Delta P}$ = 0.80187 ✓

SAMPLE RECOVERY FIELD DATA

Method 0010 HFPO Dimer Acid

Client: Chemours | W.O. #: 15418.002.009.0001

Location/Plant: Fayetteville, NC | Source & Location: Carbon Bed Outlet

Run No. 1 | Sample Date 1/16/19 | Recovery Date 1/16/19

Sample I.D. Chemours - Carbon Bed - OUT - 1 - M 0010 HFPO Dime | Analyst WF | Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	H_2O	H_2O	Empty						
Final	0	103	99	0					314.1	
Initial	0	100	100	0					300.0	
Gain	0	3	-1	0				2 ✓	14.1 ✓	

Impinger Color: Clear | Labeled? ✓

Silica Gel Condition: 90% Blue | Sealed? ✓

Run No. 2 | Sample Date 1/16/19 | Recovery Date 1/16/19

Sample I.D. Chemours - Carbon Bed - OUT - 2 - M 0010 HFPO Dime | Analyst WF | Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	H_2O	H_2O	Empty						
Final	0	102	100	0					320.4	
Initial	0	100	100	0				✓	300.0	✓
Gain	0	2	0	0				2 ✓	20.4 ✓	

Impinger Color: Clear | Labeled? ✓

Silica Gel Condition: 95% Blue | Sealed? ✓

Run No. 3 | Sample Date 1/17/19 WF | Recovery Date 1/17/19 WF

Sample I.D. Chemours - Carbon Bed - OUT - 3 - M 0010 HFPO Dime | Analyst WF | Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	H_2O	H_2O	Empty						
Final	0	96	104	1					314.2	
Initial	0	100	100	0				✓	300	✓
Gain	0	-4	4	1				1	14.2	✓

Impinger Color: clear | Labeled? ✓

Silica Gel Condition: 95% Blue | Sealed?

Check COC for Sample IDs of Media Blanks

SAMPLE RECOVERY FIELD DATA

Method 0010 HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.009.0001
Location/Plant	Fayetteville, NC	Source & Loaction	Carbon Bed Outlet

Run No. Blank Sample Date 1/17/19 Recovery Date 1/17/19

Sample I.D. Chemours - Carbon Bed - OUT - BT - M 0010 HFPO Di Analyst SR Filter Number —

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

Impinger Color Clear Labeled? ✓

Silica Gel Condition All Blue 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										
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										
Final										
Initial										
Gain										

Impinger Color — Labeled? —

Silica Gel Condition — Sealed? —

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

t Folders.A-F\Chemours Fayetteville\15418.002.009 Fayetteville Jan 2019 Carbon Bed Test\Data\Division\0116
Program Version: 2.1, built 19 May 2017 **File Version:** 2.03
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, %	**16.6**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Start Time: 07:51

O_2

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

Calibration Standards

%	Cylinder ID
12.0	CC18055
21.0	SG9169108

Calibration Results

Zero	5 mv
Span, 21.0 %	7991 mv

Curve Coefficients

Slope	Intercept
380.3	5

CO_2

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

Calibration Standards

%	Cylinder ID
8.9	CC18055
16.6	SG9169108

Calibration Results

Zero	5 mv
Span, 16.6 %	8383 mv

Curve Coefficients

Slope	Intercept
505.3	5

CALIBRATION ERROR DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Start Time: 07:51

O_2
Method: EPA 3A
Span Conc. 21.0 %
Slope 380.3 **Intercept** 5.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.0	0.0	0.0	Pass
21.0	21.0	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.6 %
Slope 505.3 **Intercept** 5.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.9	8.6	-0.3	-1.8	Pass
16.6	16.6	0.0	0.0	Pass

BIAS

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Start Time: 07:58

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	12.0	12.0	0.0	0.0	Pass

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.5	-0.1	-0.6	Pass

RUN DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Time	O_2 %	CO_2 %
	Port A	
09:41	20.9	0.0
09:42	20.8	0.0
09:43	20.8	0.1
09:44	20.9	0.1
09:45	20.9	0.1
09:46	20.9	0.1
09:47	20.9	0.1
09:48	20.9	0.1
09:49	20.9	0.1
09:50	20.9	0.1
09:51	20.9	0.1
09:52	20.9	0.1
09:53	20.9	0.1
09:54	20.9	0.1
09:55	20.9	0.1
09:56	20.9	0.1
09:57	20.9	0.1
09:58	20.9	0.1
09:59	20.9	0.1
10:00	20.9	0.1
10:01	20.9	0.1
10:02	20.9	0.1
10:03	20.9	0.1
10:04	20.9	0.1
10:05	20.9	0.1
10:06	20.9	0.1
10:07	21.0	0.1
10:08	20.9	0.1
10:09	21.0	0.1
10:10	21.0	0.1
10:11	21.0	0.1
10:12	21.0	0.1
10:13	21.0	0.1
10:14	21.0	0.1
10:15	21.0	0.1
10:16	21.0	0.1
10:17	21.0	0.1
10:18	21.0	0.1
10:19	21.0	0.1
10:20	21.0	0.1

