FLUOROMONOMERS
MANUFACTURING PROCESS
VINYL ETHERS NORTH CARBON BED
REMOVAL EFFICIENCY AND
DIVISION STACK EMISSIONS TEST REPORT
TEST DATES: 24 AND 25 SEPTEMBER 2019

THE CHEMOURS COMPANY
FAYETTEVILLE, NORTH CAROLINA

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TABLE OF CONTENTS

Section **Page**

LIST OF FIGURES

Title **Page**

LIST OF TABLES

Title **Page**

1. INTRODUCTION

1.1 FACILITY AND BACKGROUND INFORMATION

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

Chemours contracted Weston Solutions, Inc. (Weston) to perform HFPO Dimer Acid Fluoride, captured as HFPO Dimer Acid, emission testing on the Vinyl Ethers North (VEN) Carbon Bed and Division stack at the facility. Testing was performed on 24 and 25 September 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 and Division stack which are located in the Fluoromonomers process area.
- Calculate the Carbon Bed removal efficiency for HFPO Dimer Acid.
- Monitor and record process and emissions control data in conjunction with the test program.
- Provide representative emissions data.

1.3 TEST PROGRAM OVERVIEW

During the emissions test program, the concentrations and mass emissions rates of HFPO Dimer Acid were measured at three locations.

Tables 1-1 and 1-2 provide a summary of the test locations and the parameters that were measured along with the sampling/analytical procedures that were followed.

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

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

Table 1-1
Sampling Plan for VEN Carbon Bed

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

Key:

[1] Sample collected in field.

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

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

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

[5] Actual number of samples collected in field.

[6] Not applicable.

Table 1-2
Sampling Plan for Division Stack

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

Key:

[1] Sample collected in field.

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

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

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

[5] Actual number of samples collected in field.

[6] Not applicable.

2. SUMMARY OF TEST RESULTS

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

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

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

	Inlet		Outlet		Removal Efficiency	Division Stack	
	g/sec	lb/hr	g/sec	lb/hr	%	g/sec	lb/hr
R1	2.03E-03	1.61E-02	1.12E-04	8.90E-04	94.5	1.88E-04	1.49E-03
R2	1.07E-03	8.48E-03	3.53E-05	2.80E-04	96.7	2.78E-04	2.21E-03
R3	4.62E-04	3.67E-03	4.66E-05	3.70E-04	89.9	1.19E-04	9.44E-04
Average	1.19E-03	9.42E-03	6.46E-05	5.13E-04	93.7	1.95E-04	1.55E-03

3. PROCESS DESCRIPTIONS

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

3.1 FLUOROMONOMERS

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

Process emissions are vented to the Division waste gas scrubber system (which includes the secondary scrubber) and vents to the Carbon Bed and then onto the Division Stack. The VE North building air systems are vented to the Carbon Bed and then onto the Division Stack.

3.2 PROCESS OPERATIONS AND PARAMETERS

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

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

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

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

4. DESCRIPTION OF TEST LOCATIONS

4.1 DIVISION STACK

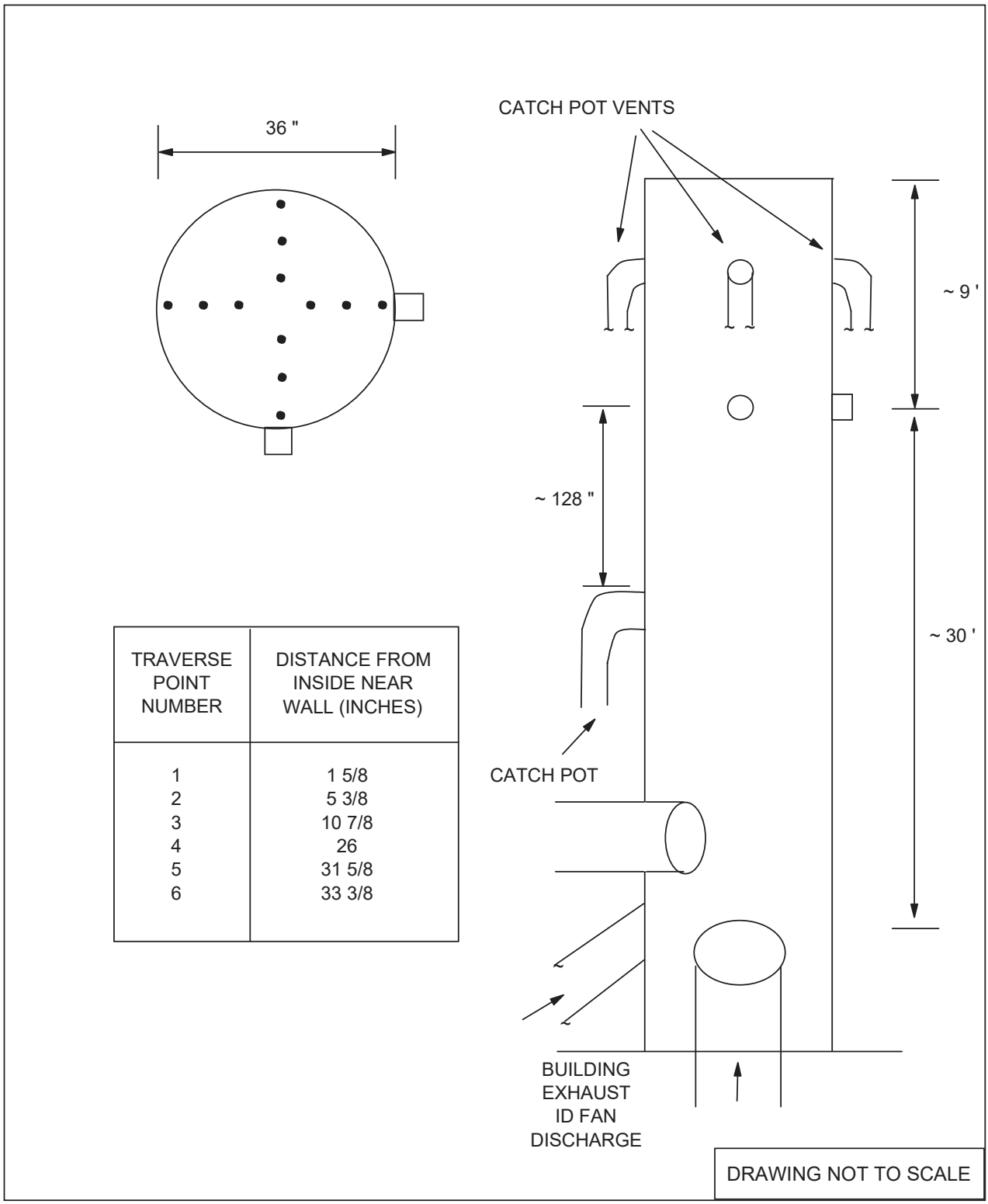
Two 6-inch ID test ports were installed on the 36-inch ID fiberglass stack as shown below. The four vents that enter the top of the stack and the one vent ~11 feet below are catch pots which, under normal process operations, do not discharge to the stack. They are used to vent process gas to the stack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

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

4.2 VINYL ETHERS NORTH CARBON BED INLET AND OUTLET

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

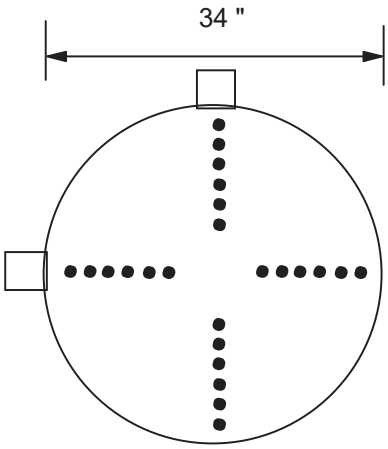
Location	Distance from Flow Disturbance	
	Downstream (B)	Upstream (A)
Carbon Bed Inlet	67 inches > 1.9 duct diameters	61 inches > 1.8 duct diameters
Carbon Bed Outlet	58 inches > 1.7 duct diameters	57 inches > 1.5 duct diameters
Division Stack	30 feet > 10 duct diameters	9 feet > 3 duct diameters



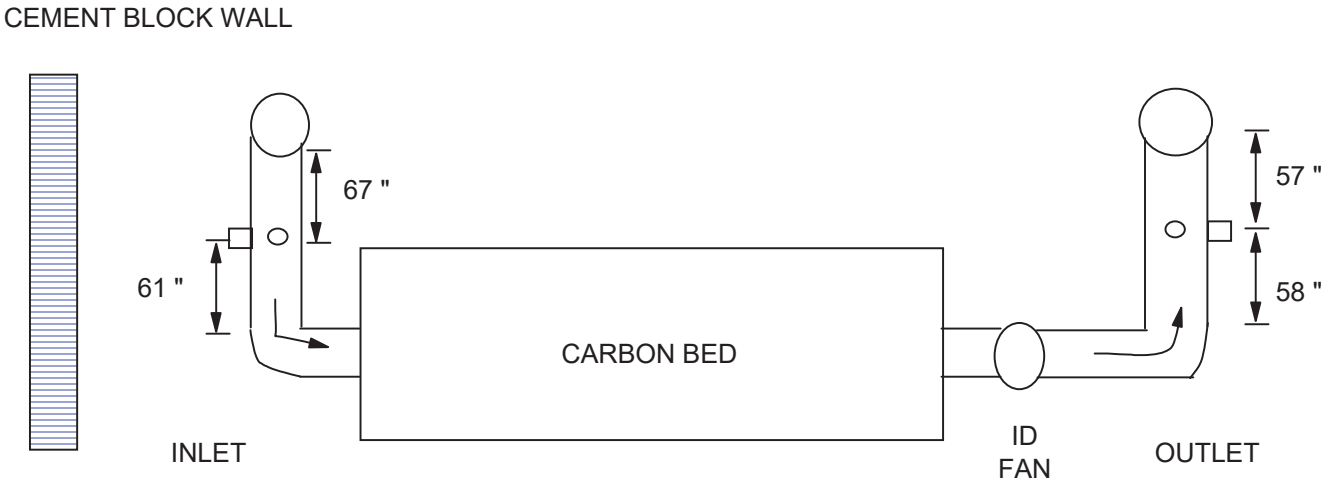
TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1 5/8
2	5 3/8
3	10 7/8
4	26
5	31 5/8
6	33 3/8

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

IASDATA\CHEMOURS\15418.002.017\FIGURE 4-1 DIVISION STACK



TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1
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



DRAWING NOT TO SCALE

FIGURE 4-2
VE NORTH PROCESS CARBON BED INLET AND OUTLET SCHEMATIC

IASDATA\CHEMOURS\15418.002.017\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 all three locations was an EPA Method 0010 train (see Figure 5-1). The Method 0010 consisted of a borosilicate nozzle that attached directly to a heated borosilicate probe. In order to minimize possible thermal degradation of the HFPO Dimer Acid, the probe and particulate filter were heated above stack temperature to minimize water vapor condensation before the filter. The probe was connected directly to a heated borosilicate filter holder containing a solvent extracted glass fiber filter.

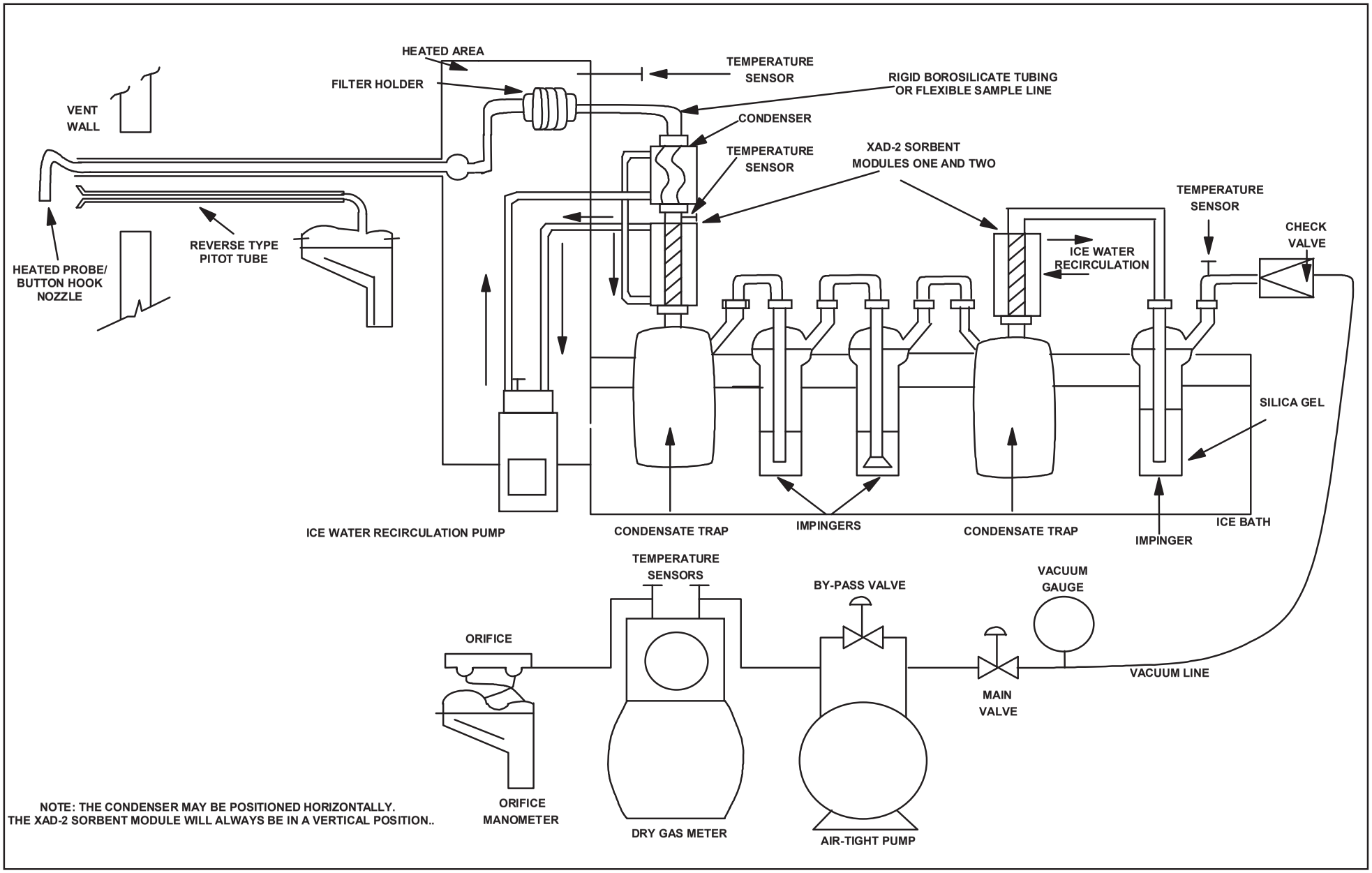


FIGURE 5-1
EPA METHOD 0010 SAMPLING TRAIN

IASDATA\CHEMOURS\15418.002.017\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 mL of high-purity distilled water. The train also included a second XAD-2 resin trap behind the impinger section to evaluate possible sampling train breakthrough. Each XAD-2 resin trap was connected to a 1-liter condensate knockout trap. The final impinger contained 300 grams of dry pre-weighed silica gel. All impingers and the condensate traps were maintained in an ice bath. Ice water was continuously circulated in the condenser and the XAD-2 module to maintain method-required temperature. A control console with a leakless vacuum pump, a calibrated orifice, and dual inclined manometers was connected to the final impinger via an umbilical cord to complete the sample train.