RUN DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Time	O_2 %	CO_2 %
10:21	21.0	0.1
10:22	21.0	0.1
10:23	21.0	0.1
10:24	21.0	0.1
10:25	20.9	0.1
10:26	21.0	0.1
10:27	21.0	0.1
10:28	21.0	0.1
10:29	21.0	0.1
	Port B	
10:52	20.9	0.0
10:53	20.9	0.0
10:54	20.9	0.1
10:55	20.9	0.1
10:56	20.9	0.1
10:57	20.9	0.1
10:58	20.9	0.1
10:59	20.9	0.1
11:00	20.9	0.1
11:01	20.9	0.1
11:02	20.9	0.1
11:03	20.9	0.1
11:04	20.9	0.1
11:05	20.9	0.1
11:06	20.9	0.1
11:07	20.9	0.1
11:08	20.9	0.1
11:09	21.0	0.1
11:10	21.0	0.1
11:11	21.0	0.1
11:12	21.0	0.1
11:13	21.0	0.1
11:14	21.0	0.1
11:15	21.0	0.1
11:16	21.0	0.1
11:17	21.0	0.1
11:18	21.0	0.1
11:19	21.0	0.1
11:20	21.0	0.1
11:21	21.0	0.1
11:22	21.0	0.1

RUN DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Time	O_2 %	CO_2 %
11:23	21.0	0.1
11:24	21.0	0.1
11:25	21.0	0.1
11:26	21.0	0.1
11:27	21.0	0.1
11:28	21.0	0.1
11:29	21.0	0.1
11:30	21.0	0.1
11:31	21.0	0.1
11:32	21.0	0.1
11:33	21.0	0.1
11:34	21.0	0.1
11:35	21.0	0.1
11:36	21.0	0.1
11:37	21.0	0.1
11:38	21.0	0.1
11:39	21.0	0.1
11:40	21.0	0.1
	End Run 1	
Avgs	**21.0**	**0.1**

RUN SUMMARY

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

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

Time: 09:40 to 11:40

Run Averages

	21.0	0.1

Pre-run Bias at 07:58

Zero Bias	0.0	0.0
Span Bias	12.0	8.5
Span Gas	12.0	8.9

Post-run Bias at 12:04

Zero Bias	0.0	0.1
Span Bias	12.0	8.5
Span Gas	12.0	8.9

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

	21.0	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Start Time: 12:04

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	12.0	12.0	0.0	0.0	Pass

Calibration Drift

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

*Bias No. 1

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.6	8.5	-0.1	-0.6	Pass

Calibration Drift

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

*Bias No. 1

RUN DATA

Number 2

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Time	O_2 %	CO_2 %
	Port A	
13:12	20.8	0.0
13:13	20.8	0.0
13:14	20.9	0.0
13:15	20.9	0.0
13:16	20.9	0.1
13:17	20.9	0.1
13:18	20.9	0.1
13:19	20.9	0.1
13:20	20.9	0.1
13:21	20.9	0.1
13:22	20.9	0.1
13:23	20.9	0.1
13:24	20.9	0.1
13:25	20.9	0.1
13:26	20.9	0.1
13:27	20.9	0.1
13:28	20.9	0.1
13:29	20.9	0.1
13:30	20.9	0.1
13:31	20.9	0.1
13:32	20.9	0.1
13:33	20.9	0.1
13:34	20.9	0.1
13:35	20.9	0.1
13:36	20.9	0.1
13:37	20.9	0.1
13:38	20.9	0.1
13:39	20.9	0.1
13:40	20.9	0.1
13:41	20.9	0.1
13:42	20.9	0.1
13:43	20.9	0.1
13:44	20.9	0.1
13:45	20.9	0.1
13:46	20.9	0.1
13:47	20.9	0.1
13:48	20.9	0.1
13:49	20.9	0.1
13:50	20.9	0.1
13:51	20.9	0.1

WESTON

RUN DATA

Number 2

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Time	O_2 %	CO_2 %
13:52	20.9	0.1
13:53	20.9	0.1
13:54	20.9	0.1
13:55	20.9	0.1
13:56	20.9	0.1
13:57	20.9	0.1
13:58	20.9	0.1
13:59	20.9	0.1
14:00	20.9	0.1
	Port B	
14:25	20.8	0.0
14:26	20.8	0.0
14:27	20.9	0.1
14:28	20.9	0.1
14:29	20.9	0.1
14:30	20.9	0.1
14:31	20.9	0.1
14:32	20.9	0.1
14:33	20.9	0.1
14:34	20.9	0.1
14:35	20.9	0.1
14:36	20.9	0.1
14:37	20.9	0.1
14:38	20.9	0.1
14:39	20.9	0.1
14:40	20.9	0.1
14:41	20.9	0.1
14:42	20.9	0.1
14:43	20.9	0.1
14:44	20.9	0.1
14:45	20.9	0.1
14:46	20.9	0.1
14:47	20.9	0.1
14:48	20.9	0.1
14:49	20.9	0.1
14:50	20.9	0.1
14:51	20.9	0.1
14:52	20.9	0.1
14:53	20.9	0.1
14:54	20.9	0.1
14:55	20.9	0.1