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

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

5.2.2 EPA Method 0010 Sample Recovery

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

A consistent procedure was employed for sample recovery:

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

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

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

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

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

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

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

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

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

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

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

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

5.2.3 EPA Method 0010 Sample Analysis

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

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

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

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

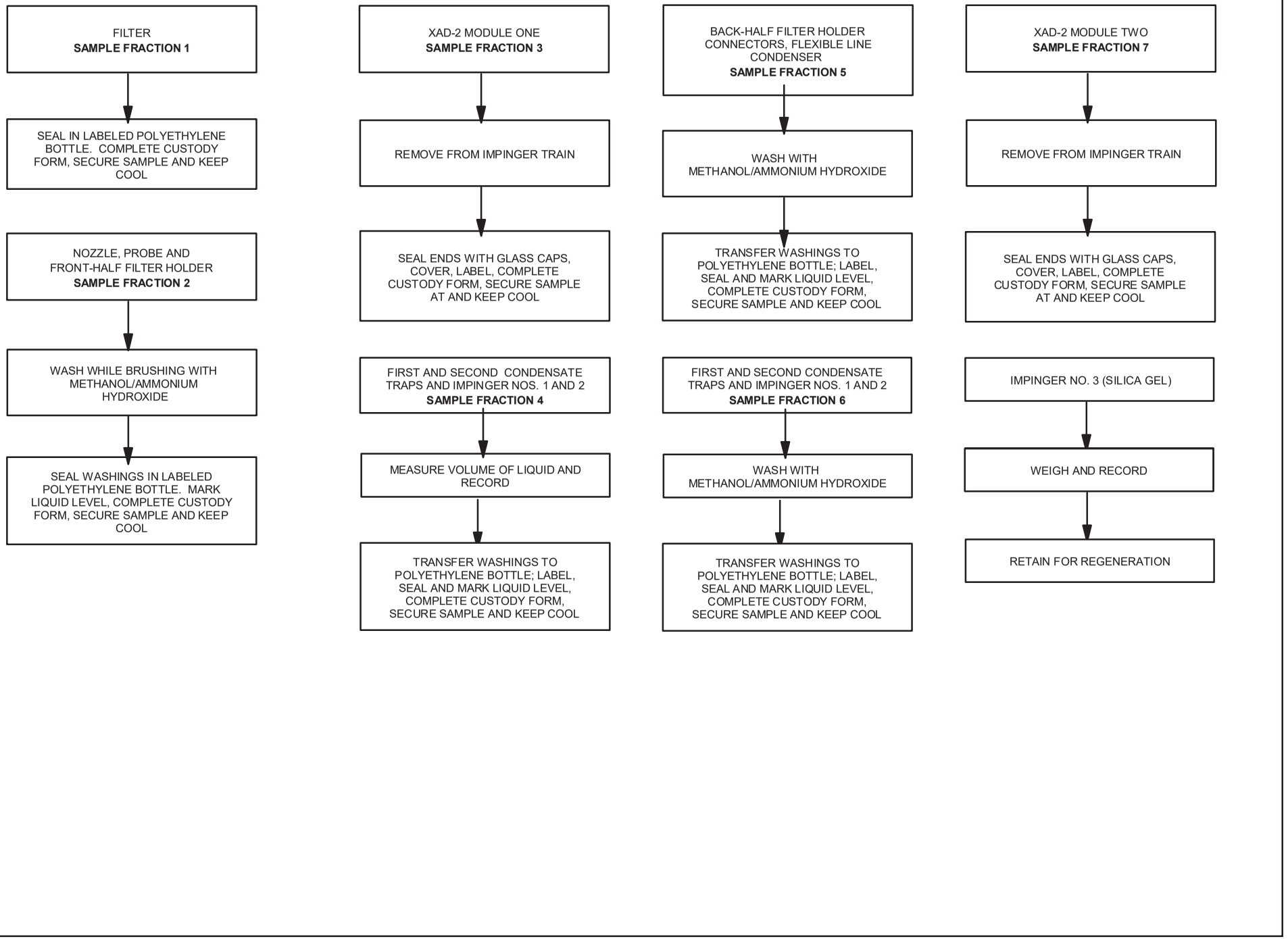


FIGURE 5-2
HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010

IASDATA\CHEMOURS\15418.002.017\FIGURE 5-2 EPA 0010

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

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

5.3 GAS COMPOSITION

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

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

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

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

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

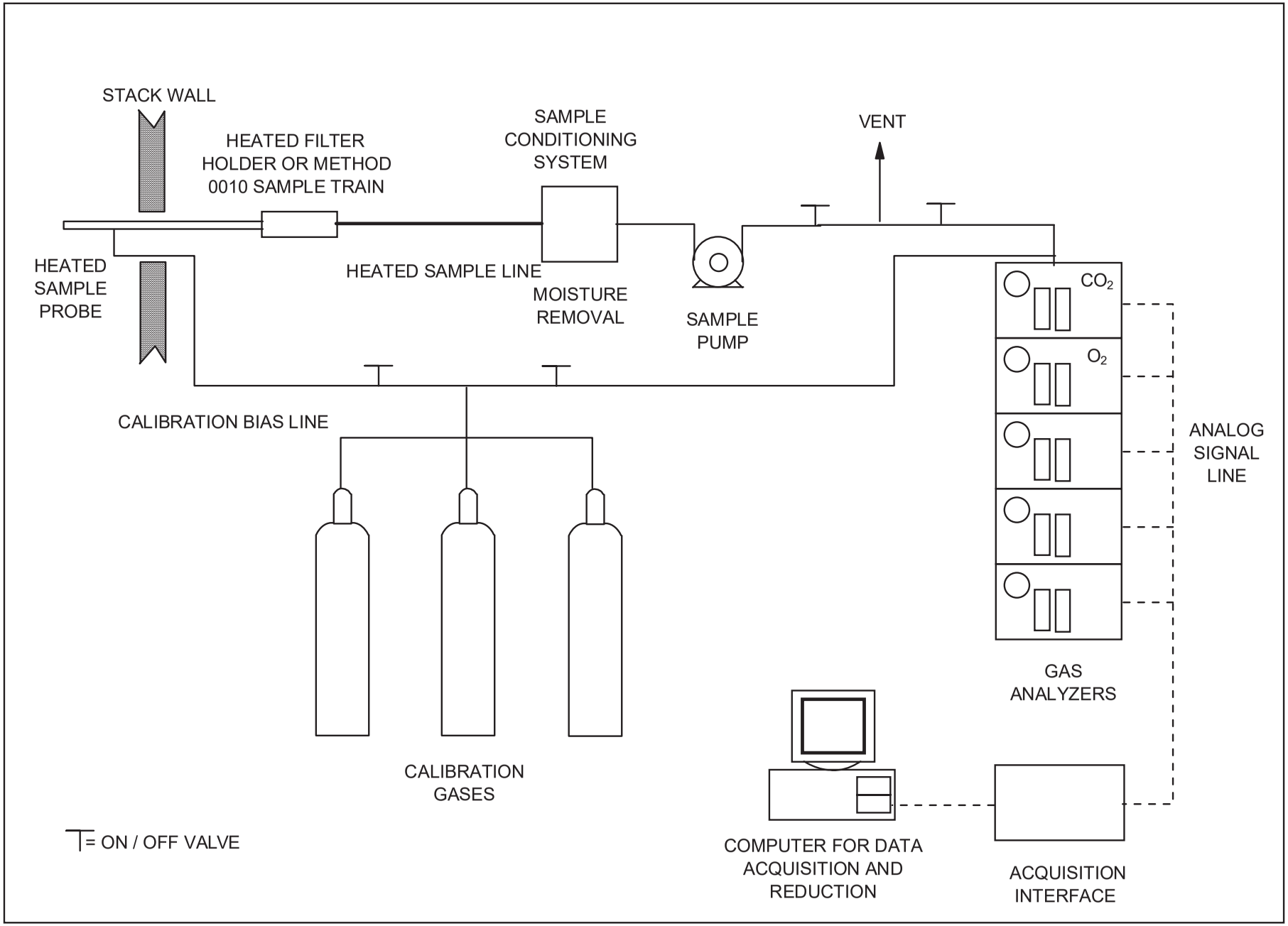


FIGURE 5-3
WESTON SAMPLING SYSTEM

I:\ASDATA\CHEMOURS\15418.002.017\FIGURE 5-3 WESTON SAMPLING SYSTEM

6. DETAILED TEST RESULTS AND DISCUSSION

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

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

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

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

The sampling nozzle was broken during the midpoint port change of Run 3 at the Division stack. Pre- and post-leak checks were good, the nozzle was replaced in kind and the second half of the test run was completed.

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

Test Data			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
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	29.95	29.95	29.98
Avg. orifice press. diff., in H_2O	1.11	1.16	1.05
Avg. dry gas meter temp., deg F	96.3	101.7	90.8
Avg. abs. dry gas meter temp., deg. R	556	562	551
Total liquid collected by train, ml	28.2	35.4	31.1
Std. vol. of H_2O vapor coll., cu.ft.	1.33	1.67	1.46
Dry gas meter calibration factor	0.9944	0.9944	0.9944
Sample vol. at meter cond., dcf	55.120	56.473	54.769
Sample vol. at std. cond., dscf [(1)]	52.201	52.969	52.428
Percent of isokinetic sampling	96.9	97.2	99.5
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.	0.025	0.031	0.027
Mole fraction of dry gas	0.975	0.969	0.973
Molecular wt. of wet gas, lb/lb mole	28.57	28.51	28.54
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-6.50	-6.50	-6.50
Absolute pressure, in. Hg	29.47	29.47	29.50
Avg. temperature, deg. F	94	100	88
Avg. absolute temperature, deg.R	554	560	548
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	40.6	41.7	39.3
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	15349	15767	14878
Avg. gas stream volumetric flow, dscf/min.	14036	14203	13736

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

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

TEST DATA			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	452.55	239.11	106.00
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	306.09	159.38	71.39
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	1.91E-08	9.95E-09	4.46E-09
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	1.61E-02	8.48E-03	3.67E-03
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	2.03E-03	1.07E-03	4.62E-04

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

Test Data			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
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	29.95	29.95	29.94
Avg. orifice press. diff., in H_2O	1.13	1.22	1.24
Avg. dry gas meter temp., deg F	89.3	99.0	77.5
Avg. abs. dry gas meter temp., deg. R	549	559	538
Total liquid collected by train, ml	38.1	32.0	33.0
Std. vol. of H_2O vapor coll., cu.ft.	1.8	1.5	1.6
Dry gas meter calibration factor	0.9834	0.9834	0.9834
Sample vol. at meter cond., dcf	55.877	60.071	61.740
Sample vol. at std. cond., dscf [(1)]	53.002	55.999	59.835
Percent of isokinetic sampling	94.3	99.5	105.3
GAS STREAM COMPOSITION DATA:			
CO_2, % by volume, dry basis	0.0	0.0	0.0
O_2, % by volume, dry basis	20.9	20.9	20.9
N_2, % by volume, dry basis	79.1	79.1	79.1
Molecular wt. of dry gas, lb/lb mole	28.84	28.84	28.84
H_20 vapor in gas stream, prop. by vol.	0.033	0.026	0.025
Mole fraction of dry gas	0.967	0.974	0.975
Molecular wt. of wet gas, lb/lb mole	28.48	28.55	28.56
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	3.60	3.60	3.70
Absolute pressure, in. Hg	30.21	30.21	30.21
Avg. temperature, deg. F	93	95	95
Avg. absolute temperature, deg.R	553	555	555
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	24	24	24
Avg. gas stream velocity, ft./sec.	41.5	41.5	41.8
Stack/duct cross sectional area, sq.ft.	6.31	6.31	6.31
Avg. gas stream volumetric flow, wacf/min.	15699	15684	15810
Avg. gas stream volumetric flow, dscf/min.	14642	14667	14808

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

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

TEST DATA			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	24.37	7.97	11.19
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	16.23	5.03	6.60
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	1.01E-09	3.14E-10	4.12E-10
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	8.90E-04	2.80E-04	3.70E-04
HFPO Dimer Acid (From Inlet Data)	1.61E-02	8.48E-03	3.67E-03
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.12E-04	3.53E-05	4.66E-05
Carbon Bed Removal Efficiency, %	94.5	96.7	89.9

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

Test Data			
Run number	1	2	3
Location	Divison Stack	Divison Stack	Divison Stack
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
SAMPLING DATA:			
Sampling duration, min.	96.0	96.0	96.0
Nozzle diameter, in.	0.160	0.160	0.160
Cross sectional nozzle area, sq.ft.	0.000140	0.000140	0.000140
Barometric pressure, in. Hg	29.94	29.78	29.89
Avg. orifice press. diff., in H_2O	1.00	1.09	0.83
Avg. dry gas meter temp., deg F	85.2	94.3	74.1
Avg. abs. dry gas meter temp., deg. R	545	554	534
Total liquid collected by train, ml	29.4	24.0	38.6
Std. vol. of H_2O vapor coll., cu.ft.	1.4	1.1	1.82
Dry gas meter calibration factor	0.9979	0.9979	0.9979
Sample vol. at meter cond., dcf	55.361	59.405	51.299
Sample vol. at std. cond., dscf [(1)]	53.647	56.337	50.640
Percent of isokinetic sampling	102.9	104.3	108.0
GAS STREAM COMPOSITION DATA:			
CO_2, % by volume, dry basis	0.0	0.0	0.0
O_2, % by volume, dry basis	20.9	20.9	20.9
N_2, % by volume, dry basis	79.1	79.1	79.1
Molecular wt. of dry gas, lb/lb mole	28.84	28.84	28.84
H_20 vapor in gas stream, prop. by vol.	0.025	0.020	0.035
Mole fraction of dry gas	0.975	0.980	0.965
Molecular wt. of wet gas, lb/lb mole	28.56	28.62	28.46
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:			
Static pressure, in. H_2O	-0.35	-0.35	-0.35
Absolute pressure, in. Hg	29.91	29.75	29.86
Avg. temperature, deg. F	90	93	88
Avg. absolute temperature, deg.R	550	553	548
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	12	12	12
Avg. gas stream velocity, ft./sec.	69.3	72.2	62.8
Stack/duct cross sectional area, sq.ft.	7.07	7.07	7.07
Avg. gas stream volumetric flow, wacf/min.	29383	30643	26646
Avg. gas stream volumetric flow, dscf/min.	27506	28491	24747

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

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

TEST DATA			
Run number	1	2	3
Location	Divison Stack	Divison Stack	Divison Stack
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
LABORATORY REPORT DATA, ug.			
HFPO Dimer Acid	22.04	33.02	14.60
EMISSION RESULTS, ug/dscm.			
HFPO Dimer Acid	14.50	20.69	10.18
EMISSION RESULTS, lb/dscf.			
HFPO Dimer Acid	9.06E-10	1.29E-09	6.36E-10
EMISSION RESULTS, lb/hr.			
HFPO Dimer Acid	1.49E-03	2.21E-03	9.44E-04
EMISSION RESULTS, g/sec.			
HFPO Dimer Acid	1.88E-04	2.78E-04	1.19E-04

APPENDIX A
PROCESS OPERATIONS DATA

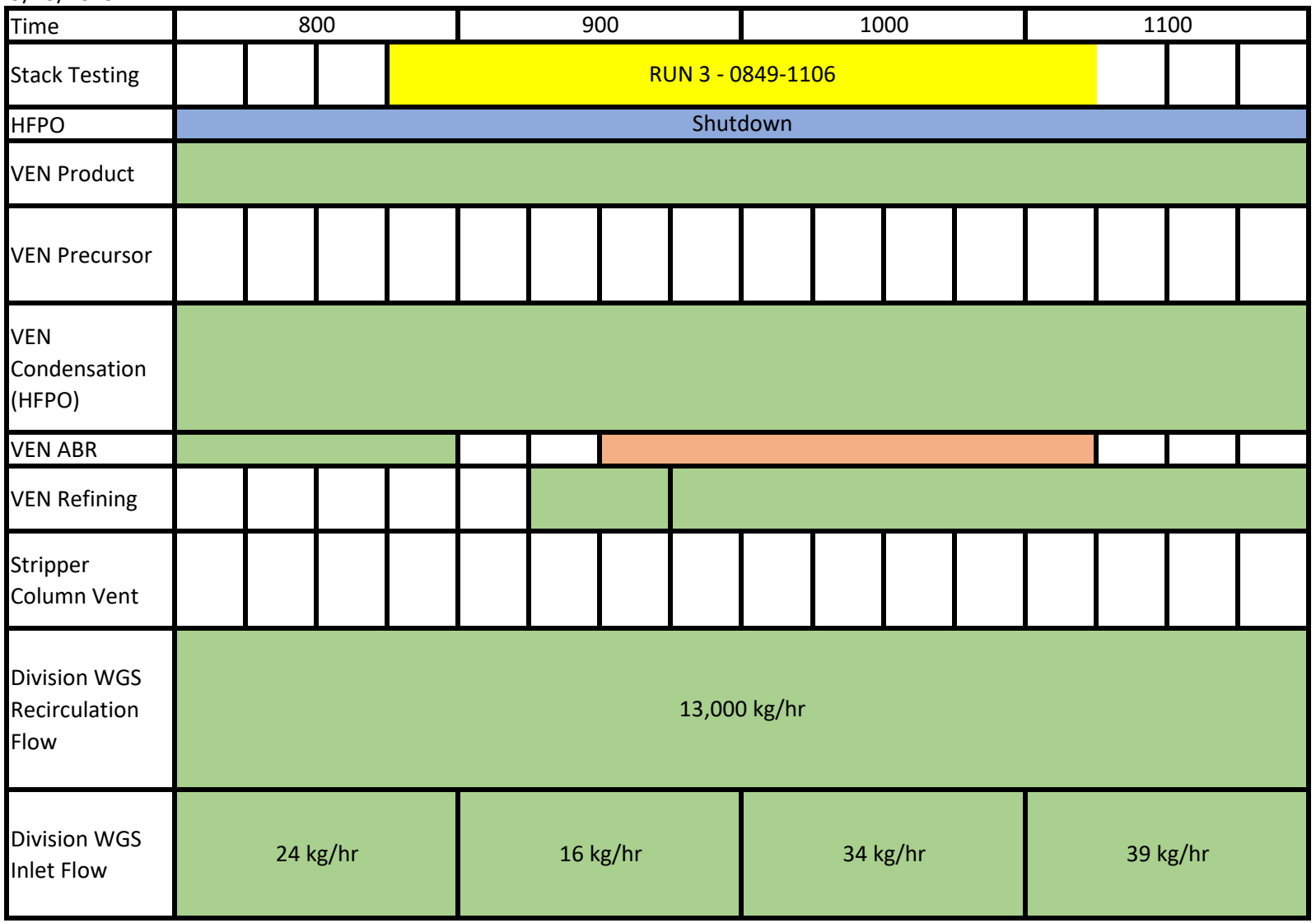
VE North

Date:
9/24/2019

Time	900	1000	1100	1200	1300	1400	1500	1600	1700
Stack Testing		RUN 1: 1002-1232				RUN 2 - 1355-1554			
HFPO									
VEN Product									
VEN Precursor									
VEN Condensation (HFPO)									
VEN ABR									
VEN Refining									
Stripper Column Vent									
Division WGS Recirculation Flow	13,000 kg/hr								
Division WGS Inlet Flow	5 kg/hr		43 kg/hr	51 kg/hr	57 kg/hr	65 kg/hr	60 kg/hr		55 kg/hr

VE North

Date:
9/25/2019



APPENDIX B
RAW AND REDUCED TEST DATA

INLET

Sample and Velocity Traverse Point Data Sheet - Method 1

Client Chemours
Loaction/Plant Fayetteville NC
Source VE North Carbon Inlet

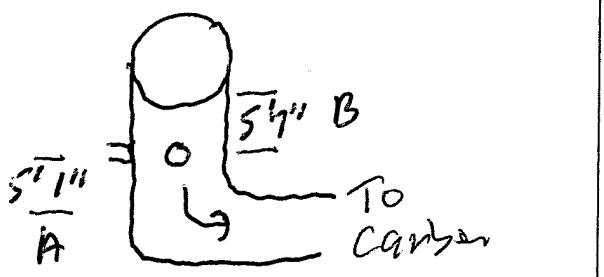
Operator AS
Date 6-13-18
W.O. Number

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

Distance from far wall to outside of port (in.) = C	54 5/4"
Port Depth (in.) = D	20 5/8"
Depth of Duct, diameter (in.) = C-D	34"
Area of Duct (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