WESTON SOLUTIONS

RUN DATA

Number 2

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Time	O_2 %	CO_2 %
14:56	20.9	0.1
14:57	20.9	0.1
14:58	20.9	0.1
14:59	20.9	0.1
15:00	20.9	0.1
15:01	20.9	0.1
15:02	20.9	0.1
15:03	20.9	0.1
15:04	20.9	0.1
15:05	20.9	0.1
15:06	20.9	0.1
15:07	20.9	0.1
15:08	20.9	0.1
15:09	20.9	0.1
15:10	20.9	0.1
15:11	20.9	0.1
15:12	20.9	0.1
15:13	20.9	0.1
	End Run 2	
Avgs	**20.9**	**0.1**

RUN SUMMARY

Number 2

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

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

Time: 13:11 to 15:13

Run Averages

20.9	0.1

Pre-run Bias at 12:04

Zero Bias	0.0	0.1
Span Bias	12.0	8.5
Span Gas	12.0	8.9

Post-run Bias at 15:16

Zero Bias	0.0	0.0
Span Bias	12.0	8.5
Span Gas	12.0	8.9

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

20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **16 Jan 2019**

Start Time: 15:16

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	12.0	12.0	0.0	0.0	Pass

Calibration Drift

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

*Bias No. 2

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.5	-0.1	-0.6	Pass

Calibration Drift

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

*Bias No. 2

METHODS AND ANALYZERS

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

t Folders.A-F\Chemours Fayetteville\15418.002.009 Fayetteville Jan 2019 Carbon Bed Test\Data\Division\0117
Program Version: 2.1, built 19 May 2017 **File Version:** 2.03
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, %	**16.6**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Start Time: 07:32

O_2

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

Calibration Standards

%	Cylinder ID
12.0	CC18055
21.0	SG9169108

Calibration Results

Zero	8 mv
Span, 21.0 %	8020 mv

Curve Coefficients

Slope	Intercept
381.5	8

CO_2

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

Calibration Standards

%	Cylinder ID
8.9	CC18055
16.6	SG9169108

Calibration Results

Zero	1 mv
Span, 16.6 %	8293 mv

Curve Coefficients

Slope	Intercept
500.1	1

CALIBRATION ERROR DATA

Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Start Time: 07:32

O_2
Method: EPA 3A
Span Conc. 21.0 %
Slope 381.5 **Intercept** 8.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.0	0.0	0.0	Pass
21.0	21.0	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.6 %
Slope 500.1 **Intercept** 1.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.9	8.6	-0.3	-1.8	Pass
16.6	16.6	0.0	0.0	Pass

BIAS
Number 1

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Start Time: 07:36

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	12.0	12.0	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.5	-0.1	-0.6	Pass

RUN DATA

Number 3

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Time	O_2 %	CO_2 %
	Port A	
08:42	20.9	0.0
08:43	20.9	0.0
08:44	20.9	0.0
08:45	20.9	0.0
08:46	20.9	0.1
08:47	20.9	0.1
08:48	20.9	0.1
08:49	20.9	0.1
08:50	20.9	0.1
08:51	20.9	0.1
08:52	20.9	0.1
08:53	20.9	0.1
08:54	20.9	0.1
08:55	21.0	0.1
08:56	20.9	0.1
08:57	21.0	0.1
08:58	21.0	0.1
08:59	21.0	0.1
09:00	21.0	0.1
09:01	21.0	0.1
09:02	20.9	0.1
09:03	20.9	0.1
09:04	21.0	0.1
09:05	20.9	0.1
09:06	20.9	0.1
09:07	21.0	0.1
09:08	20.9	0.1
09:09	21.0	0.1
09:10	21.0	0.1
09:11	21.0	0.1
09:12	21.0	0.1
09:13	21.0	0.1
09:14	21.0	0.1
09:15	21.0	0.1
09:16	21.0	0.1
09:17	21.0	0.1
09:18	21.0	0.1
09:19	21.0	0.1
09:20	21.0	0.1
09:21	21.0	0.1

WESTON

RUN DATA

Number 3

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Time	O_2 %	CO_2 %
09:22	21.0	0.1
09:23	21.0	0.1
09:24	21.0	0.1
09:25	21.0	0.1
09:26	21.0	0.1
09:27	21.0	0.1
09:28	21.0	0.1
09:29	21.0	0.1
09:30	21.0	0.1
	Port B	
09:47	20.8	0.0
09:48	20.8	0.0
09:49	20.8	0.1
09:50	20.9	0.1
09:51	20.9	0.1
09:52	20.9	0.1
09:53	20.9	0.1
09:54	20.9	0.1
09:55	20.9	0.1
09:56	20.9	0.1
09:57	20.9	0.1
09:58	21.0	0.1
09:59	21.0	0.1
10:00	20.9	0.1
10:01	21.0	0.1
10:02	21.0	0.1
10:03	21.0	0.1
10:04	21.0	0.1
10:05	21.0	0.1
10:06	21.0	0.1
10:07	21.0	0.1
10:08	21.0	0.1
10:09	21.0	0.1
10:10	21.0	0.1
10:11	21.0	0.1
10:12	21.0	0.1
10:13	21.0	0.1
10:14	21.0	0.1
10:15	21.0	0.1
10:16	21.0	0.1
10:17	21.0	0.1