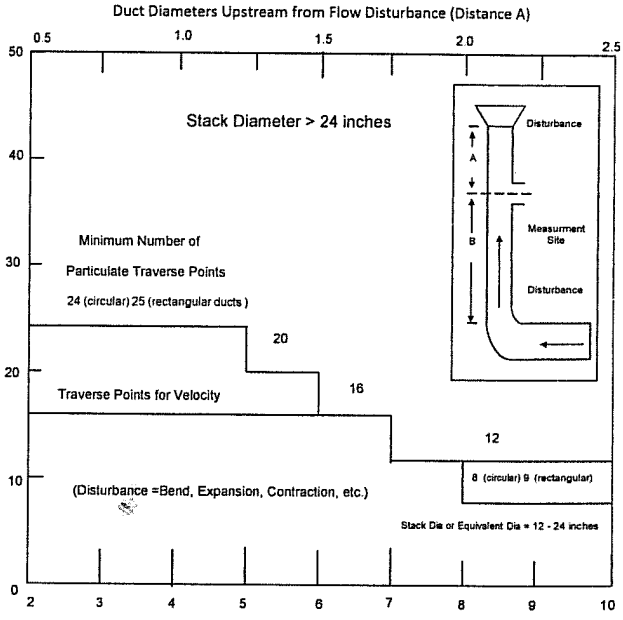
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	.021	3/4	21 3/8
2	.067	2 1/4	22 7/8
3	.118	4	24 3/8
4	.177	6	26 3/8
5	.250	8 1/2	29 1/8
6	.356	12 1/8	32 3/4
7	.644	21 7/8	42 1/2
8	.750	25 1/2	46 1/8
9	.823	28	48 3/8
10	.882	30	50 3/8
11	.933	31 3/4	52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

CEM 3 Point(Long Measurment Line) Stratificaton Point Locations

1	0.167		
2	0.50		
3	0.833		

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

Duct Diameters Upstream from Flow Disturbance (Distance A)



Duct Diameters Downstream from Flow Disturbance (Distance B)

Traverse Point Location Percent of Stack -Circular

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

Traverse Point Location Percent of Stack -Rectangular

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

WESTON MANAGERS DESIGNERS/CONSULTANTS

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

Test Data			
Run number	1	2	3
Location	CBed Inlet	CBed Inlet	CBed Inlet
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
Operator	BB	BB	BB
Inputs For Calcs.			
Sq. rt. delta P	0.69628	0.71117	0.67865
Delta H	1.1133	1.1583	1.0536
Stack temp. (deg.F)	94.4	99.5	88.4
Meter temp. (deg.F)	96.3	101.7	90.8
Sample volume (act.)	55.120	56.473	54.769
Barometric press. (in.Hg)	29.95	29.95	29.98
Volume H_2O imp. (ml)	14.0	18.0	18.0
Weight change sil. gel (g)	14.2	17.4	13.1
% CO_2	0.0	0.0	0.0
% O_2	20.9	20.9	20.9
% N_2	79.1	79.1	79.1
Area of stack (sq.ft.)	6.305	6.305	6.305
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	-6.50	-6.50	-6.50
Nozzle dia. (in.)	0.215	0.215	0.215
Meter box cal.	0.9944	0.9944	0.9944
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

CB Inlet

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.017			
Project ID	Chemours	% Moisture	2	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		
Samp. Loc. ID	IN	Silica gel (g)		
Run No.ID	1	CO2, % by Vol	0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	23SEP2019	Temperature (°F)	75	
Source/Location	VE North CB Inlet	Meter Temp (°F)	75	
Sample Date	9/24/19 ✓	Static Press (in H_2O)	-6.5	-6.5 ✓
Baro. Press (in Hg)	29.95 ✓			
Operator	BB ✓	Ambient Temp (°F)	75	

Meter Box ID	24		
Meter Box Y	.9944 ✓		
Meter Box Del H	1.9231		
Probe ID / Length	705	Sample Train (ft^3)	
Probe Material	Boro	Leak Check @ (in Hg)	
Pitot / Thermocouple ID	705	Pitot leak check good	yes / no
Pitot Coefficient	0.84 ✓	Pitot Inspection good	yes / no
Nozzle ID	.215	Method 3 System good	yes / no
Nozzle Measurements	.215 .215 .215	**Temp Check**	
Avg Nozzle Dia (in)	.215 ✓	Meter Box Temp	
Area of Stack (ft^2)	96 6.305 ✓	Reference Temp	
Sample Time	96 ✓	Pass/Fail (+/- 2°)	
Total Traverse Pts	24 ✓	Temp Change Response ?	

K Factor 2.28

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.011	0.010	0.010
Leak Check @ (in Hg)	15"	10"	16"
Pitot leak check good	yes / no	yes / no	yes / no
Pitot Inspection good	yes / no	yes / no	yes / no
Method 3 System good	yes / no	yes / no	yes / no
	Pre-Test Set		Post-Test Set
Meter Box Temp	85		
Reference Temp	86		
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.		SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
		0	1002 ✓			987.648							BB		
A	1	4		.64	1.46	990.4	91	91	124	117	66	4.5	548		
	2	8		.62	1.41	993.0	91	90	125	127	58	4.5	46		
	3	12		.60	1.37	995.6	92	91	125	125	55	4.5	45		
	4	16		.57	1.30	998.1	92	92	125	122	57	4.5	49		
	5	20		.57	1.30	1000.6	92	93	125	125	59	4.5	47		
	6	24		.55	1.25	1003.3	92	94	125	127	57	4.5	49		
	7	28		.43	.98	1005.4	92	94	125	125	61	4.5	48		
	8	32		.42	.96	1007.7	93	95	125	122	61	4	48		
	9	36		.40	.91	1009.9	93	95	125	126	61	4	51		
	10	40		.40	.91	1011.9	93	95	125	127	61	4	50		28.614
	11	44		.40	.91	1014.2	93	96	125	124	62	4	48		
	12	48	1050	.37	.84	1016.262	94	96	125	124	62	4	52		
						1016.344									
B	1	4	1144	.45	1.0	1018.7	96	96	125	124	61	4	55		
	2	8		.45	1.0	1020.9	96	98	125	125	62	4	54		
	3	12		.45	1.0	1022.3	96	98	125	125	63	4	46		
	4	16		.46	1.0	1025.4	96	98	125	125	62	4	52		
	5	20		.46	1.1	1027.7	96	99	125	126	61	4	47		26.506
	6	24		.50	1.14	1030.1	96	99	125	124	62	4.5	50		
	7	28		.50	1.14	1032.2	97	100	125	124	61	4.5	50		
	8	32		.50	1.14	1034.5	97	100	125	127	61	4.5	50		
	9	36		.52	1.19	1036.8	97	100	125	124	62	4.5	46		
	10	40		.52	1.19	1039.2	97	100	125	124	63	4.5	45		
	11	44		.50	1.14	1041.5	97	100	125	124	61	4.5	54		
	12	48	1232 ✓	.42	.98	1043.350	97	100	125	123	61	4.5	51		
				Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
				.4875	1.113	55.182	94.41 ✓	96.25	124/125	117/127	66	4.5	45/52		

WESTON SOLUTIONS

Avg Sqrt Delta P	Avg Sqrt Del H
~~.6921~~	~~1.0551~~
.69627 ✓	1.0522 ✓

Comments: 55.120 ✓

EPA Method 0010 from EPA SW-846

96.9 170 2.5%

14180 dscf

and

CB INLET

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	Chemours	% Moisture	2	
W.O.#	15418.002.017	Impinger Vol (ml)		
Project ID	Chemours	Silica gel (g)		
Mode/Source ID	Carbon Bed	CO2, % by Vol	0	
Samp. Loc. ID	IN	O2, % by Vol	20.9	
Run No.ID	2	Temperature (°F)	95	
Test Method ID	M0010	Meter Temp (°F)	100	
Date ID	23SEP2019	Static Press (in H_2O)	-6.5	-6.5 ✓
Source/Location	VE North CB Inlet	Ambient Temp (°F)	85	
Sample Date	9-24-19 ✓			
Baro. Press (in Hg)	29.95 ✓			
Operator	BB ✓			

Meter Box ID	24			
Meter Box Y	.9944 ✓			
Meter Box Del H	1.9231			
Probe ID / Length	705	Sample Train (ft^3)	K Factor	2.28
Probe Material	Boro	Leak Check @ (in Hg)	Initial	0.005 / 15"
Pitot / Thermocouple ID	705	Pitot leak check good	Mid-Point	0.005 / 10"
Pitot Coefficient	0.84 ✓	Pitot Inspection good	Final	0.005 / 10"
Nozzle ID	.215	Method 3 System good		
Nozzle Measurements	.215 / .215 / .215	**Temp Check**	Pre-Test Set	Post-Test Set
Avg Nozzle Dia (in)	.215 ✓	Meter Box Temp	87 86 90	
Area of Stack (ft^2)	6.305 ✓	Reference Temp		
Sample Time	96 ✓	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Total Traverse Pts	24 ✓	Temp Change Response ?	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1355 ✓			44,360						BB			
A 1	4		.64	1.46	47.1	99	102	125	127	66	~~6~~5.5	55		
2	8		.61	1.39	49.8	99	101	125	125	60	5.5	57		
3	12		.59	1.34	52.3	99	101	125	124	54	5.5	55		
4	16		.58	1.32	~~53.6~~ 54.9	99	101	125	126	54	5.5	57		
5	20		.56	1.28	57.5	99	102	125	127	54	5.5	57		
6	24		.55	1.25	60.1	99	102	125	124	55	5.5	52		
7	28		.46	1.05	62.4	99	102	125	124	55	~~4~~ 5	55		29.04
8	32		.42	.96	64.6	99	102	125	126	55	4.5	56		
9	36		.43	.98	66.9	99	102	125	127	56	4.5	53		
10	40		.43	.98	69.1	99	102	125	125	55	4.5	52		
11	44		.40	.91	71.4	99	102	125	124	56	4.5	53		
12	48	1443	.38	.86	73.400	100	102	125	125	57	4.5	55		
					74.103									
B 1	4	1506	.50	1.14	75.8	100	102	125	124	67	4.5	52		27.433
2	8		.48	1.1	78.1	100	101	125	124	59	4.5	50		
3	12		.48	1.1	80.4	100	101	125	126	56	4.5	52		
4	16		.48	1.1	82.7	100	101	125	125	56	4.5	53		
5	20		.48	1.1	84.9	99	101	125	124	57	4.5	51		
6	24		.50	1.14	87.1	100	102	125	126	58	5	53		
7	28		.52	1.19	89.4	100	102	125	123	58	5.5	51		
8	32		.55	1.25	91.1	100	102	125	126	58	5.5	54		
9	36		.53	1.21	94.2	100	102	125	128	59	5.5	54		
10	40		.53	1.21	96.7	100	102	125	126	59	5.5	55		
11	44		.55	1.25	99.1	100	102	125	123	59	5.5	56		
12	48	~~1554~~ 1554	.54	1.23	101.536	100	102	125	126	59	5.5	58		
		BB	Avg Delta P ✓	Avg Delta H ✓	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			.508	1.158 ✓	56.477	~~100.5~~ 99.5	101.71	125/125	123/128	67	5.5	51/58		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			.713	1.076										

WESTON

EPA Method 0010 from EPA SW-846

.711 ✓ 1.074 ✓ ✓ amd

98.2 Isa 3.0 % m
14230 Dsct

CB INLET

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Field	Value
Client	Chemours
W.O.#	15418.002.017
Project ID	Chemours
Mode/Source ID	Carbon Bed
Samp. Loc. ID	IN
Run No.ID	3
Test Method ID	M0010
Date ID	23SEP2019
Source/Location	VE North CB Inlet
Sample Date	9-25-19 ✓
Baro. Press (in Hg)	29.98 ✓
Operator	BB ✓

Stack Conditions	Assumed	Actual
% Moisture	2	
Impinger Vol (ml)		
Silica gel (g)		
CO2, % by Vol	0	
O2, % by Vol	20.9	
Temperature (°F)	95	
Meter Temp (°F)	75	
Static Press (in H_2O)	-6.5	-6.5 ✓
Ambient Temp (°F)	80	

Field	Value		
Meter Box ID	24		
Meter Box Y	0.9944 ✓		
Meter Box Del H	1.9231		
Probe ID / Length	705		
Probe Material	Boro		
Pitot / Thermocouple ID	705		
Pitot Coefficient	0.84 ✓		
Nozzle ID	.215		
Nozzle Measurements	.215	.215	.215
Avg Nozzle Dia (in)	.215 ✓		
Area of Stack (ft²)	6.305 ✓		
Sample Time	96 ✓		
Total Traverse Pts	24 ✓		

K Factor 2.28

	Initial	Mid-Point	Final
Sample Train (ft³)	0.005	0.005	0.005
Leak Check @ (in Hg)	15"	10"	10"
Pitot leak check good	(yes) / no	(yes) / no	(yes) / no
Pitot Inspection good	(yes) / no	(yes) / no	(yes) / no
Method 3 System good	~~yes / no~~	~~yes / no~~	~~yes / no~~

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp		84
Reference Temp		83
Pass/Fail (+/- 2°)	Pass / Fail	(Pass) / Fail
Temp Change Response ?	yes / no	(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	0849 ✓			101.912									
A 1	4		.60	1.37	104.4	84	85	125	125	57	5	49		
2	8		.55	1.25	107.1	85	85	125	125	52	5	50		
3	12		.55	1.25	109.6	85	85	125	126	51	5	51		
4	16		.53	1.21	112.0	86	86	125	125	52	5	50		
5	20		.51	1.16	114.6	86	87	125	125	53	5	51		
6	24		.48	1.09	116.9	86	87	125	125	55	4.5	51		//
7	28		.40	.91	119.2	86	88	125	125	56	4.5	50		
8	32		.37	.84	121.3	87	88	125	125	56	4	50		27.556
9	36		.37	.84	123.3	87	88	125	125	57	4	52		
10	40		.37	.84	125.4	87	89	125	125	57	4	52		
11	44		.36	.82	127.5	87	89	125	125	55	4	53		
12	48	0937	.36	.82	129.468	87	90	125	126	58	4	52		
					129.675									
B 1	4	1018	.45	1.026	131.8	91	94	127	130	60	4	49		
2	8		.45	1.02	133.4	90	93	125	124	60	4.5	47		27.213 ✓
3	12		.43	.98	136.3	90	93	125	124	58	5	47		
4	16		.45	1.02	138.5	90	93	125	126	57	5	47		
5	20		.45	1.02	140.8	90	94	125	125	59	5	47		
6	24		.50	1.14	143.1	91	94	125	125	60	5	47		
7	28		.50	1.14	145.6	91	94	125	126	61	5	49		
8	32		.50	1.14	147.6	91	95	125	126	60	5	46		
9	36		.50	1.14	150.0	91	95	125	123	59	5	45		
10	40		.50	1.14	152.2	91	95	125	126	59	5	46		
11	44		.50	1.14	154.4	91	96	125	127	59	5	46		
12	48	1106 ✓	.43	.98	156.888	91	96	125	123	60	5	47		
			Avg Delta P .463 ✓	Avg Delta H 1.053	Total Volume ~~54.976~~	Avg Ts 88.4 ✓	Avg Tm 90.8 ✓	Min/Max 125/127	Min/Max 123/130	Max 60	Max Vac 5	Min/Max 46/53		
			Avg Sqrt Delta P .680	Avg Sqrt Del H ~~1.026~~	Comments:									

WESTON

EPA Method 0010 from EPA SW-846

✓ .67865 1.024 ✓ 54.769 ✓✓

amd

99.5 ~~130~~ 2.7% M
13735 dscfm

CB INLET

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.017
Location/Plant	Fayetteville, NC	Source & Location	VE North CB Inlet

Run No. 1 — Sample Date 9/24/19 — Recovery Date 9/24/19

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

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	12	127	100	4					314.3	
Initial	0	100	100	0					300	
Gain	10	0	0	4				14 J	14.3 J	28.2

Impinger Color all clear — Labeled? ✓

Silica Gel Condition blue 90% — Sealed? ✓

Run No. 2 — Sample Date 9/24/19 — Recovery Date 9/24/19

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

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	19	100	100	4					317.4	
Initial	0	100	100	0					300	
Gain	19	0	0	4				18 J	17.4 J	35.4

Impinger Color all clear — Labeled? ✓

Silica Gel Condition blue 90% — Sealed? ✓

Run No. 3 — Sample Date 9/25/19 — Recovery Date 9/25/19

Sample I.D. Chemours - Carbon Bed - IN - 3 - M0010 - — Analyst JNJ — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	14	100	100	4					313.1	
Initial	0	100	100	0					300	
Gain	14	0	0	4				18 J	13.1 J	31.1

Impinger Color all clear — Labeled? ✓

Silica Gel Condition blue 90% — Sealed? ✓

Check COC for Sample IDs of Media Blanks

Balance Check

Date	Reference	Actual	
9/24/19	500.0	499.9	JNJ
9/25/19	500.0	500.0	JNJ

OUTLET

Sample and Velocity Traverse Point Data Sheet - Method 1

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

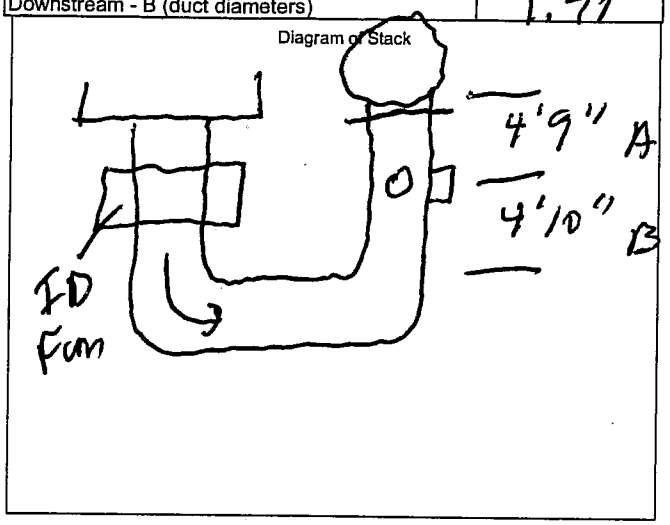
Duct Type	☒ Circular	☐ Rectangular Duct	Indicate appropriate type	
Traverse Type	☒ Particulate Traverse	☐ Velocity Traverse	☐ CEM Traverse	