WESTON

RUN DATA

Number 3

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Time	O_2 %	CO_2 %
10:18	21.0	0.1
10:19	21.0	0.1
10:20	21.0	0.1
10:21	21.0	0.1
10:22	21.0	0.1
10:23	21.0	0.1
10:24	21.0	0.1
10:25	21.0	0.1
10:26	21.0	0.1
10:27	21.0	0.1
10:28	21.0	0.1
10:29	21.0	0.1
10:30	21.0	0.1
10:31	21.0	0.1
10:32	21.0	0.1
10:33	21.0	0.1
10:34	21.0	0.1
10:35	21.0	0.1
	End Run 3	
Avgs	**21.0**	**0.1**

RUN SUMMARY

Number 3

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

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

Time: 08:41 to 10:35

Run Averages

	21.0	0.1

Pre-run Bias at 07:36

Zero Bias	0.0	0.0
Span Bias	12.0	8.5
Span Gas	12.0	8.9

Post-run Bias at 10:43

Zero Bias	0.0	0.1
Span Bias	12.0	8.4
Span Gas	12.0	8.9

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

	21.0	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours**
Location: **CHEMOURS**
Source: **Division Stack**

Calibration **1**

Project Number: **15418.002.009**
Operator: **CW**
Date: **17 Jan 2019**

Start Time: 10:43

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	12.0	12.0	0.0	0.0	Pass

Calibration Drift

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

*Bias No. 1

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.6	8.4	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.5	8.4	-0.1	-0.6	Pass

*Bias No. 1

WESTON SOLUTIONS

APPENDIX C
LABORATORY ANALYTICAL REPORT

Note: The analytical report is included on the attached CD.

Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: Division Stack Carbon Bed Inlet - M0010

TestAmerica Job ID: 140-14019-1

Client Sample ID: O-2347,2348 DIV VEN CARBON BED INLET R1 M0010 FH

Lab Sample ID: 140-14019-1

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.51		0.126	0.0136	ug/Sample		01/23/19 14:18	02/01/19 11:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*96*		*50 - 200*	*01/23/19 14:18*	*02/01/19 11:03*	*1*

Client Sample ID: O-2349,2350,2352 DIV VEN CARBON BED INLET R1 M0010 BH

Lab Sample ID: 140-14019-2

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	365		17.5	3.50	ug/Sample		01/22/19 12:55	02/01/19 10:04	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*96*	*D*	*50 - 200*	*01/22/19 12:55*	*02/01/19 10:04*	*50*

Client Sample ID: O-2351 DIV VEN CARBON BED INLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-14019-3

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND	H	0.200	0.0102	ug/Sample		01/30/19 04:42	02/04/19 11:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*71*		*50 - 200*	*01/30/19 04:42*	*02/04/19 11:28*	*1*

Client Sample ID: O-2353 DIV VEN CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-14019-4

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.102	J	0.200	0.0400	ug/Sample		01/22/19 12:55	02/01/19 10:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*74*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:07*	*1*

Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: Division Stack Carbon Bed Inlet - M0010

TestAmerica Job ID: 140-14019-1

Client Sample ID: O-2354,2355 DIV VEN CARBON BED INLET R2 M0010 FH

Lab Sample ID: 140-14019-5

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.40		0.126	0.0136	ug/Sample		01/23/19 14:18	02/01/19 11:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*93*		*50 - 200*	*01/23/19 14:18*	*02/01/19 11:09*	*1*

Client Sample ID: O-2356,2357,2359 DIV VEN CARBON BED INLET R2 M0010 BH

Lab Sample ID: 140-14019-6

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	686		10.0	2.00	ug/Sample		01/22/19 12:55	02/01/19 10:11	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*80*	*D*	*50 - 200*	*01/22/19 12:55*	*02/01/19 10:11*	*50*

Client Sample ID: O-2358 DIV VEN CARBON BED INLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-14019-7

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.00	H	0.200	0.0102	ug/Sample		01/30/19 04:42	02/04/19 11:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*83*		*50 - 200*	*01/30/19 04:42*	*02/04/19 11:31*	*1*

Client Sample ID: O-2360 DIV VEN CARBON BED INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-14019-8

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/22/19 12:55	02/01/19 10:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*67*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:14*	*1*

Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: Division Stack Carbon Bed Inlet - M0010

TestAmerica Job ID: 140-14019-1

Client Sample ID: O-2361,2362 DIV VEN CARBON BED INLET R3 M0010 FH

Lab Sample ID: 140-14019-9

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	5.76		0.126	0.0136	ug/Sample		01/23/19 14:18	02/01/19 11:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*93*		*50 - 200*	*01/23/19 14:18*	*02/01/19 11:12*	*1*

Client Sample ID: O-2363,2364,2366 DIV VEN CARBON BED INLET R3 M0010 BH

Lab Sample ID: 140-14019-10

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	625		10.0	2.00	ug/Sample		01/22/19 12:55	02/01/19 10:17	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*77*	*D*	*50 - 200*	*01/22/19 12:55*	*02/01/19 10:17*	*50*

Client Sample ID: O-2365 DIV VEN CARBON BED INLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-14019-11

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.269		0.200	0.0102	ug/Sample		01/30/19 04:42	02/04/19 11:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*81*		*50 - 200*	*01/30/19 04:42*	*02/04/19 11:38*	*1*