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

N

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

Diagram of Stack



Traverse Point Locations

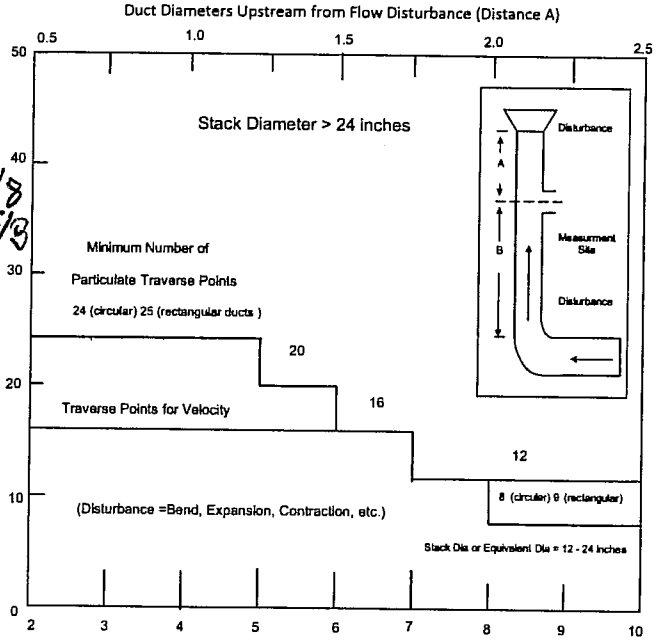
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	.021	3/4	21 3/8
2	.067	2 1/4	22 7/8
3	.118	4	24 5/8
4	.177	6	26 5/8
5	.250	8 1/2	29 1/8
6	.356	12 1/8	32 3/4
7	.644	21 5/8	42 1/2
8	.75	25 1/2	~~46 1/8~~ 46 1/8
9	.823	28	~~50 5/8~~ 48 5/8
10	.882	30	50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

CEM 3 Point(Long Measurment Line) Stratificaton Point Locations

1	0.167		
2	0.50		
3	0.833		

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

Duct Diameters Upstream from Flow Disturbance (Distance A)



Duct Diameters Downstream from Flow Disturbance (Distance B)

Traverse Point Location Percent of Stack -Circular

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

Traverse Point Location Percent of Stack -Rectangular

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

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

Test Data			
Run number	1	2	3
Location	CBed Outlet	CBed Outlet	CBed Outlet
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
Operator	KA/NG	KA/NG	KA/NG
Inputs For Calcs.			
Sq. rt. delta P	0.72106	0.71980	0.72592
Delta H	1.1338	1.2238	1.2383
Stack temp. (deg.F)	92.8	95.0	94.6
Meter temp. (deg.F)	89.3	99.0	77.5
Sample volume (act.)	55.877	60.071	61.740
Barometric press. (in.Hg)	29.95	29.95	29.94
Volume H_2O imp. (ml)	23.0	14.0	16.0
Weight change sil. gel (g)	15.1	18.0	17.0
% CO_2	0.0	0.0	0.0
% O_2	20.9	20.9	20.9
% N_2	79.1	79.1	79.1
Area of stack (sq.ft.)	6.305	6.305	6.305
Sample time (min.)	96	96	96
Static pressure (in.H_2O)	3.6	3.6	3.7
Nozzle dia. (in.)	0.215	0.215	0.215
Meter box cal.	0.9834	0.9834	0.9834
Cp of pitot tube	0.84	0.84	0.84
Traverse points	24	24	24

CB outlet

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Page 1 of 1

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.017			
Project ID	Chemours	% Moisture	2	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		23
Samp. Loc. ID	OUT	Silica gel (g)		15.1
Run No.ID	1	CO2, % by Vol	0.0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	23SEP2019	Temperature (°F)	89	92.750
Source/Location	VE North Outlet	Meter Temp (°F)	84	89.250
Sample Date	9/24/19 ✓	Static Press (In H_2O)	3.7	3.6 ✓
Baro. Press (in Hg)	KA 29.95 ✓			
Operator	KA/NS ✓	Ambient Temp (°F)	73	

Meter Box ID	32		
Meter Box Y	0.9834		
Meter Box Del H	1.7175		
Probe ID / Length	B 707	Sample Train (ft³)	
Probe Material	Boro	Leak Check @ (in Hg)	
Pitot / Thermocouple ID		Pitot leak check good	
Pitot Coefficient	0.84 ✓	Pitot Inspection good	
Nozzle ID	.245	Method 3 System good	
Nozzle Measurements	.245 .245 .245	**Temp Check**	
Avg Nozzle Dia (in)	.245 ✓	Meter Box Temp	
Area of Stack (ft²)	6.305 ✓	Reference Temp	
Sample Time	KA 96 min ✓	Pass/Fail (+/- 2°)	
Total Traverse Pts	24 ✓	Temp Change Response ?	

K Factor ~~2.3~~ 1.A 2.11 JMD

	Initial	Mid-Point	Final
	0.002	0.000	0.001
	2	6	5
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no

Pre-Test Set	Post-Test Set
	88 89 JMD
Pass / Fail	Pass / Fail
yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (In Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1002 ✓			692.997									
A 1	4		.50	~~1.0~~ 1.1	694.1	92	81	115	116	66	5	69		
2	8		.51	1.1	696.6	92	82	116	116	64	5	62		
3	12		.53	1.1	699.1	92	82	116	115	63	5	62		
4	16		.58	1.2	701.6	92	83	115	115	61	5	62		
5	20		.64	1.3	704.3	92	84	115	115	61	5	62		
6	24		.64	1.3	707.0	92	85	117	115	61	5	63		
7	28		.50	1.1	709.4	92	86	119	121	61	5	60		
8	32		.39	.82	711.6	92	86	120	120	61	3	57		
9	36		.31	.65	713.5	92	87	120	119	61	3	57		
10	40		.27	.57	715.3	92	88	120	120	63	3	60		23.634
11	44		.26	.53	716.9	92	89	120	120	63	3	60		
12	48	1050	.23	.48	~~718.625~~ 716.628	92	90	120	120	64	2	61		
														717.914
B 1	4	1144	~~.32~~ KA .39	~~.67~~ .82	720.0	93	94	120	120	65	3	64		1.286
2	8		.37	.78	722.0	93	94	120	120	63	3	62		HPLC
3	12		.40	.84	724.1	93	93	120	121	63	4	60		
4	16		.44	.92	726.4	93	93	120	120	61	5	58		
5	20		~~.45~~ KA .48	1.0	728.8	94	93	120	120	62	5	59		32.243
6	24		.55	1.2	731.4	93	93	120	120	62	6	54		
7	28		.82	1.7	734.5	94	93	120	120	63	8	61		
8	32		.82	1.7	737.6	94	94	121	120	64	8	62		
9	36		.84	1.8	740.7	94	94	120	119	64	8	61		
10	40		.84	1.8	744.0	94	93	120	120	63	8	60		
11	44		.81	1.7	747.1	94	93	120	120	64	8	61		
12	48	1232 ✓	.81	1.7	750.157	93	92	120	120	64	8	62		
			Avg Delta P	Avg Delta H	Total Volume ✓	Avg Ts ✓	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			.538 ✓	1.134 ✓	55.877	92.750	89.250	115/120	115/120	66	8	57/64		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments									
			.7206	1.047 ✓	✓✓									

~~.7214~~

ISO: 94.327
moist: 3.275
SCFM: 143840.975

JMD

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	Chemours	% Moisture	2	
W.O.#	15418.002.017	Impinger Vol (ml)		
Project ID	Chemours	Silica gel (g)		
Mode/Source ID	Carbon Bed	CO2, % by Vol	0.0	
Samp. Loc. ID	OUT	O2, % by Vol	20.9	
Run No.ID	2	Temperature (°F)	97	95.000
Test Method ID	M0010	Meter Temp (°F)	98	99.000
Date ID	23SEP2019	Static Press (in H_2O)	3.6	3.6 ✓
Source/Location	VE North Outlet	Ambient Temp (°F)	84	
Sample Date	9/24/19 ✓			
Baro. Press (in Hg)	29.95 ✓			
Operator	KA/NG ✓			

Meter Box ID	32		
Meter Box Y	0.9837		
Meter Box Del H	1.715		
Probe ID / Length	707	Sample Train (ft³)	0.007 / 0.000 / 0.000
Probe Material	Boro	Leak Check @ (in Hg)	8 / 8
Pitot / Thermocouple ID		Pitot leak check good	yes / no
Pitot Coefficient	0.84 ✓	Pitot Inspection good	yes / no
Nozzle ID	.215	Method 3 System good	yes / no
Nozzle Measurements	.215 / .215 / .215	**Temp Check**	Pre-Test Set / Post-Test Set
Avg Nozzle Dia (in)	.215 ✓	Meter Box Temp	86
Area of Stack (ft²)	6.305 ✓	Reference Temp	83
Sample Time	96 min ✓	Pass/Fail (+/- 2°)	Pass / Fail
Total Traverse Pts	24 ✓	Temp Change Response ?	yes / no

K Factor KA 1.2.3

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 (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1355 ✓			750.357									
A 1	4		.50	KA 1.2	752.4	95	104	120	120	66	3	55		
2	8		.53	KA 1.2	755.2	95	102	120	121	60	3	48		
3	12		.53	1.2	757.6	95	101	120	119	58	3	42		
4	16		.54	1.2	760.3	95	100	120	120	59	3	41		
5	20		.58	1.3	763.1	95	100	120	121	60	3	42		
6	24		.59	1.4	765.8	95	100	120	122	59	4	42		
7	28		.50	1.2	768.4	95	100	120	121	60	3	42		
8	32		.41	.94	770.7	95	98	120	120	61	3	42		
9	36		.35	.81	772.8	95	98	120	119	62	3	43		27.215
10	40		.31	.71	774.8	96	98	120	121	63	2	41		
11	44		.31	.71	776.8	96	98	120	120	63	2	43		
12	48	1443	.25	.58	~~778.572~~ KA 777.572	95	98	120	119	64	2	44		777.573 778.919
		KA ~~1506~~ 1506												
B 1	4		.38	.87	780.4	94	96	120	118	63	3	44		-1.341 MPLC
2	8		.37	.85	782.7	94	96	120	121	60	3	43		
3	12		.39	.90	784.8	96	96	120	121	62	3	44		
4	16		.44	1.0	787.2	95	96	120	120	62	4	44		
5	20		.47	1.1	789.8	95	96	120	121	63	4	44		
6	24		.55	1.3	792.4	95	97	120	119	64	5	46		32.856
7	28		.78	1.8	795.7	95	99	120	121	63	6	46		
8	32		.82	1.9	799.0	96	100	120	122	63	6	45		
9	36		.80	1.8	802.2	95	100	120	120	64	6	45		
10	40		.80	1.8	805.4	95	101	120	121	64	6	46		
11	44		.79	1.8	808.6	95	101	120	120	65	6	47		
12	48	1554 ✓	.79	1.8	811.768	95	101	120	120	65	6	47		
			Avg Delta P .593 ✓	Avg Delta H 1.294 ✓	Total Volume 60.071 ✓	Avg Ts 95.000 ✓	Avg Tm 99.000 ✓	Min/Max 120/120	Min/Max 118/122	Max 66	Max Vac 6	Min/Max 47/55		
			Avg Sqrt Delta P .720	Avg Sqrt Del H 1.091 ✓	Comments ✓✓									

WESTON

EPA Method 0010 from EPA SW-846

.71989

99.5 Iso 2.6 % Mc

14670 dsctn

NMd

CB OUTLET

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

			Assumed	Actual
Client	Chemours			
W.O.#	15418.002.017			
Project ID	Chemours	% Moisture	2	
Mode/Source ID	Carbon Bed	Impinger Vol (ml)		
Samp. Loc. ID	OUT	Silica gel (g)		
Run No.ID	3	CO2, % by Vol	0.0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	23SEP2019	Temperature (°F)	87	94.583
Source/Location	VE North Outlet	Meter Temp (°F)	82	77.542
Sample Date	9/23/19 ✓	Static Press (in H_2O)	3.6	3.7 ✓
Baro. Press (in Hg)	29.94 ✓			
Operator	KAING ✓	Ambient Temp (°F)	73	

Stack Conditions

Meter Box ID	32		Sample Train (ft^3)	0.093 / 0.093
Meter Box Y	0.9871 ✓		Leak Check @ (in Hg)	15 / 15
Meter Box Del H	1.7175		Pitot leak check good	yes / no / yes / no
Probe ID / Length	P707		Pitot Inspection good	yes / no / yes / no
Probe Material	Boro		Method 3 System good	yes / no / yes / no
Pitot / Thermocouple ID	P707		**Temp Check**	Pre-Test Set / Post-Test Set
Pitot Coefficient	0.84 ✓		Meter Box Temp	83 / 85
Nozzle ID	.215		Reference Temp	
Nozzle Measurements	.215 / .215 / .215		Pass/Fail (+/- 2°)	Pass / Fail / Pass / Fail
Avg Nozzle Dia (in)	.215 ✓		Temp Change Response ?	yes / no / yes / no
Area of Stack (ft^2)	6.365 ✓			
Sample Time	96 min ✓			
Total Traverse Pts	24 ✓			

K Factor 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 OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	0849 ✓			811.663									
A 1	4		.49	1.1	813.7	93	70	119	121	66	5	58		
2	8		.47	1.1	816.2	97	71	120	120	58	5	51		
3	12		.49	1.1	818.8	93	71	120	120	55	5	51		
4	16		.54	1.2	821.2	93	71	120	120	56	5	51		
5	20		.58	1.3	823.9	93	72	120	120	57	6	52		
6	24		.61	1.4	826.7	94	72	121	120	58	6	52		
7	28		.55	1.3	829.3	94	73	120	120	59	6	54		29.03
8	32		.48	1.1	831.9	94	73	120	120	59	5	54		
9	36		.43	.99	~~835~~ 834.6	94	73	120	120	60	5	55		
10	40		.39	.90	836.4	94	75	120	120	62	5	55		
11	44		.39	.90	838.7	94	76	120	120	62	5	58		
12	48	0937	.33	.76	840.693	94	76	120	120	62	4	56		
														840.913
P 1	4	1018	.37	.85	843.0	94	~~76~~ 79	120	120	65	5	58		.220
2	8		.35	.81	845.2	95	80	120	121	61	5	54		MPLC
3	12		.35	.81	847.3	96	80	120	120	62	5	55		
4	16		.39	.90	849.5	96	80	120	121	61	5	54		
5	20		.44	1.0	851.8	96	81	120	120	61	5	53		
6	24		.49	1.1	854.3	95	82	120	119	62	5	52		32.71
7	28		.77	1.8	857.5	96	82	120	121	63	8	53		
8	32		.82	1.9	860.6	96	84	120	121	64	8	54		
9	36		.82	1.9	864.1	96	84	120	120	64	8	55		
10	40		.81	1.9	867.4	96	85	120	120	63	8	56		
11	44		.80	1.8	870.4	96	85	119	120	64	8	57		
12	48	1106 ✓	.78	1.8	873.623	96	86	120	120	64	8	57		
			Avg Delta P .539 ✓	Avg Delta H 1.238 ✓	Total Volume 61.740 ✓	Avg Ts 94.583 ✓	Avg Tm 77.542 ✓	Min/Max 119/121	Min/Max ~~119/121~~	Max 55/66	Max Vac 8	Min/Max 51/58		
			Avg Sqrt Delta P .726	Avg Sqrt Del H 1.100 ✓	Comments: ✓									

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

.72592 ✓

119/121

AM

105.3

2.5%n

14800

CB OUTLET

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.017
Location/Plant	Fayetteville, NC	Source & Location	VE North Outlet

Run No. 1 — Sample Date 9/24/19 — Recovery Date 9/24/19

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

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	18	100	100	5					315.1	
Initial	0	100	100	0					300	
Gain	18	0	0	5				23	15.1	38.1

Impinger Color all clear — Labeled? ✓

Silica Gel Condition Ice 90% — Sealed? ✓

Run No. 2 — Sample Date 9/24/19 — Recovery Date 9/24/19

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

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	14	100	100	0					318	
Initial	0	100	100	0					300	
Gain	14	0	0	0				14	18	32

Impinger Color all clear — Labeled? ✓

Silica Gel Condition Ice 80% — Sealed? ✓

Run No. 3 — Sample Date 9/25/19 — Recovery Date 9/25/19

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

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	16	100	100	0					317	
Initial	0	100	100	0					300	
Gain	16	0	0	0				16	17	33

Impinger Color all clear — Labeled? ✓

Silica Gel Condition Ice 85% — Sealed? ✓

Check COC for Sample IDs of Media Blanks

WESTON SOLUTIONS

Balance Check

Date	Reference	Actual	
9/24/19	500.0	499.9	JM
9/25/19	500.0	500.0	JM

VEN CB Blank Train

SAMPLE RECOVERY FIELD DATA

Client Chemours W.O. # 15418.007.017
Location/Plant ~~Fayetteville~~ Source & Location VEN CB

Run No. 3 Sample Date 9/25/14 Recovery Date 9/25/14
Sample I.D. Blank Train Analyst _____ Filter Number _____

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

Impinger Color all clear Labeled? ✓
Silica Gel Condition blue 100% Sealed? ✓

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

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

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

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

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

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

Check COC for Sample IDs of Media Blanks

Sample and Velocity Traverse Point Data Sheet - Method 1

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

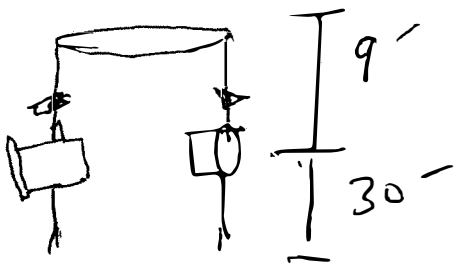
Operator MWKS
Date 11/22/12
W.O. Number 10418.00.002

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

Distance from far wall to outside of port (in.) = C	5"
Port Depth (in.) = D	12.5
Depth of Duct, diameter (in.) = C-D	37
Area of Duct (ft^2) 3/07/13 7.07	7.66
Total Traverse Points MD	12
Total Traverse Points per Port	6
Port Diameter (in.) —(Flange-Threaded-Hole)	4"
Monorail Length	8'
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	
Equivalent Diameter = (2*L*W)/(L+W)	

Flow Disturbances	
Upstream - A (ft)	9' 12' 9'
Downstream - B (ft)	18' 30'
Upstream - A (duct diameters)	9.2
Downstream - B (duct diameters)	27.6

Diagram of Stack



Traverse Point Locations

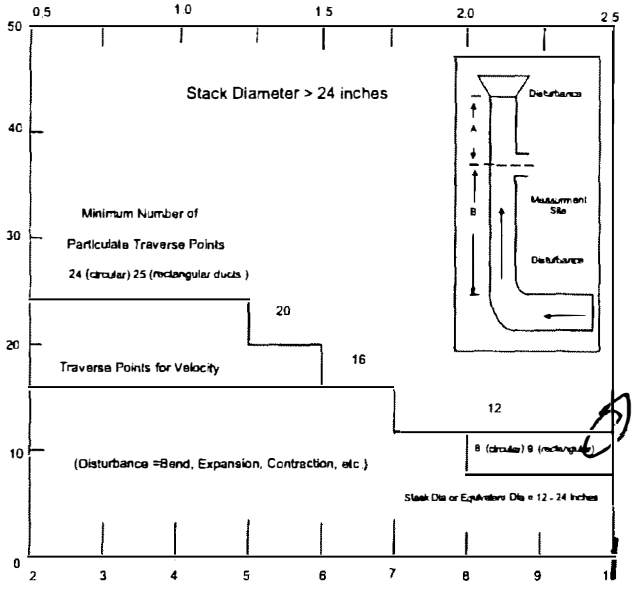
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)	
1	4.4	1.62	19 3/4	20 1/8
2	14.6	5.40	23 1/4	24 3/8
3	29.6	10.95	23 7/8	24 7/8
4	70.4	26.04	44.0	45
5	95.4	31.59	49 3/8	50 5/8
6	95.6	35.37	53 1/4	54 3/8
7				
8				
9				
10				
11				
12				

CEM 3 Point(Long Measurment Line) Stratificaton Point Locations

1	0.167		
2	0.50		
3	0.833		

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

Duct Diameters Upstream from Flow Disturbance (Distance A)



Duct Diameters Downstream from Flow Disturbance (Distance B)

Traverse Point Location Percent of Stack -Circular

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

Traverse Point Location Percent of Stack -Rectangular

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

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

Test Data			
Run number	1	2	3
Location	Divison Stack	Divison Stack	Divison Stack
Date	09/24/19	09/24/19	09/25/19
Time period	1002-1232	1355-1554	0849-1106
Operator	MW	MW	MW
Inputs For Calcs.			
Sq. rt. delta P	1.20277	1.24788	1.08978
Delta H	1.0008	1.0871	0.8254
Stack temp. (deg.F)	89.5	93.4	87.6
Meter temp. (deg.F)	85.2	94.3	74.1
Sample volume (act.)	55.361	59.405	51.299
Barometric press. (in.Hg)	29.94	29.78	29.89
Volume H_2O imp. (ml)	14.0	14.0	24.0
Weight change sil. gel (g)	15.4	10.0	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.)	7.070	7.070	7.070
Sample time (min.)	96.0	96.0	96.0
Static pressure (in.H_2O)	-0.35	-0.35	-0.35
Nozzle dia. (in.)	0.160	0.160	0.160
Meter box cal.	0.9979	0.9979	0.9979
Cp of pitot tube	0.84	0.84	0.84
Traverse points	12	12	12

VENT STACK

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Page 1 of 1

		Stack Conditions	Assumed	Actual				
Client	Chemours				Meter Box ID	22		
W.O.#	15418.002.017				Meter Box Y	0.9979 ✓		
Project ID	Chemours	% Moisture	=3		Meter Box Del H	1.8477		
Mode/Source ID	Division	Impinger Vol (ml)		14	Probe ID / Length	P746700 5'	Sample Train (ft³)	
Samp. Loc. ID	STK	Silica gel (g)		15.4	Probe Material	Boro	Leak Check @ (in Hg)	
Run No.ID	1	CO2, % by Vol	0.0		Pitot / Thermocouple ID	996700	Pitot leak check good	
Test Method ID	M0010	O2, % by Vol	20.8		Pitot Coefficient	0.84 ✓	Pitot Inspection good	
Date ID	9SEP2019	Temperature (°F)	=90		Nozzle ID	G160	Method 3 System good	
Source/Location	Division Stack	Meter Temp (°F)	=86		Nozzle Measurements	0.160 / 0.160 / 0.16	**Temp Check**	
Sample Date	9/7/19 9/24/19	Static Press (in H_2O)	-0.35 ✓		Avg Nozzle Dia (in)	0.160 ✓	Meter Box Temp	
Baro. Press (in Hg)	24.94				Area of Stack (ft²)	1.81 ✓	Reference Temp	
Operator	MW LOINK/ELEN ✓	Ambient Temp (°F)	=8890		Sample Time	96 ✓	Pass/Fail (+/- 2°)	
					Total Traverse Pts	12 ✓	Temp Change Response ?	

K Factor ~~0.690~~ 0.684

	Initial	Mid-Point	Final
	0.001	0.001	0.002
	≤5	≤5	≤6
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
	Pre-Test Set		Post-Test Set
	86		89
	~~88~~ 87		90
	Pass / Fail		Pass / Fail
	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1002	1.4	0.95	525.172									
B 1	4		~~0.45~~	~~0.307~~	527.42	87	81	100	100	67	3	58		
1	8		1.4	0.95	529.6	88	81	101	100	66	3	58		
2	12		1.6	1.09	532.1	88	81	100	100	63	3	58		
2	16		1.6	1.09	534.6	88	82	100	100	64	3	59		27.598
3	20		1.6	1.23	537.2	88	83	100	100	64	4	58		
3	24		1.7	1.16	539.8	88	83	100	99	64	4	59		
4	28		1.5	1.03	542.2	88	84	100	101	64	3.5	58		
4	32		1.5	1.03	544.6	89	84	100	101	65	3.5	57		
5	36		1.4	0.95	546.8	89	84	100	99	65	3.5	59		
5	40		1.4	0.95	549.1	89	84	100	100	66	3	58		
6	44		1.1	0.75	551.1	89	85	100	100	66	3	59		New K Factor
6	48	1050	1.1	0.75	553.170	89	85	100	100	68	3	58		
		1144			553.200									.690 k-factor
A 1	4		1.6	1.10	555.35	90	85	100	100	67	4	62		
1	8		1.6	1.10	557.86	90	86	100	100	66	4	62		
2	12		1.6	1.10	560.00	90	86	100	100	66	4	62		
2	16		1.6	1.10	562.90	90	87	100	100	66	4	62		27.463
3	20		1.7	1.17	565.27	91	88	101	100	66 3	4	60		
3	24		1.7	1.17	567.71	91	88	100	100	63	4	60		
4	28		1.7	1.17	570.40	91	88	100	101	63	4	61		
4	32		1.8	1.24	573.67	91	88	100	101	63	4	61		
5	36		1.4	0.96	575.10	91	88	101	101	63	4	61		
5	40		1.4	0.96	577.40	91	88	101	101	61	3	59		
6	44		0.75	0.51	579.10	91	88	101	101	61	3	59		
6	48	1232 ✓	0.75	0.51	580.663	91	88	101	101	61	3	55		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.45417	1.00083	55.361	89.5	85.21	100/101	99/101	67	4	58/62		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments: ✓									
			1.19952	0.99484 ✓										

WESTON SOLUTIONS 1.4625 1.20277

For 0.6472 0.441667

EPA Method 0010 from EPA SW-846

and

VENT STACK

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

Page 1 of 1

		Stack Conditions	Assumed	Actual
Client	Chemours			
W.O.#	15418.002.017			
Project ID	Chemours	% Moisture	≈3	
Mode/Source ID	Division	Impinger Vol (ml)		14 / 15.4
Samp. Loc. ID	STK	Silica gel (g)		
Run No.ID	2	CO2, % by Vol	0.0	
Test Method ID	M0010	O2, % by Vol	20.9	
Date ID	9SEP2019	Temperature (°F)	≈90	
Source/Location	Division Stack	Meter Temp (°F)	≈90	
Sample Date	~~9/13/19~~ 9/24/19	Static Press (in H_2O)	-0.35 ✓	
Baro. Press (in Hg)	29.78 ✓			
Operator	MD, WINKELER ✓	Ambient Temp (°F)	≈91	

Meter Box ID	22		
Meter Box Y	0.9979 ✓		
Meter Box Del H	1.8477		
Probe ID / Length	P746 700 5'	Sample Train (ft³)	
Probe Material	Boro	Leak Check @ (in Hg)	
Pitot / Thermocouple ID	~~746~~ 700	Pitot leak check good	
Pitot Coefficient	0.84 ✓	Pitot Inspection good	
Nozzle ID	G160	Method 3 System good	
Nozzle Measurements	0.160 | 0.160 | 0.160	**Temp Check**	
Avg Nozzle Dia (in)	0.160 ✓	Meter Box Temp	
Area of Stack (ft²)	7.07 ✓	Reference Temp	
Sample Time	96 ✓	Pass/Fail (+/- 2°)	
Total Traverse Pts	12 ✓	Temp Change Response ?	

K Factor 0.690

	Initial	Mid-Point	Final
Sample Train (ft³)	0.001	0.001	0.001
Leak Check @ (in Hg)	15	✓6	✓6
Pitot leak check good	(yes) / no	(yes) / no	(yes) / no
Pitot Inspection good	(yes) / no	yes / no	yes / no
Method 3 System good	(yes) / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp	95		91
Reference Temp	91		92
Pass/Fail (+/- 2°)	Pass / Fail		(Pass) / Fail
Temp Change Response ?	(yes) / no		(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1355 ✓			580.372									
B 1	4		1.5	1.04	583.2	93	93	100	104	65	3.5	59		
1	8		1.6	1.10	585.7	93	93	100	100	64	3.5	60		
2	12		1.6	1.10	588.2	93	94	100	101	65	3.5	58		
2	16		1.6	1.10	590.7	93	94	100	100	66	3.5	59		
3	20		1.9	1.31	593.3	93	95	100	100	67	4	60		29.479
3	24		1.9	1.31	596.0	94	94	100	101	63	4	58		
4	28		1.8	1.24	598.7	93	94	100	99	61	4	59		
4	32		1.8	1.24	601.3	93	94	100	101	62	4	58		
5	36		1.5	1.04	603.7	93	93	100	101	60	3.5	58		
5	40		1.6	1.10	606.1	93	94	100	99	61	3.5	59		
6	44		1.1	0.76	608.2	94	94	100	99	60	3	60		
6	48	1443	1.1	0.76	610.291	93	95	100	100	61	3	59		
		1506			610.3									
A 1	4		1.6	1.10	612.7	93	93	101	101	64	3.5	59		.696
1	8		1.5	1.04	615.1	93	93	101	103	60	3.5	58		
2	12		1.7	1.18	617.7	93	94	100	101	60	4	59		
2	16		1.7	1.18	620.2	94	95	100	101	61	4	58		
3	20		1.9	1.32	622.9	94	95	100	100	65	4.5	60		
3	24		1.9	1.32	~~625.6~~ 625.6	94	94	100	100	62	4.5	59		
4	28		1.7	1.18	628.3	93	94	101	101	54	4.5	56		
4	32		1.8	1.25	631.0	94	95	100	100	55	4.5	58		
5	36		1.5	1.04	633.6	94	95	100	101	54	4.5	58		
5	40		1.6	1.11	636.3	94	96	100	101	54	4.5	59		
6	44		.92	.64	638.3	94	95	100	101	53	2.5	59		
6	48	1554 ✓	.91	.63	640.286	94	96	102	101	54	2.5	58		
			Avg Delta P	Avg Delta H ✓	Total Volume	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.572083 ✓	1.087083	~~59.414~~	93.4	94.3	100/102	99/104	67	4.5	56/60		
			Avg Sqrt Delta P	Avg Sqrt Del H ✓	Comments:									
			1.247885 ✓	1.037709	59.405									

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

amd

VRN JPM

ISOKINETIC FIELD DATA SHEET

EPA Method 0010 - HFPO Dimer Acid

		Stack Conditions									
Client	Chemours		Assumed	Actual	Meter Box ID	22			Page ___ of ___		
W.O.#	15418.002.017	% Moisture	≈2.5		Meter Box Y	0.99-1.01 ✓			K Factor 0.683		
Project ID	Chemours	Impinger Vol (ml)			Meter Box Del H	1.1977			Initial	Mid-Point	Final
Mode/Source ID	Division	Silica gel (g)			Probe ID / Length	P996 700 5'		Sample Train (ft³)	0.001	0.001	0.000
Samp. Loc. ID	STK	CO2, % by Vol	0.0		Probe Material	Boro		Leak Check @ (in Hg)	≤15	5	5
Run No.ID	3	O2, % by Vol	20.8		Pitot / Thermocouple ID	~~796~~ 700		Pitot leak check good	(yes) / no	yes / no	yes / no
Test Method ID	M0010	Temperature (°F)	≈ 80		Pitot Coefficient	0.84 ✓		Pitot Inspection good	(yes) / no	yes / no	yes / no
Date ID	23SEP2019	Meter Temp (°F)	≈ 75		Nozzle ID	G160		Method 3 System good	yes / no	yes / no	yes / no
Source/Location	Division Stack	Static Press (in H_2O)	-0.35 ✓		Nozzle Measurements	0.160 0.160 0.160		**Temp Check**	Pre-Test Set		Post-Test Set
Sample Date	9/23-/19 ✓				Avg Nozzle Dia (in)	0.160 ✓		Meter Box Temp	79		
Baro. Press (in Hg)	29.85				Area of Stack (ft²)	7.07 ✓		Reference Temp	78		
Operator	MW WINKELMAN ✓	Ambient Temp (°F)	≈ 85		Sample Time	96 ✓		Pass/Fail (+/- 2°)	(Pass) / Fail		Pass / Fail
					Total Traverse Pts	12 ✓		Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	0849 ✓			640.329									
B 1	4		1.4	0.956	642.90	79	63	101	101	50	3	51		
1	8		1.4	0.956	645.35	80	63	101	101	50	3	51		
2	12		1.4	0.956	647.52	80	63	100	100	50	3	51		
2	16		1.4	0.956	649.72	81	64	100	100	51	3	52		25,301
3	20		1.3	0.887	651.50	81	64	101	100	56	3	52		
3	24		1.3	0.887	653.65	81	64	101	100	56	3	52		
4	28		1.3	0.887	655.66	81	64	101	101	56	3	52		
4	32		1.3	0.887	658.10	81	64	100	100	57	3	52		
5	36		1.2	0.819	660.00	87	68	100	100	57	3	52		
5	40		1.2	0.819	661.60	87	68	100	100	57	3	52		
6	44		1.0	0.683	664.10	87	70	100	100	59	3	52		
6	48	0937	1.0	0.683	665.630	87	70	100	100	59	2	52		
		1018			665.789									
A 1	4		1.3	0.887	667.89	89	80	101	102	65	3.5	59		25,998
1	8		1.3	0.887	~~671~~ 670.02	90	81	101	100	66	3	60		
2	12		1.3	0.887	672.17	90	81	100	102	65	3	58		
2	16		1.3	0.887	674.36	90	82	100	103	66	3	59		
3	20		1.3	0.887	676.65	90	82	100	102	66	3	58		
3	24		1.5	1.024	678.84	90	83	100	103	66	3	59		
4	28		1.4	.956	~~680~~ 681.09	90	83	100	101	66	3	59		
4	32		1.4	.956	683.30	90	83	100	99	65	3	59		
5	36		1.1	.751	685.36	90	84	100	102	65	2.5	59		
5	40		1.1	.751	687.37	91	84	100	100	65	2.5	58		
6	44		.41	.280	689.47	90	85	100	101	66	3	59		
6	48	1106 ✓	.41	.280	691.787	90	85	100	99	66	3	59		
			Avg Delta P ✓	Avg Delta H ✓	Total Volume ✓	Avg Ts ✓	Avg Tm ✓	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			1.20167	.825375	51.299 ✓	87.58	74.08 ✓	100/101	99/103	66	3.5	51/60		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			1.089781 ✓	.900377										

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

3.5 107.9

24700 dscf

VEN STACK

SAMPLE RECOVERY FIELD DATA

EPA Method 0010 - HFPO Dimer Acid

Client	Chemours	W.O. #	15418.002.017
Location/Plant	Fayetteville, NC	Source & Location	Division Stack

Run No. 1 — Sample Date 9/24/19 — Recovery Date 9/24/19

Sample I.D. Chemours - Division - STK - 1 - M0010 - — Analyst KS — Filter Number N/A

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	10	100	104					214	315.4	
Initial	0	100	100					200	300	
Gain	10	0	4					14	15.4	

Impinger Color: Blue/Purple — Labeled? Yes ✓ ✓

Silica Gel Condition: Good — Sealed? Yes

Run No. 2 — Sample Date 9/24/19 — Recovery Date 9/24/19

Sample I.D. Chemours - Division - STK - 2 - M0010 - — Analyst KS — Filter Number N/A

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	10	104	100					214	310.0	
Initial	0	100	100					200	300	
Gain	10	4	0					14	10.0	

Impinger Color: Blue/Purple — Labeled? Yes ✓ ✓

Silica Gel Condition: Good — Sealed? Yes

Run No. 3 — Sample Date 9/25/19 — Recovery Date 9/25/19

Sample I.D. Chemours - Division - STK - 3 - M0010 - — Analyst KS — Filter Number N/A

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	14	110	106					224	314.6	
Initial		100	100					200	300	
Gain	14	10	0					24	14.6	

Impinger Color: Blue Purple — Labeled? Yes ✓ ✓

Silica Gel Condition: Good — Sealed? Yes

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

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

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

File: G:\Chemours Fayetteville\092419division1.cem
Program Version: 2.1, built 19 May 2017 **File Version:** 2.02
Computer: WSWCAIRSERVICES **Trailer:** 27
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.0**