Client Sample ID: O-2367 DIV VEN CARBON BED INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-14019-12

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.380		0.200	0.0400	ug/Sample		01/22/19 12:55	02/01/19 10:20	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*64*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:20*	*1*

Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: Division Stack Carbon Bed Outlet - M0010

TestAmerica Job ID: 140-14020-1

Client Sample ID: D-2677,2678 DIV VEN CARBON BED OUTLET R1 M0010 FH

Lab Sample ID: 140-14020-1

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	9.53		0.126	0.0136	ug/Sample		01/23/19 14:18	02/01/19 11:16	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*88*		*50 - 200*	*01/23/19 14:18*	*02/01/19 11:16*	*1*

Client Sample ID: D-2679,2680,2682 DIV VEN CARBON BED OUTLET R1 M0010 BH

Lab Sample ID: 140-14020-2

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	19.4		0.325	0.0650	ug/Sample		01/22/19 12:55	02/01/19 10:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*66*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:24*	*1*

Client Sample ID: D-2681 DIV VEN CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-14020-3

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND	H	0.204	0.0104	ug/Sample		01/30/19 04:42	02/04/19 11:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*87*		*50 - 200*	*01/30/19 04:42*	*02/04/19 11:41*	*1*

Client Sample ID: D-2683 DIV VEN CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-14020-4

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.325	0.0650	ug/Sample		01/22/19 12:55	02/01/19 10:27	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*84*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:27*	*1*

Client Sample ID: D-2684,2685 DIV VEN CARBON BED OUTLET R2 M0010 FH

Lab Sample ID: 140-14020-5

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	7.36		0.101	0.0109	ug/Sample		01/23/19 14:18	02/01/19 11:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*81*		*50 - 200*	*01/23/19 14:18*	*02/01/19 11:19*	*1*

Client Sample ID: D-2686,2687,2689 DIV VEN CARBON BED OUTLET R2 M0010 BH

Lab Sample ID: 140-14020-6

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	24.1		0.400	0.0800	ug/Sample		01/22/19 12:55	02/01/19 10:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*72*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:33*	*1*

Client Sample ID: D-2688 DIV VEN CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-14020-7

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND	H	0.210	0.0107	ug/Sample		01/30/19 04:42	02/04/19 11:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*86*		*50 - 200*	*01/30/19 04:42*	*02/04/19 11:44*	*1*

Client Sample ID: D-2690 DIV VEN CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-14020-8

Date Collected: 01/16/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.237		0.200	0.0400	ug/Sample		01/22/19 12:55	02/01/19 10:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*59*		*50 - 200*	*01/22/19 12:55*	*02/01/19 10:37*	*1*

Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: Division Stack Carbon Bed Outlet - M0010

TestAmerica Job ID: 140-14020-1

Client Sample ID: D-2691,2692 DIV VEN CARBON BED OUTLET R3 M0010 FH

Lab Sample ID: 140-14020-9

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	11.8		0.101	0.0109	ug/Sample		01/28/19 10:24	02/04/19 10:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*76*		*50 - 200*	*01/28/19 10:24*	*02/04/19 10:32*	*1*

Client Sample ID: D-2693,2694,2696 DIV VEN CARBON BED OUTLET R3 M0010 BH

Lab Sample ID: 140-14020-10

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	27.2		0.300	0.0600	ug/Sample		01/24/19 07:31	01/30/19 13:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*68*		*50 - 200*	*01/24/19 07:31*	*01/30/19 13:40*	*1*

Client Sample ID: D-2695 DIV VEN CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-14020-11

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.204	0.0104	ug/Sample		01/30/19 04:42	02/04/19 11:47	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*88*		*50 - 200*	*01/30/19 04:42*	*02/04/19 11:47*	*1*

Client Sample ID: D-2697 DIV VEN CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-14020-12

Date Collected: 01/17/19 00:00
Date Received: 01/20/19 10:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		01/24/19 07:31	01/30/19 13:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*71*		*50 - 200*	*01/24/19 07:31*	*01/30/19 13:43*	*1*

APPENDIX D
SAMPLE CALCULATIONS

SAMPLE CALCULATIONS FOR HFPO DIMER ACID (METHOD 0010)

Client: Chemours
Test Number: Run 1
Test Location: CBed Inlet

Plant: Fayetteville, NC
Test Date: 1/16/2019
Test Period: 0941-1140

1. HFPO Dimer Acid concentration, lbs/dscf.

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

$$Conc1 = \frac{369.6 \times 2.2046 \times 10\text{-}9}{59.149}$$

Conc1 = 1.38E-08

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 = 369.6 / (59.149 x 0.02832)

Conc2 = 220.6

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

$MR1_{(Inlet)}$ = 1.38E-08 x 16202 x 60

$MR1_{(Inlet)}$ = 1.34E-02

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

$MR2_{(Inlet)}$ = 1.34E-02 x 453.59 /3600

$MR2_{(Inlet)}$ = 1.69E-03

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, %

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

$$RE = \frac{(4.18E\text{-}2) - (8.53E\text{-}4)}{4.18E\text{-}02}$$

RE = 98.0

Where:

RE = Carbon Bed Removal Efficiency.