Channel 2

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

CALIBRATION DATA

Number 1

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

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

Start Time: 08:07

O_2

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

Calibration Standards

%	**Cylinder ID**
12.1	ALM053372
21.0	CC112489

Calibration Results

Zero	9 mv
Span, 21.0 %	8004 mv

Curve Coefficients

Slope	**Intercept**
381.1	9

CO_2

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

Calibration Standards

%	**Cylinder ID**
9.0	ALM053372
17.1	CC112489

Calibration Results

Zero	3 mv
Span, 17.1 %	8539 mv

Curve Coefficients

Slope	**Intercept**
500.6	3

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **1** | Date: **24 Sep 2019**

Start Time: 08:07

O_2
Method: EPA 3A
Span Conc. 21.0 %
Slope 381.1 **Intercept** 9.0

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

CO_2
Method: EPA 3A
Span Conc. 17.1 %
Slope 500.6 **Intercept** 3.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
9.0	8.9	-0.1	-0.6	Pass
17.0	17.0	0.0	0.0	Pass

BIAS

Number 1

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **1** | Date: **24 Sep 2019**

Start Time: 08:13

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	12.1	0.1	0.5	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.9	8.5	-0.4	-2.3	Pass

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
10:02	20.8	0.0
10:03	20.7	0.0
10:04	20.7	0.0
10:05	20.8	0.1
10:06	20.7	0.1
10:07	20.7	0.1
10:08	20.7	0.1
10:09	20.7	0.1
10:10	20.8	0.1
10:11	20.8	0.1
10:12	20.8	0.1
10:13	20.8	0.1
10:14	20.8	0.1
10:15	20.8	0.1
10:16	20.8	0.1
10:17	20.8	0.1
10:18	20.8	0.1
10:19	20.8	0.1
10:20	20.8	0.1
10:21	20.8	0.1
10:22	20.8	0.1
10:23	20.8	0.1
10:24	20.8	0.1
10:25	20.8	0.1
10:26	20.8	0.1
10:27	20.8	0.1
10:28	20.8	0.1
10:29	20.7	0.1
10:30	20.7	0.1
10:31	20.7	0.1
10:32	20.7	0.1
10:33	20.7	0.1
10:34	20.7	0.0
10:35	20.7	0.0
10:36	20.7	0.0
10:37	20.7	0.0
10:38	20.7	0.0
10:39	20.7	0.0
10:40	20.8	0.0
10:41	20.8	0.0

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
10:42	20.8	0.0
10:43	20.7	0.0
10:44	20.7	0.0
10:45	20.7	0.0
10:46	20.7	0.0
10:47	20.7	0.0
10:48	20.7	0.0
10:49	20.7	0.0
10:50	20.7	0.0
10:51	20.7	0.0
10:52	20.8	0.0
10:53	20.8	0.0
10:54	20.8	0.0
10:55	20.8	0.0
10:56	20.8	0.0
10:57	20.7	0.0
10:58	20.7	0.0
10:59	20.7	0.0
11:00	20.7	0.0
11:01	20.7	0.0
11:02	20.7	0.0
11:03	20.7	0.0
11:04	20.7	0.0
11:05	20.8	0.0
11:06	20.7	0.0
11:07	20.7	0.0
11:08	20.7	0.0
11:09	20.7	0.0
11:10	20.7	0.0
11:11	20.7	0.0
11:12	20.7	0.0
11:13	20.7	0.0
11:14	20.7	0.0
11:15	20.7	0.0
11:16	20.7	0.0
11:17	20.7	0.0
11:18	20.7	0.0
11:19	20.7	0.0
11:20	20.7	0.0
11:21	20.7	0.0

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
11:22	20.7	0.0
11:23	20.7	0.0
11:24	20.7	0.0
11:25	20.7	0.0
11:26	20.7	0.0
11:27	20.7	0.0
11:28	20.7	0.0
11:29	20.7	0.0
11:30	20.7	0.0
11:31	20.7	0.0
11:32	20.7	0.0
11:33	20.7	0.0
11:34	20.7	0.0
11:35	20.7	0.0
11:36	20.7	0.0
11:37	20.7	0.0
11:38	20.7	0.0
11:39	20.7	0.0
11:40	20.7	0.0
11:41	20.7	0.0
11:42	20.7	0.0
11:43	20.7	0.0
11:44	20.7	0.0
11:45	20.7	0.0
11:46	20.7	0.0
11:47	20.7	0.0
11:48	20.7	0.0
11:49	20.7	0.0
11:50	20.7	0.0
11:51	20.7	0.0
11:52	20.7	0.0
11:53	20.7	0.0
11:54	20.7	0.0
11:55	20.7	0.0
11:56	20.7	0.0
11:57	20.7	0.0
11:58	20.7	0.0
11:59	20.7	0.0
12:00	20.7	0.0
12:01	20.7	0.0

RUN DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **1** | Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
12:02	20.7	0.0
12:03	20.7	0.0
12:04	20.7	0.0
12:05	20.7	0.0
12:06	20.7	0.0
12:07	20.7	0.0
12:08	20.7	0.0
12:09	20.7	0.0
12:10	20.7	0.0
12:11	20.7	0.0
12:12	20.7	0.0
12:13	20.7	0.0
12:14	20.7	0.0
12:15	20.7	0.0
12:16	20.7	0.0
12:17	20.7	0.0
12:18	20.7	0.0
12:19	20.7	0.0
12:20	20.7	0.0
12:21	20.7	0.0
12:22	20.7	0.0
12:23	20.7	0.0
12:24	20.7	0.0
12:25	20.7	0.0
12:26	20.7	0.0
12:27	20.7	0.0
12:28	20.7	0.0
12:29	20.7	0.0
12:30	20.7	0.0
12:31	20.7	0.0
12:32	20.7	0.0
Avgs	**20.7**	**0.0**

RUN SUMMARY

Number 1

Client:	**Chemours**	Project Number:	**15418.002.017.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**Division Stack**	Calibration **1**	Date: **24 Sep 2019**

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

Time: 10:01 to 12:32

Run Averages

20.7	0.0

Pre-run Bias at 08:13

Zero Bias	0.0	0.0
Span Bias	12.1	8.5
Span Gas	12.1	9.0

Post-run Bias at 12:35

Zero Bias	0.2	0.1
Span Bias	12.1	8.4
Span Gas	12.1	9.0

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

20.7	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **1** | Date: **24 Sep 2019**

Start Time: 12:35

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	1.0	Pass
Span	12.0	12.1	0.1	0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.2	0.2	1.0	Pass
Span	12.1	12.1	0.0	0.0	Pass

*Bias No. 1

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.9	8.4	-0.5	-2.9	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

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
13:55	20.7	0.0
13:56	20.7	0.0
13:57	20.7	0.0
13:58	20.7	0.0
13:59	20.7	0.0
14:00	20.7	0.0
14:01	20.7	0.0
14:02	20.7	0.0
14:03	20.7	0.0
14:04	20.7	0.0
14:05	20.7	0.0
14:06	20.7	0.0
14:07	20.7	0.0
14:08	20.7	0.0
14:09	20.7	0.0
14:10	20.7	0.0
14:11	20.7	0.0
14:12	20.7	0.0
14:13	20.7	0.0
14:14	20.7	0.0
14:15	20.7	0.0
14:16	20.7	0.0
14:17	20.7	0.0
14:18	20.7	0.0
14:19	20.7	0.0
14:20	20.7	0.0
14:21	20.7	0.0
14:22	20.7	0.0
14:23	20.7	0.0
14:24	20.7	0.0
14:25	20.7	0.0
14:26	20.7	0.0
14:27	20.7	0.0
14:28	20.7	0.0
14:29	20.7	0.0
14:30	20.7	0.0
14:31	20.7	0.0
14:32	20.7	0.0
14:33	20.7	0.0
14:34	20.7	0.0

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
14:35	20.7	0.0
14:36	20.7	0.0
14:37	20.7	0.0
14:38	20.7	0.0
14:39	20.7	0.0
14:40	20.7	0.0
14:41	20.7	0.0
14:42	20.7	0.0
14:43	20.7	0.0
14:44	20.7	0.0
14:45	20.7	0.0
14:46	20.7	0.0
14:47	20.7	0.0
14:48	20.7	0.0
14:49	20.7	0.0
14:50	20.7	0.0
14:51	20.7	0.0
14:52	20.7	0.0
14:53	20.7	0.0
14:54	20.7	0.0
14:55	20.7	0.0
14:56	20.7	0.0
14:57	20.7	0.0
14:58	20.7	0.0
14:59	20.7	0.0
15:00	20.7	0.0
15:01	20.7	0.0
15:02	20.7	0.0
15:03	20.7	0.0
15:04	20.7	0.0
15:05	20.7	0.0
15:06	20.7	0.0
15:07	20.7	0.0
15:08	20.6	0.0
15:09	20.6	0.0
15:10	20.6	0.0
15:11	20.6	0.0
15:12	20.6	0.0
15:13	20.6	0.0
15:14	20.6	0.0

RUN DATA

Number 2

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **1** | Date: **24 Sep 2019**

Time	O_2 %	CO_2 %
15:15	20.6	0.0
15:16	20.6	0.0
15:17	20.6	0.0
15:18	20.6	0.0
15:19	20.6	0.0
15:20	20.6	0.0
15:21	20.6	0.0
15:22	20.6	0.0
15:23	20.6	0.0
15:24	20.7	0.0
15:25	20.7	0.0
15:26	20.7	0.0
15:27	20.7	0.0
15:28	20.7	0.0
15:29	20.7	0.0
15:30	20.7	0.0
15:31	20.7	0.0
15:32	20.7	0.0
15:33	20.7	0.0
15:34	20.7	0.0
15:35	20.7	0.0
15:36	20.7	0.0
15:37	20.7	0.0
15:38	20.7	0.0
15:39	20.7	0.0
15:40	20.7	0.0
15:41	20.7	0.0
15:42	20.7	0.0
15:43	20.7	0.0
15:44	20.7	0.0
15:45	20.7	0.0
15:46	20.7	0.0
15:47	20.7	0.0
15:48	20.7	0.0
15:49	20.7	0.0
15:50	20.7	0.0
15:51	20.7	0.0
15:52	20.7	0.0
15:53	20.7	0.0
15:54	20.7	0.0

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **24 Sep 2019**

	Time	O_2 %	CO_2 %
	Avgs	**20.7**	**0.0**

RUN SUMMARY

Number 2

Client:	**Chemours**	Project Number:	**15418.002.017.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**Division Stack**	Calibration **1**	Date: **24 Sep 2019**

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

Time: 13:54 to 15:54

Run Averages

20.7	0.0

Pre-run Bias at 12:35

Zero Bias	0.2	0.1
Span Bias	12.1	8.4
Span Gas	12.1	9.0

Post-run Bias at 15:56

Zero Bias	0.6	0.1
Span Bias	12.1	8.4
Span Gas	12.1	9.0

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

20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **1** | Date: **24 Sep 2019**

Start Time: 15:56

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.6	0.6	2.9	Pass
Span	12.0	12.1	0.1	0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.2	0.6	0.4	1.9	Pass
Span	12.1	12.1	0.0	0.0	Pass

*Bias No. 2

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.9	8.4	-0.5	-2.9	Pass

Calibration Drift

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

*Bias No. 2

METHODS AND ANALYZERS

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

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **25 Sep 2019**

File: G:\Chemours Fayetteville\092519divisionrun3.cem
Program Version: 2.1, built 19 May 2017 **File Version:** 2.02
Computer: WSWCAIRSERVICES **Trailer:** 27
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.0**

Channel 2

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

CALIBRATION DATA

Number 2

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

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **25 Sep 2019**

Start Time: 07:57

O_2

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

Calibration Standards

%	**Cylinder ID**
12.1	ALM053372
21.0	CC112489

Calibration Results

Zero	12 mv
Span, 21.0 %	8007 mv

Curve Coefficients

Slope	**Intercept**
381.1	12

CO_2

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

Calibration Standards

%	**Cylinder ID**
9.0	ALM053372
17.1	CC112489

Calibration Results

Zero	5 mv
Span, 17.1 %	8544 mv

Curve Coefficients

Slope	**Intercept**
500.8	5

CALIBRATION ERROR DATA

Number 2

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **2** | Date: **25 Sep 2019**

Start Time: 07:57

O_2
Method: EPA 3A
Span Conc. 21.0 %
Slope 381.1 **Intercept** 12.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.1	12.1	0.0	0.0	Pass
21.0	21.0	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %
Slope 500.8 **Intercept** 5.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
9.0	9.0	0.0	0.0	Pass
17.0	17.0	0.0	0.0	Pass

BIAS

Number 4

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **2** | Date: **25 Sep 2019**

Start Time: 08:02

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.3	0.3	1.4	Pass
Span	12.1	12.2	0.1	0.5	Pass

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	9.0	8.6	-0.4	-2.3	Pass

RUN DATA

Number 3

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **2** | Date: **25 Sep 2019**

Time	O_2 %	CO_2 %
08:49	20.8	0.0
08:50	20.8	0.0
08:51	20.8	0.0
08:52	20.8	0.0
08:53	20.8	0.0
08:54	20.8	0.0
08:55	20.8	0.0
08:56	20.8	0.0
08:57	20.8	0.0
08:58	20.8	0.0
08:59	20.8	0.0
09:00	20.8	0.0
09:01	20.8	0.0
09:02	20.8	0.0
09:03	20.8	0.0
09:04	20.8	0.0
09:05	20.8	0.0
09:06	20.8	0.0
09:07	20.8	0.0
09:08	20.8	0.0
09:09	20.8	0.0
09:10	20.8	0.0
09:11	20.8	0.0
09:12	20.8	0.0
09:13	20.8	0.0
09:14	20.8	0.0
09:15	20.8	0.0
09:16	20.8	0.0
09:17	20.8	0.0
09:18	20.8	0.0
09:19	20.8	0.0
09:20	20.8	0.0
09:21	20.8	0.0
09:22	20.8	0.0
09:23	20.8	0.0
09:24	20.8	0.0
09:25	20.8	0.0
09:26	20.8	0.0
09:27	20.8	0.0
09:28	20.8	0.0

RUN DATA

Number 3

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

Calibration **2**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **25 Sep 2019**

Time	O_2 %	CO_2 %
09:29	20.8	0.0
09:30	20.8	0.0
09:31	20.8	0.0
09:32	20.8	0.0
09:33	20.8	0.0
09:34	20.8	0.0
09:35	20.8	0.0
09:36	20.8	0.0
09:37	20.8	0.0
09:38	20.8	0.0
09:39	20.8	0.0
09:40	20.8	0.0
09:41	20.8	0.0
09:42	20.8	0.0
09:43	20.8	0.0
09:44	20.8	0.0
09:45	20.8	0.0
09:46	20.8	0.0
09:47	20.8	0.0
09:48	20.8	0.0
09:49	20.8	0.0
09:50	20.8	0.0
09:51	20.8	0.0
09:52	20.8	0.0
09:53	20.8	0.0
09:54	20.8	0.0
09:55	20.8	0.0
09:56	20.8	0.0
09:57	20.8	0.0
09:58	20.8	0.0
09:59	20.8	0.0
10:00	20.8	0.0
10:01	20.8	0.0
10:02	20.8	0.0
10:03	20.8	0.0
10:04	20.8	0.0
10:05	20.8	0.0
10:06	20.8	0.0
10:07	20.8	0.0
10:08	20.8	0.0

RUN DATA

Number 3

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

Calibration **2**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **25 Sep 2019**

Time	O_2 %	CO_2 %
10:09	20.8	0.0
10:10	20.8	0.0
10:11	20.8	0.0
10:12	20.8	0.0
10:13	20.8	0.0
10:14	20.8	0.0
10:15	20.8	0.0
10:16	20.8	0.0
10:17	20.8	0.0
10:18	20.8	0.0
10:19	20.8	0.0
10:20	20.8	0.0
10:21	20.8	0.0
10:22	20.8	0.0
10:23	20.8	0.0
10:24	20.8	0.0
10:25	20.8	0.0
10:26	20.8	0.0
10:27	20.8	0.0
10:28	20.8	0.0
10:29	20.8	0.0
10:30	20.8	0.0
10:31	20.8	0.0
10:32	20.8	0.0
10:33	20.8	0.0
10:34	20.8	0.0
10:35	20.8	0.0
10:36	20.8	0.0
10:37	20.8	0.0
10:38	20.8	0.0
10:39	20.8	0.0
10:40	20.8	0.0
10:41	20.8	0.0
10:42	20.8	0.0
10:43	20.8	0.0
10:44	20.8	0.0
10:45	20.8	0.0
10:46	20.8	0.0
10:47	20.8	0.0
10:48	20.8	0.0

RUN DATA

Number 3

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

Calibration **2**

Project Number: **15418.002.017.0001**
Operator: **KS**
Date: **25 Sep 2019**

Time	O_2 %	CO_2 %
10:49	20.8	0.0
10:50	20.8	0.0
10:51	20.8	0.0
10:52	20.8	0.0
10:53	20.8	0.0
10:54	20.8	0.0
10:55	20.8	0.0
10:56	20.8	0.0
10:57	20.8	0.0
10:58	20.8	0.0
10:59	20.8	0.0
11:00	20.8	0.0
11:01	20.8	0.0
11:02	20.8	0.0
11:03	20.8	0.0
11:04	20.8	0.0
11:05	20.8	0.0
11:06	20.8	0.0
Avgs	**20.8**	**0.0**

RUN SUMMARY

Number 3

Client:	**Chemours**	Project Number:	**15418.002.017.0001**
Location:	**Fayetteville, NC**	Operator:	**KS**
Source:	**Division Stack**	Calibration **2**	Date: **25 Sep 2019**

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

Time: 08:48 to 11:06

Run Averages

20.8	0.0

Pre-run Bias at 08:02

Zero Bias	0.3	0.1
Span Bias	12.2	8.6
Span Gas	12.1	9.0

Post-run Bias at 11:09

Zero Bias	0.5	0.0
Span Bias	12.1	8.5
Span Gas	12.1	9.0

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

21.0	0.0

BIAS AND CALIBRATION DRIFT

Number 5

Client: **Chemours** | Project Number: **15418.002.017.0001**
Location: **Fayetteville, NC** | Operator: **KS**
Source: **Division Stack** | Calibration **2** | Date: **25 Sep 2019**

Start Time: 11:09

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.5	0.5	2.4	Pass
Span	12.1	12.1	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.3	0.5	0.2	1.0	Pass
Span	12.2	12.1	-0.1	-0.5	Pass

*Bias No. 4

CO_2
Method: EPA 3A
Span Conc. 17.1 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	9.0	8.5	-0.5	-2.9	Pass

Calibration Drift

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

*Bias No. 4

APPENDIX C
LABORATORY ANALYTICAL REPORT

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Job Number: 140-16768-1

Job Description: VEN CB Inlet - M0010

Contract Number: LBIO-67048

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

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager I
10/9/2019 8:11 AM

Courtney M Adkins, Project Manager I
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
10/09/2019

Table of Contents

Table of Contents

Qualifiers

LCMS

Qualifier	Qualifier Description
D	Sample results are obtained from a dilution; the surrogate or matrix spike recoveries reported are calculated from diluted samples.

Glossary

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

Method Summary

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

Job ID: 140-16768-1

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

Protocol References:

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

Laboratory References:

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

Sample Summary

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

Job ID: 140-16768-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-16768-1	R-2937,2938 DIV VEN CARBON BED INLET R1 M0010 FH	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-2	R-2939,2940,2942 DIV VEN CARBON BED INLET R1 M0010 BH	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-3	R-2941 DIV VEN CARBON BED INLET R1 M001 IMP 1,2&3 CONDENSATE	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-4	R-2943 DIV VEN CARBON BED INLET R1 M001 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-5	R-2944,2945 DIV VEN CARBON BED INLET R2 M0010 FH	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-6	R-2946,2947,2949 DIV VEN CARBON BED INLET R2 M0010 BH	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-7	R-2948 DIV VEN CARBON BED INLET R2 M001 IMP 1,2&3 CONDENSATE	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-8	R-2950 DIV VEN CARBON BED INLET R2 M001 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/24/19 00:00	09/25/19 19:00	
140-16768-9	R-2951,2952 DIV VEN CARBON BED INLET R3 M0010 FH	Air	09/25/19 00:00	09/25/19 19:00	
140-16768-10	R-2953,2954,2956 DIV VEN CARBON BED INLET R3 M0010 BH	Air	09/25/19 00:00	09/25/19 19:00	
140-16768-11	R-2955 DIV VEN CARBON BED INLET R3 M001 IMP 1,2&3 CONDENSATE	Air	09/25/19 00:00	09/25/19 19:00	
140-16768-12	R-2957 DIV VEN CARBON BED INLET R3 M001 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/25/19 00:00	09/25/19 19:00	

Job Narrative
140-16768-1

Sample Receipt

The samples were received on September 25, 2019 at 7:00 PM in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 0.4º C, 0.6º C and 0.8º C.

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample.

LCMS

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

Organic Prep

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

Comments

Reporting Limits (RLs) and Method Detection Limits (MDLs) for the HFPO-DA used in this report were derived in Denver for reporting soils and water samples. Method 0010 sampling train matrix specific RLs and MDLs have not been established for HFPO-DA. The soil and water limits are expected to be reasonable approximations of the actual matrix specific limits, under these conditions.

Breakthrough from the Modified Method 0010 Sampling Train for PFAS compounds will be measured by the percentage (%) concentration of a specific PFAS target analyte determined to be present in the Breakthrough XAD-2 resin module of a test run. If the concentration of a specific PFAS compound is ≤30% of the sum of the concentrations determined for the other three (3) fractions of the sampling train, then sampling breakthrough is determined not to have occurred. Also, no breakthrough will be determined to have occurred if < 250 µg of a target analyte is collected on all fractions of a sampling train. Breakthrough the sampling train implies that sample loss through the train has occurred and results in a negative bias to the sample results.

QC Association Summary

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

Job ID: 140-16768-1

LCMS

Analysis Batch: 464589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-464589/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 472295

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16768-2	R-2939,2940,2942 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-16768-4	R-2943 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	None	
140-16768-6	R-2946,2947,2949 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-16768-8	R-2950 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	None	
140-16768-10	R-2953,2954,2956 DIV VEN CARBON BED INLE	Total/NA	Air	None	
140-16768-12	R-2957 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	None	
MB 280-472295/13-A	Method Blank	Total/NA	Air	None	
MB 280-472295/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472295/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 472321

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16768-1	R-2937,2938 DIV VEN CARBON BED INLET R1	Total/NA	Air	None	
140-16768-5	R-2944,2945 DIV VEN CARBON BED INLET R2	Total/NA	Air	None	
140-16768-9	R-2951,2952 DIV VEN CARBON BED INLET R3	Total/NA	Air	None	
MB 280-472321/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472321/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 472332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16768-3	R-2941 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	None	
140-16768-7	R-2948 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	None	
140-16768-11	R-2955 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	None	
MB 280-472332/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472332/2-A	Lab Control Sample	Total/NA	Air	None	

Analysis Batch: 472874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16768-2	R-2939,2940,2942 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	472295
140-16768-4	R-2943 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	8321A	472295
140-16768-6	R-2946,2947,2949 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	472295
140-16768-8	R-2950 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	8321A	472295
140-16768-10	R-2953,2954,2956 DIV VEN CARBON BED INLE	Total/NA	Air	8321A	472295
140-16768-12	R-2957 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	8321A	472295
MB 280-472295/13-A	Method Blank	Total/NA	Air	8321A	472295
MB 280-472295/1-A	Method Blank	Total/NA	Air	8321A	472295
LCS 280-472295/2-A	Lab Control Sample	Total/NA	Air	8321A	472295

Analysis Batch: 472875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16768-1	R-2937,2938 DIV VEN CARBON BED INLET R1	Total/NA	Air	8321A	472321
140-16768-5	R-2944,2945 DIV VEN CARBON BED INLET R2	Total/NA	Air	8321A	472321
140-16768-9	R-2951,2952 DIV VEN CARBON BED INLET R3	Total/NA	Air	8321A	472321
MB 280-472321/1-A	Method Blank	Total/NA	Air	8321A	472321
LCS 280-472321/2-A	Lab Control Sample	Total/NA	Air	8321A	472321

QC Association Summary

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

Job ID: 140-16768-1

LCMS

Analysis Batch: 472876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16768-3	R-2941 DIV VEN CARBON BED INLET R1 M001	Total/NA	Air	8321A	472332
140-16768-7	R-2948 DIV VEN CARBON BED INLET R2 M001	Total/NA	Air	8321A	472332
140-16768-11	R-2955 DIV VEN CARBON BED INLET R3 M001	Total/NA	Air	8321A	472332
MB 280-472332/1-A	Method Blank	Total/NA	Air	8321A	472332
LCS 280-472332/2-A	Lab Control Sample	Total/NA	Air	8321A	472332

Client Sample ID: R-2937,2938 DIV VEN CARBON BED INLET R1 M0010 FH

Lab Sample ID: 140-16768-1

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	47.0		0.750	0.0810	ug/Sample		09/30/19 09:50	10/03/19 14:23	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*100*	*D*	*50 - 200*	*09/30/19 09:50*	*10/03/19 14:23*	*10*

Client Sample ID: R-2939,2940,2942 DIV VEN CARBON BED INLET R1 M0010 BH

Lab Sample ID: 140-16768-2

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	336		2.50	0.500	ug/Sample		09/29/19 11:20	10/03/19 12:16	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*69*	*D*	*50 - 200*	*09/29/19 11:20*	*10/03/19 12:16*	*10*

Client Sample ID: R-2941 DIV VEN CARBON BED INLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16768-3

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	69.1		1.98	0.101	ug/Sample		09/30/19 10:21	10/03/19 15:28	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*122*	*D*	*50 - 200*	*09/30/19 10:21*	*10/03/19 15:28*	*10*

Client Sample ID: R-2943 DIV VEN CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16768-4

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.453		0.200	0.0400	ug/Sample		09/29/19 11:20	10/03/19 12:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*73*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:19*	*1*

Client Sample ID: R-2944,2945 DIV VEN CARBON BED INLET R2 M0010 FH

Lab Sample ID: 140-16768-5

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	18.4		0.200	0.0216	ug/Sample		09/30/19 09:50	10/03/19 14:26	2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*112*	*D*	*50 - 200*	*09/30/19 09:50*	*10/03/19 14:26*	*2*

Client Sample ID: R-2946,2947,2949 DIV VEN CARBON BED INLET R2 M0010 BH

Lab Sample ID: 140-16768-6

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	198		2.75	0.550	ug/Sample		09/29/19 11:20	10/03/19 12:26	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*75*	*D*	*50 - 200*	*09/29/19 11:20*	*10/03/19 12:26*	*10*

Client Sample ID: R-2948 DIV VEN CARBON BED INLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16768-7

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	22.4		0.218	0.0111	ug/Sample		09/30/19 10:21	10/03/19 15:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*98*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:31*	*1*

Client Sample ID: R-2950 DIV VEN CARBON BED INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16768-8

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.307		0.200	0.0400	ug/Sample		09/29/19 11:20	10/03/19 12:29	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*70*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:29*	*1*

Client Sample ID: R-2951,2952 DIV VEN CARBON BED INLET R3 M0010 FH

Lab Sample ID: 140-16768-9

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	10.9		0.100	0.0108	ug/Sample		09/30/19 09:50	10/03/19 14:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*98*		*50 - 200*	*09/30/19 09:50*	*10/03/19 14:30*	*1*

Client Sample ID: R-2953,2954,2956 DIV VEN CARBON BED INLET R3 M0010 BH

Lab Sample ID: 140-16768-10

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	67.5		2.50	0.500	ug/Sample		09/29/19 11:20	10/03/19 12:35	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*79*	*D*	*50 - 200*	*09/29/19 11:20*	*10/03/19 12:35*	*10*

Client Sample ID: R-2955 DIV VEN CARBON BED INLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16768-11

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	27.6		0.216	0.0110	ug/Sample		09/30/19 10:21	10/03/19 15:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*96*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:35*	*1*

Client Sample ID: R-2957 DIV VEN CARBON BED INLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16768-12

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
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		09/29/19 11:20	10/03/19 12:39	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*73*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:39*	*1*

Default Detection Limits

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

Job ID: 140-16768-1

Method: 8321A - HFPO-DA

Prep: None

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

Method: 8321A - PFOA and PFOS

Prep: None

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

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ANALYTICAL REPORT

Job Number: 140-16771-1

Job Description: VEN CB Outlet - M0010

Contract Number: LBIO-67048

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

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager I
10/9/2019 8:20 AM

Courtney M Adkins, Project Manager I
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
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10/09/2019

Table of Contents

Table of Contents

Glossary

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

Method Summary

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

Job ID: 140-16771-1

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

Protocol References:

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

Laboratory References:

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

Sample Summary

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

Job ID: 140-16771-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-16771-1	E-2137,2138 DIV VEN CARBON BED OUTLET R1 M0010 FH	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-2	E-2139,2140,2142 DIV VEN CARBON BED OUTLET R1 M0010 BH	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-3	E-2141 DIV VEN CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-4	E-2143 DIV VEN CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-5	E-2144,2145 DIV VEN CARBON BED OUTLET R2 M0010 FH	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-6	E-2146,2147,2149 DIV VEN CARBON BED OUTLET R2 M0010 BH	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-7	E-2148 DIV VEN CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-8	E-2150 DIV VEN CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/24/19 00:00	09/25/19 19:00	
140-16771-9	E-2151,2152 DIV VEN CARBON BED OUTLET R3 M0010 FH	Air	09/25/19 00:00	09/25/19 19:00	
140-16771-10	E-2153,2154,2156 DIV VEN CARBON BED OUTLET R3 M0010 BH	Air	09/25/19 00:00	09/25/19 19:00	
140-16771-11	E-2155 DIV VEN CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE	Air	09/25/19 00:00	09/25/19 19:00	
140-16771-12	E-2157 DIV VEN CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/25/19 00:00	09/25/19 19:00	

Job Narrative
140-16771-1

Sample Receipt

The samples were received on September 25, 2019 at 7:00 PM in good condition and properly preserved. The temperatures of the 3 coolers at receipt time were 0.4º C, 0.6º C and 0.8º C.

Quality Control and Data Interpretation

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

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample.

LCMS

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

Organic Prep

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

Comments

Reporting Limits (RLs) and Method Detection Limits (MDLs) for the HFPO-DA used in this report were derived in Denver for reporting soils and water samples. Method 0010 sampling train matrix specific RLs and MDLs have not been established for HFPO-DA. The soil and water limits are expected to be reasonable approximations of the actual matrix specific limits, under these conditions.

Breakthrough from the Modified Method 0010 Sampling Train for PFAS compounds will be measured by the percentage (%) concentration of a specific PFAS target analyte determined to be present in the Breakthrough XAD-2 resin module of a test run. If the concentration of a specific PFAS compound is ≤30% of the sum of the concentrations determined for the other three (3) fractions of the sampling train, then sampling breakthrough is determined not to have occurred. Also, no breakthrough will be determined to have occurred if < 250 µg of a target analyte is collected on all fractions of a sampling train. Breakthrough the sampling train implies that sample loss through the train has occurred and results in a negative bias to the sample results

LCMS

Analysis Batch: 464589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-464589/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 472295

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16771-2	E-2139,2140,2142 DIV VEN CARBON BED OUT	Total/NA	Air	None	
140-16771-4	E-2143 DIV VEN CARBON BED OUTLET R1 M0	Total/NA	Air	None	
140-16771-6	E-2146,2147,2149 DIV VEN CARBON BED OUT	Total/NA	Air	None	
140-16771-8	E-2150 DIV VEN CARBON BED OUTLET R2 M0	Total/NA	Air	None	
140-16771-10	E-2153,2154,2156 DIV VEN CARBON BED OUT	Total/NA	Air	None	
140-16771-12	E-2157 DIV VEN CARBON BED OUTLET R3 M0	Total/NA	Air	None	
MB 280-472295/13-A	Method Blank	Total/NA	Air	None	
MB 280-472295/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472295/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 472321

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16771-1	E-2137,2138 DIV VEN CARBON BED OUTLET F	Total/NA	Air	None	
140-16771-5	E-2144,2145 DIV VEN CARBON BED OUTLET F	Total/NA	Air	None	
140-16771-9	E-2151,2152 DIV VEN CARBON BED OUTLET F	Total/NA	Air	None	
MB 280-472321/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472321/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 472332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16771-3	E-2141 DIV VEN CARBON BED OUTLET R1 M0	Total/NA	Air	None	
140-16771-7	E-2148 DIV VEN CARBON BED OUTLET R2 M0	Total/NA	Air	None	
140-16771-11	E-2155 DIV VEN CARBON BED OUTLET R3 M0	Total/NA	Air	None	
MB 280-472332/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472332/2-A	Lab Control Sample	Total/NA	Air	None	

Analysis Batch: 472874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16771-2	E-2139,2140,2142 DIV VEN CARBON BED OUT	Total/NA	Air	8321A	472295
140-16771-4	E-2143 DIV VEN CARBON BED OUTLET R1 M0	Total/NA	Air	8321A	472295
140-16771-6	E-2146,2147,2149 DIV VEN CARBON BED OUT	Total/NA	Air	8321A	472295
140-16771-8	E-2150 DIV VEN CARBON BED OUTLET R2 M0	Total/NA	Air	8321A	472295
140-16771-10	E-2153,2154,2156 DIV VEN CARBON BED OUT	Total/NA	Air	8321A	472295
140-16771-12	E-2157 DIV VEN CARBON BED OUTLET R3 M0	Total/NA	Air	8321A	472295
MB 280-472295/13-A	Method Blank	Total/NA	Air	8321A	472295
MB 280-472295/1-A	Method Blank	Total/NA	Air	8321A	472295
LCS 280-472295/2-A	Lab Control Sample	Total/NA	Air	8321A	472295

Analysis Batch: 472875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16771-1	E-2137,2138 DIV VEN CARBON BED OUTLET F	Total/NA	Air	8321A	472321
140-16771-5	E-2144,2145 DIV VEN CARBON BED OUTLET F	Total/NA	Air	8321A	472321
140-16771-9	E-2151,2152 DIV VEN CARBON BED OUTLET F	Total/NA	Air	8321A	472321
MB 280-472321/1-A	Method Blank	Total/NA	Air	8321A	472321
LCS 280-472321/2-A	Lab Control Sample	Total/NA	Air	8321A	472321

QC Association Summary

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

Job ID: 140-16771-1

LCMS

Analysis Batch: 472876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16771-3	E-2141 DIV VEN CARBON BED OUTLET R1 M0	Total/NA	Air	8321A	472332
140-16771-7	E-2148 DIV VEN CARBON BED OUTLET R2 M0	Total/NA	Air	8321A	472332
140-16771-11	E-2155 DIV VEN CARBON BED OUTLET R3 M0	Total/NA	Air	8321A	472332
MB 280-472332/1-A	Method Blank	Total/NA	Air	8321A	472332
LCS 280-472332/2-A	Lab Control Sample	Total/NA	Air	8321A	472332

Client Sample ID: E-2137,2138 DIV VEN CARBON BED OUTLET R1 M0010 FH

Lab Sample ID: 140-16771-1

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	11.0		0.100	0.0108	ug/Sample		09/30/19 09:50	10/03/19 14:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*104*		*50 - 200*	*09/30/19 09:50*	*10/03/19 14:33*	*1*

Client Sample ID: E-2139,2140,2142 DIV VEN CARBON BED OUTLET R1 M0010 BH

Lab Sample ID: 140-16771-2

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	10.2		0.250	0.0500	ug/Sample		09/29/19 11:20	10/03/19 12:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*99*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:42*	*1*

Client Sample ID: E-2141 DIV VEN CARBON BED OUTLET R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16771-3

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.17		0.212	0.0108	ug/Sample		09/30/19 10:21	10/03/19 15:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*95*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:38*	*1*