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

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

EXAMPLE CALCULATIONS FOR VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 1	Test Date: 1/16/19
Test Location: VEN-Carbon Bed Inlet	Test Period: 0941-1140

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

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

$$Vm(std) = \frac{17.64 \times 0.9852 \times 56.817 \times \left(30.20 + \frac{1.776}{13.6} \right)}{46.33 + 460} = 59.149$$

Where:

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

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

Vw(std) = (0.04707 x Vwc) + (0.04715 x Wwsg)

Vw(std) = (0.04707 x 2.0) + (0.04715 x 14.8) = 0.79

Where:

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

3. Moisture content

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

$$bws = \frac{0.79}{0.79 + 59.149} = 0.013$$

Where:

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

4. Mole fraction of dry gas.

$$Md = 1 - bws$$

$$Md = 1 - 0.013 = 0.987$$

Where:

Md = Mole fraction of dry gas, dimensionless.

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

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

$$MWd = (0.440 \times 0.0) + (0.320 \times 20.9) + (0.280 \times (79.1 + 0.00))$$

$$MWd = 28.84$$

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.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

$$MWs = (28.84 \times 0.987) + (18 (1 - 0.987)) = 28.69$$

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.

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

$$Vs = 85.49 \times 0.84 \times 0.77436 \times \left(\frac{529}{29.74 \times 28.69}\right)^{\wedge}1/2 = 43.8$$

Where:

Vs = Average gas stream velocity, ft/sec.

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

Cp = Pitot tube coefficient, dimensionless.

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

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

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

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

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

$$Qs(act) = 60 \times 43.8 \times 6.31 = 16571$$

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.

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

$$Qs(std) = 17.64 \times 0.987 \times \frac{29.74}{529.4} \times 16571$$

$$Qs(std) = 16202$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 529 \times 59.149}{43.8 \times 96 \times 29.74 \times 0.987 \times (0.218)^{\wedge}2} = 92.5$$

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

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
an Air Liquide company

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

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	82-401288926-1
Cylinder Number:	CC18055	Cylinder Volume:	150.5 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Sep 04, 2018

Expiration Date: Sep 04, 2026

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

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.864 %	G1	+/- 0.7% NIST Traceable	09/04/2018
OXYGEN	12.00 %	12.00 %	G1	+/- 0.4% NIST Traceable	09/04/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060629	CC413730	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019

ANALYTICAL EQUIPMENT

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

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

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

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI62E15A0224	Reference Number:	82-401044874-1
Cylinder Number:	SG9169108	Cylinder Volume:	157.2 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52017	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Nov 18, 2017

Expiration Date: Nov 18, 2025

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

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	17.00 %	16.58 %	G1	+/- 0.7% NIST Traceable	11/18/2017
OXYGEN	21.00 %	21.00 %	G1	+/- 0.5% NIST Traceable	11/18/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061336	CC360792	11.002 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2018
NTRM	09061415	CC273526	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-19GYCXEG	NDIR	Oct 30, 2017
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Oct 27, 2017

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** 23 **Ambient Temp** 72

Date 25-Sep-18 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 17087349

Baro Press, in Hg (Pb)	30.29

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_2O (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	15.866	72.0	72.00	72.00	72.5	14.0	0.9995	2.1805
		20.867		73.00	73.00				
		5.001		72.50	72.50				
1.0	5.0	21.860	72.0	73.00	73.00	73.5	10.6	0.9925	2.4953
		26.900		74.00	74.00				
		5.040		73.50	73.50				
1.5	10.0	27.975	72.0	75.00	75.00	75.5	16.9	0.9808	2.3697
		38.201		76.00	76.00				
		10.226		75.50	75.50				
2.0	10.0	39.355	72.0	76.00	76.00	76.0	14.6	0.9830	2.3559
		49.555		76.00	76.00				
		10.200		76.00	76.00				
3.0	10.0	50.614	72.0	76.00	76.00	76.5	12.0	0.9701	2.3755
		60.955		77.00	77.00				
		10.341		76.50	76.50				
							Average	**0.9852**	**2.3554**

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

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

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

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

Reference Temperature	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
Select Temperature ○ °C ◉ °F	Channel Number							
	1	2	3	4	5	6		
32	32	32	32	32	33		32.2	0.0%
212	212	213	213	212	213		212.6	-0.1%
932	931	932	931	932	933		931.8	0.0%
1832	1831	1833	1833	1832	1833		1832.4	0.0%

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

2 - Acceptable Temperature Difference less than 1.5 %

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

Post Test Calibration

Calibrator MDW

Date 30-Jan-19

Meter Box Number 23

Wet Test Meter Number P-2952

Dry Gas Meter Number 17087349

Client Chemours Fayetteville

Location/Plant Fayetteville, NC

PreTest Y 0.9945

Baro Press, in Hg (Pb)	29.75

Setting	Gas Volume		Temperatures					
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter				
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y
1.60	9.2	421.760 431.375 9.615	68.0	68.00	70.00	69.0	15.0	0.9549
1.60	9.2	432.160 441.810 9.650	68.0	70.00	72.00	71.0	15.0	0.9550
1.60	9.2	442.606 452.240 9.634	70.0	73.00	74.00	73.5	15.0	0.9575
							Average	**0.9558**
							Difference[1]	**0.0387**

1 - Tolerance for Y is less than 0.0500

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

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

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

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

No Long Calibration Required

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

Calibrator PM **Meter Box Number** 31 **Ambient Temp** 71

Date 4-Feb-18 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 17485128

Baro Press, in Hg (Pb)	29.79

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_2O (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	449.372	70.0	69.00	69.00	70.0	13.0	0.9976	1.9063
		454.378		71.00	71.00				
		5.006		70.00	70.00				
1.0	5.0	454.378	70.0	71.00	71.00	71.5	9.5	0.9972	2.0302
		459.394		72.00	72.00				
		5.016		71.50	71.50				
1.5	10.07	459.394	70.0	74.00	74.00	74.0	16.0	0.9918	2.1197
		469.586		74.00	74.00				
		10.192		74.00	74.00				
2.0	10.0	469.586	70.0	74.00	74.00	74.5	13.7	0.9894	2.0992
		479.729		75.00	75.00				
		10.143		74.50	74.50				
3.0	10.0	479.729	70.0	75.00	75.00	75.5	11.3	0.9819	2.1383
		489.943		76.00	76.00				
		10.214		75.50	75.50				
							Average	**0.9916**	**2.0587**

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

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

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

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

Reference Temperature	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
Select Temperature ○ °C ◉ °F	Channel Number							
	1	2	3	4	5	6		
32	32	32	32	32	32		32.0	0.0%
212	212	213	213	212	212		212.4	-0.1%
932	932	933	933	932	932		932.4	0.0%
1832	1832	1833	1833	1832	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
CARBON BED OUTLET
METER BOX NO. WC31
1/16/2019 + 1/17/2019

	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(°R)			
Tm = Average dry gas meter temperature , deg F.	49.8	61.2	45.8

$$Tma = Ts + 460$$

$$Tma = 49.83 + 460$$

Tma = 509.83 521.21 505.83

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	1.54	1.55	1.53
Pb = Barometric Pressure, in Hg.	30.20	30.16	30.18

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

$$Pm = 30.2 + (1.53583333333333 / 13.6)$$

Pm = 30.31 30.27 30.29

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.	60.326	61.169	59.984
Y = Dry gas meter calibration factor (based on full calibration)	0.9916	0.9916	0.9916
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	2.0587	2.0587	2.0587
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.2196	1.2239	1.2154
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 60.33) * SQRT (0.0319 * 509.83 * 29) / (2.06 * 30.31 * 28.84) * 1.22$$

$$Yqa = 1.591 * SQRT\ 471.647 / 1{,}799.343 * 1.22$$

Yqa = 0.9936 0.9950 0.9923

Diff = Absolute difference between Yqa and Y	0.20	0.34	0.07

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

$$Diff = ((0.9916 - 0.994) / 0.9916) * 100$$

Average Diff = 0.2

Allowable = 5.0

BALANCE CALIBRATION LOG

Balance ID:

Date	Initials	Calibration Weight	Measured Weight(1)	Maintenance and Adjustments
1/16/19	CSW	500.0	499.6	NA Cleaned
1/17/19	CSW	500.0	499.6	NA Cleaned

(1) Measured weight must be within ±0.5 grams of calibration weight

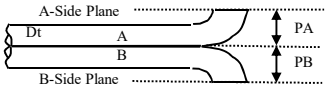
Type S Pitot Tube Inspection Data Form

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

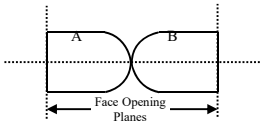
If all Criteria PASS
Cp is equal to 0.84

Inspection Date 5/30/18 Individual Conducting Inspection SR

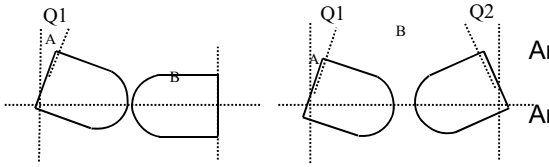
		PASS/FAIL
Distance to A Plane (PA) - inches	0.453	PASS
Distance to B Plane (PB) - inches	0.453	PASS
Pitot OD (D_t) - inches	0.375	



$1.05\ D_t < P < 1.5\ D_t$ PA must Equal PB

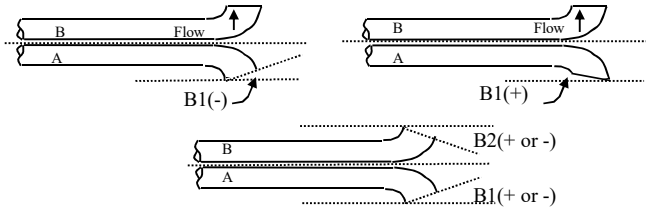


Are Open Faces Aligned Perpendicular to the Tube Axis: ◉ YES ○ NO — PASS



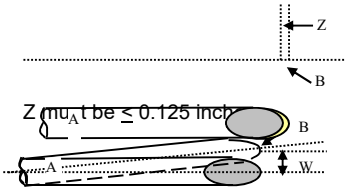
Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	0	PASS

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



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

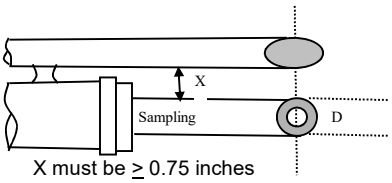
B1 or B2 must be $\leq 5^o$



Z must be $\leq$ 0.125 inches

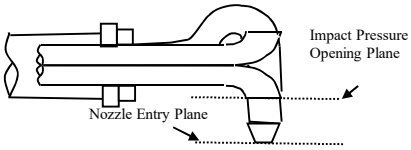
Horizontal offset between A and B Tubes (Z) - inches	0.012	PASS
Vertical offset between A and B Tubes (W) - inches	0.022	PASS

W must be $\leq$ 0.03125 inches

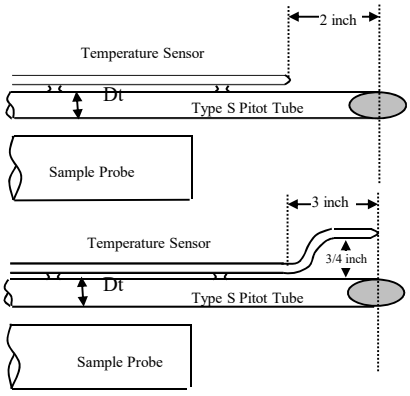


Distance between Sample Nozzle and Pitot (X) - inches: 0.87 — PASS

X must be $\geq$ 0.75 inches



Impact Pressure Opening Plane is above the Nozzle Entry Plane: ◉ YES ○ NO ○ NA



Thermocouple meets the Distance Criteria in the adjacent figure: ◉ YES ○ NO ○ NA

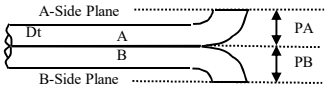
Thermocouple meets the Distance Criteria in the adjacent figure: ○ YES ○ NO ◉ NA

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-711**

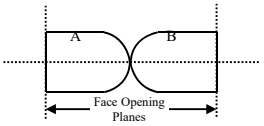
If all Criteria PASS Cp is equal to 0.84

Inspection Date 5/30/18 Individual Conducting Inspection SR

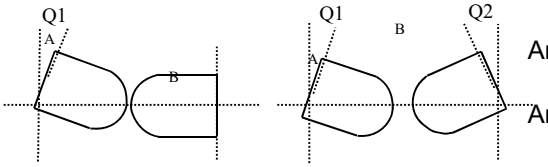


		PASS/FAIL
Distance to A Plane (PA) - inches	0.458	PASS
Distance to B Plane (PB) - inches	0.458	PASS
Pitot OD (D_t) - inches	0.375	

1.05 D_t < P < 1.5 D_t PA must Equal PB

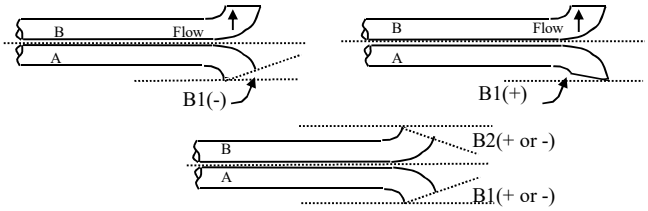


Are Open Faces Aligned Perpendicular to the Tube Axis: ◉ YES ○ NO — PASS



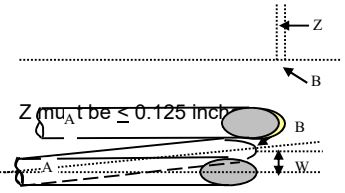
Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	0	PASS

Q1 and Q2 must be ≤ 10°



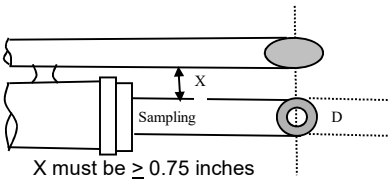
Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

B1 or B2 must be ≤ 5°



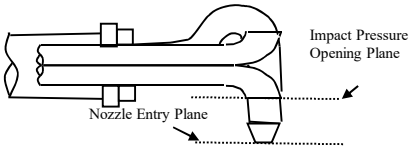
Horizontal offset between A and B Tubes (Z) - inches	0.009	PASS
Vertical offset between A and B Tubes (W) - inches	0.026	PASS

W must be ≤ 0.03125 inches

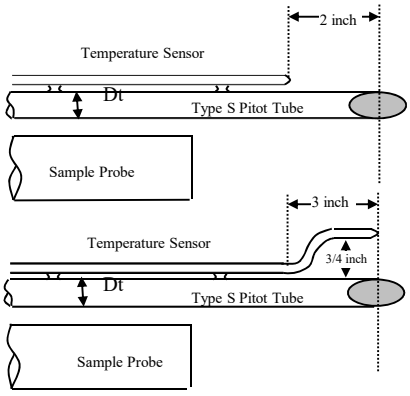


Distance between Sample Nozzle and Pitot (X) - inches: 0.87 — PASS

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
Wes Fritz	Team Member
Jack Mills	Team Member
Austin Squires	Team Member
Steve Rathfon	Team Member
Matt Winkeler	Team Member
Kris Ansley	Team Member
Chad Walker	Team Member