Client Sample ID: E-2143 DIV VEN CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16771-4

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
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		09/29/19 11:20	10/03/19 12:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*75*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:45*	*1*

Client Sample ID: E-2144,2145 DIV VEN CARBON BED OUTLET R2 M0010 FH

Lab Sample ID: 140-16771-5

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.72		0.100	0.0108	ug/Sample		09/30/19 09:50	10/03/19 14:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*110*		*50 - 200*	*09/30/19 09:50*	*10/03/19 14:36*	*1*

Client Sample ID: E-2146,2147,2149 DIV VEN CARBON BED OUTLET R2 M0010 BH

Lab Sample ID: 140-16771-6

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.90		0.300	0.0600	ug/Sample		09/29/19 11:20	10/03/19 12:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*77*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:48*	*1*

Client Sample ID: E-2148 DIV VEN CARBON BED OUTLET R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16771-7

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.35		0.215	0.0110	ug/Sample		09/30/19 10:21	10/03/19 15:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*103*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:41*	*1*

Client Sample ID: E-2150 DIV VEN CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16771-8

Date Collected: 09/24/19 00:00
Date Received: 09/25/19 19:00
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		09/29/19 11:20	10/03/19 12:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*70*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:52*	*1*

Client Sample ID: E-2151,2152 DIV VEN CARBON BED OUTLET R3 M0010 FH

Lab Sample ID: 140-16771-9

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.38		0.125	0.0135	ug/Sample		09/30/19 09:50	10/03/19 14:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*102*		*50 - 200*	*09/30/19 09:50*	*10/03/19 14:43*	*1*

Client Sample ID: E-2153,2154,2156 DIV VEN CARBON BED OUTLET R3 M0010 BH

Lab Sample ID: 140-16771-10

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	6.53		0.275	0.0550	ug/Sample		09/29/19 11:20	10/03/19 12:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*84*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:55*	*1*

Client Sample ID: E-2155 DIV VEN CARBON BED OUTLET R3 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16771-11

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.28		0.218	0.0111	ug/Sample		09/30/19 10:21	10/03/19 15:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*103*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:48*	*1*

Client Sample ID: E-2157 DIV VEN CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16771-12

Date Collected: 09/25/19 00:00
Date Received: 09/25/19 19:00
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		09/29/19 11:20	10/03/19 13:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*71*		*50 - 200*	*09/29/19 11:20*	*10/03/19 13:01*	*1*

Default Detection Limits

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

Job ID: 140-16771-1

Method: 8321A - HFPO-DA

Prep: None

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

Method: 8321A - PFOA and PFOS

Prep: None

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

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ANALYTICAL REPORT

Job Number: 140-16766-1

Job Description: VEN Stack - M0010

Contract Number: LBIO-67048

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

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager I
10/9/2019 8:07 AM

Courtney M Adkins, Project Manager I
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
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10/09/2019

Table of Contents

Table of Contents

Definitions/Glossary

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

Job ID: 140-16766-1

Qualifiers

LCMS

Qualifier	Qualifier Description
D	Sample results are obtained from a dilution; the surrogate or matrix spike recoveries reported are calculated from diluted samples.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Method Summary

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

Job ID: 140-16766-1

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

Protocol References:

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

Laboratory References:

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

Sample Summary

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

Job ID: 140-16766-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-16766-1	C-2905,2906 VEN STACK R1 M0010 FH	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-2	C-2907,2908,2910 VEN STACK R1 M0010 BH	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-3	C-2909 VEN STACK R1 M0010 IMP 1,2&3 CONDENSATE	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-4	C-2911 VEN STACK R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-5	C-2912,2913 VEN STACK R2 M0010 FH	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-6	C-2914,2915,2917 VEN STACK R2 M0010 BH	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-7	C-2916 VEN STACK R2 M0010 IMP 1,2&3 CONDENSATE	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-8	C-2918 VEN STACK R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/24/19 00:00	09/25/19 19:00	
140-16766-9	C-2919,2920 VEN STACK R3 M0010 FH	Air	09/25/19 00:00	09/25/19 19:00	
140-16766-10	C-2921,2922,2924 VEN STACK R3 M0010 BH	Air	09/25/19 00:00	09/25/19 19:00	
140-16766-11	C-2923 VEN STACK R3 M0010 IMP 1,2&3 CONDENSATE	Air	09/25/19 00:00	09/25/19 19:00	
140-16766-12	C-2925 VEN STACK R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	09/25/19 00:00	09/25/19 19:00	

Job Narrative
140-16766-1

Receipt

The samples were received on September 25, 2019 at 7:00 PM in good condition and properly preserved. The temperatures of the 2 coolers at receipt time were 0.4º C and 0.6º C.

Quality Control and Data Interpretation

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

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the Denver laboratory for HFPO-DA analysis. All results are reported in "Total ug" per sample.

LCMS

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

Organic Prep

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

Comments

Reporting Limits (RLs) and Method Detection Limits (MDLs) for the HFPO-DA used in this report were derived in Denver for reporting soils and water samples. Method 0010 sampling train matrix specific RLs and MDLs have not been established for HFPO-DA. The soil and water limits are expected to be reasonable approximations of the actual matrix specific limits, under these conditions.

Breakthrough from the Modified Method 0010 Sampling Train for PFAS compounds will be measured by the percentage (%) concentration of a specific PFAS target analyte determined to be present in the Breakthrough XAD-2 resin module of a test run. If the concentration of a specific PFAS compound is ≤30% of the sum of the concentrations determined for the other three (3) fractions of the sampling train, then sampling breakthrough is determined not to have occurred. Also, no breakthrough will be determined to have occurred if < 250 µg of a target analyte is collected on all fractions of a sampling train. Breakthrough the sampling train implies that sample loss through the train has occurred and results in a negative bias to the sample results.

LCMS

Analysis Batch: 464589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-464589/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 472295

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-2	C-2907,2908,2910 VEN STACK R1 M0010 BH	Total/NA	Air	None	
140-16766-4	C-2911 VEN STACK R1 M0010 BREAKTHROUC	Total/NA	Air	None	
140-16766-6	C-2914,2915,2917 VEN STACK R2 M0010 BH	Total/NA	Air	None	
140-16766-8	C-2918 VEN STACK R2 M0010 BREAKTHROUC	Total/NA	Air	None	
140-16766-10	C-2921,2922,2924 VEN STACK R3 M0010 BH	Total/NA	Air	None	
140-16766-12	C-2925 VEN STACK R3 M0010 BREAKTHROUC	Total/NA	Air	None	
MB 280-472295/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472295/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 472321

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-1	C-2905,2906 VEN STACK R1 M0010 FH	Total/NA	Air	None	
140-16766-5	C-2912,2913 VEN STACK R2 M0010 FH	Total/NA	Air	None	
140-16766-9	C-2919,2920 VEN STACK R3 M0010 FH	Total/NA	Air	None	
MB 280-472321/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472321/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 472332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-3	C-2909 VEN STACK R1 M0010 IMP 1,2&3 CONI	Total/NA	Air	None	
140-16766-7	C-2916 VEN STACK R2 M0010 IMP 1,2&3 CONI	Total/NA	Air	None	
140-16766-11	C-2923 VEN STACK R3 M0010 IMP 1,2&3 CONI	Total/NA	Air	None	
MB 280-472332/1-A	Method Blank	Total/NA	Air	None	
LCS 280-472332/2-A	Lab Control Sample	Total/NA	Air	None	

Analysis Batch: 472874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-2	C-2907,2908,2910 VEN STACK R1 M0010 BH	Total/NA	Air	8321A	472295
140-16766-4	C-2911 VEN STACK R1 M0010 BREAKTHROUC	Total/NA	Air	8321A	472295
140-16766-6	C-2914,2915,2917 VEN STACK R2 M0010 BH	Total/NA	Air	8321A	472295
140-16766-8	C-2918 VEN STACK R2 M0010 BREAKTHROUC	Total/NA	Air	8321A	472295
140-16766-10	C-2921,2922,2924 VEN STACK R3 M0010 BH	Total/NA	Air	8321A	472295
140-16766-12	C-2925 VEN STACK R3 M0010 BREAKTHROUC	Total/NA	Air	8321A	472295
MB 280-472295/1-A	Method Blank	Total/NA	Air	8321A	472295
LCS 280-472295/2-A	Lab Control Sample	Total/NA	Air	8321A	472295

Analysis Batch: 472875

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-1	C-2905,2906 VEN STACK R1 M0010 FH	Total/NA	Air	8321A	472321
140-16766-5	C-2912,2913 VEN STACK R2 M0010 FH	Total/NA	Air	8321A	472321
140-16766-9	C-2919,2920 VEN STACK R3 M0010 FH	Total/NA	Air	8321A	472321
MB 280-472321/1-A	Method Blank	Total/NA	Air	8321A	472321
LCS 280-472321/2-A	Lab Control Sample	Total/NA	Air	8321A	472321

Analysis Batch: 472876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-3	C-2909 VEN STACK R1 M0010 IMP 1,2&3 CONI	Total/NA	Air	8321A	472332

LCMS (Continued)

Analysis Batch: 472876 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-16766-7	C-2916 VEN STACK R2 M0010 IMP 1,2&3 CONI	Total/NA	Air	8321A	472332
140-16766-11	C-2923 VEN STACK R3 M0010 IMP 1,2&3 CONI	Total/NA	Air	8321A	472332
MB 280-472332/1-A	Method Blank	Total/NA	Air	8321A	472332
LCS 280-472332/2-A	Lab Control Sample	Total/NA	Air	8321A	472332

Client Sample ID: C-2905,2906 VEN STACK R1 M0010 FH

Lab Sample ID: 140-16766-1

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	20.7		0.125	0.0135	ug/Sample		09/30/19 09:50	10/03/19 14:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*101*		*50 - 200*	*09/30/19 09:50*	*10/03/19 14:13*	*1*

Client Sample ID: C-2907,2908,2910 VEN STACK R1 M0010 BH

Lab Sample ID: 140-16766-2

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.32		0.350	0.0700	ug/Sample		09/29/19 11:20	10/03/19 11:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*75*		*50 - 200*	*09/29/19 11:20*	*10/03/19 11:56*	*1*

Client Sample ID: C-2909 VEN STACK R1 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16766-3

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0180	J	0.198	0.0101	ug/Sample		09/30/19 10:21	10/03/19 15:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*115*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:18*	*1*

Client Sample ID: C-2911 VEN STACK R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16766-4

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		09/29/19 11:20	10/03/19 12:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*70*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:00*	*1*

Client Sample ID: C-2912,2913 VEN STACK R2 M0010 FH

Lab Sample ID: 140-16766-5

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	27.3		0.250	0.0270	ug/Sample		09/30/19 09:50	10/03/19 14:16	2

Client Sample ID: C-2912,2913 VEN STACK R2 M0010 FH

Lab Sample ID: 140-16766-5

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	98	D	50 - 200	09/30/19 09:50	10/03/19 14:16	2

Client Sample ID: C-2914,2915,2917 VEN STACK R2 M0010 BH

Lab Sample ID: 140-16766-6

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**5.17**		0.325	0.0650	ug/Sample		09/29/19 11:20	10/03/19 12:03	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	77		50 - 200	09/29/19 11:20	10/03/19 12:03	1

Client Sample ID: C-2916 VEN STACK R2 M0010 IMP 1,2&3 CONDENSATE

Lab Sample ID: 140-16766-7

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**0.550**		0.198	0.0101	ug/Sample		09/30/19 10:21	10/03/19 15:21	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	107		50 - 200	09/30/19 10:21	10/03/19 15:21	1

Client Sample ID: C-2918 VEN STACK R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-16766-8

Date Collected: 09/24/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		09/29/19 11:20	10/03/19 12:06	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	69		50 - 200	09/29/19 11:20	10/03/19 12:06	1

Client Sample ID: C-2919,2920 VEN STACK R3 M0010 FH

Lab Sample ID: 140-16766-9

Date Collected: 09/25/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**13.0**		0.100	0.0108	ug/Sample		09/30/19 09:50	10/03/19 14:20	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	103		50 - 200	09/30/19 09:50	10/03/19 14:20	1

Client Sample ID: C-2921,2922,2924 VEN STACK R3 M0010 BH
Lab Sample ID: 140-16766-10

Date Collected: 09/25/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.60		0.325	0.0650	ug/Sample		09/29/19 11:20	10/03/19 12:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*75*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:09*	*1*

Client Sample ID: C-2923 VEN STACK R3 M0010 IMP 1,2&3 CONDENSATE
Lab Sample ID: 140-16766-11

Date Collected: 09/25/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.214	0.0109	ug/Sample		09/30/19 10:21	10/03/19 15:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*105*		*50 - 200*	*09/30/19 10:21*	*10/03/19 15:25*	*1*

Client Sample ID: C-2925 VEN STACK R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-16766-12

Date Collected: 09/25/19 00:00
Matrix: Air
Date Received: 09/25/19 19:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		09/29/19 11:20	10/03/19 12:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*71*		*50 - 200*	*09/29/19 11:20*	*10/03/19 12:13*	*1*

Default Detection Limits

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

Job ID: 140-16766-1

Method: 8321A - HFPO-DA

Prep: None

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

Method: 8321A - PFOA and PFOS

Prep: None

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

APPENDIX D
SAMPLE CALCULATIONS

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 09/24/19**
Test Location: CBed Inlet | **Test Period: 1002-1232**

1. HFPO Dimer Acid concentration, lbs/dscf.

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

$$Conc1 = \frac{452.6 \times 2.2046 \times 10\text{-}9}{52.201}$$

Conc1 = 1.91E-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 = 452.6 / (52.201 x 0.02832)

Conc2 = 306.1

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

$MR1_{(Inlet)}$ = 1.91E-08 x 14036 x 60

$MR1_{(Inlet)}$ = 1.61E-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

$MR2_{(Inlet)}$ = 1.61E-02 x 453.59 /3600

$MR2_{(Inlet)}$ = 2.03E-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, %

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

$$RE = \frac{(1.61E\text{-}02) - (8.90E\text{-}04)}{1.61E\text{-}02}$$

RE = 94.5

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.

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 9/24/19 Test**
Test Location: CBed Outlet | **Period: 1002-1232**

1. HFPO Dimer Acid concentration, lbs/dscf.

$$C_1 = \frac{W \times 2.2046 \times 10^{-9}}{Vm(std)}$$

$$C_1 = \frac{24.4 \times 2.2046 \times 10\text{-}9}{53.002}$$

$$= 1.01E\text{-}09$$

Where:

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

C_1 = HFPO Dimer Acid concentration, lbs/dscf.

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

2. HFPO Dimer Acid concentration, ug/dscm.

$C_2 = W / (Vm(std) \times 0.02832)$

$C_2 = 24.4 / (53.002 \times 0.02832)$

$= 1.62E+01$

Where:

C_2 = 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.

PMR1 = C_1 x Qs(std) x 60 min/hr

PMR1 = 1.01E-09 x 14642 x 60

= 8.90E-04

Where:

PMR1 = HFPO Dimer Acid mass emission rate, lbs/hr.

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

PMR2 = PMR1 x 453.59 / 3600

PMR2 = 8.90E-04 x 453.59 /3600

= 1.12E-04

Where:

PMR2 = HFPO Dimer Acid mass emission rate, g/sec.

453.6 = Conversion factor from pounds to grams.

3600 = Conversion factor from hours to seconds.

EXAMPLE CALCULATIONS FOR
VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 1	Test Date: 09/24/19
Test Location: VEN-Carbon Bed Inlet	Test Period: 1002-1232

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

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

$$Vm(std) = \frac{17.64 \times 0.9944 \times 55.120 \times \left(29.95 + \frac{1.113}{13.6} \right)}{96.25 + 460} = 52.201$$

Where:

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

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

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

$$Vw(std) = (0.04707 \times 14.0) + (0.04715 \times 14.2) = 1.33$$

Where:

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

3. Moisture content

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

$$bws = \frac{1.33}{1.33 + 52.201} = 0.025$$

Where:

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

4. Mole fraction of dry gas.

$$Md = 1 - bws$$

$$Md = 1 - 0.025 = 0.975$$

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.

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

$$MWs = (28.84 \times 0.975) +(18 (1 - 0.975)) = 28.57$$

Where:

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

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

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

$$Vs = 85.49 \times 0.84 \times 0.69628 \times \left(\frac{554}{29.47 \times 28.57} \right)^{\wedge}1/2 = 40.6$$

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.

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

$$Qs(act) = 60 \times 40.6 \times 6.31 = 15349$$

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.

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

$$Qs(std) = 17.64 \times 0.975 \times \frac{29.47}{554.4} \times 15349$$

$$Qs(std) = 14036$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 554 \times 52.201}{40.6 \times 96 \times 29.47 \times 0.975 \times (0.215)^{\wedge}2} = 96.9$$

Where:

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

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 3 | **Test Date: 09/25/19**
Test Location: Divison Stack | **Test Period: 0849-1106**

1. HFPO Dimer Acid concentration, lbs/dscf.

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

$$Conc1 = \frac{14.6 \times 2.2046 \times 10\text{-}9}{50.640}$$

Conc1 = 6.36E-10

Where:

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

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

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

2. HFPO Dimer Acid concentration, ug/dscm.

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

Conc2 = 14.6 / (50.640 x 0.02832)

Conc2 = 1.02E+01

Where:

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

0.02832 = Conversion factor from cubic feet to cubic meters.

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

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

$MR1_{(Outlet)}$ = 6.36E-10 x 24747 x 60

$MR1_{(Outlet)}$ = 9.44E-04

Where:

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

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

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

$MR2_{(Outlet)}$ = 9.44E-04 x 453.59 /3600

$MR2_{(Outlet)}$ = 1.19E-04

Where:

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

453.6 = Conversion factor from pounds to grams.

3600 = Conversion factor from hours to seconds.

EXAMPLE CALCULATIONS FOR
VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 3	Test Date: 09/25/19
Test Location: Division Stack	Test Period: 0849-1106

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

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

$$Vm(std) = \frac{17.64 \times 0.9979 \times 51.299 \times \left(29.89 + \frac{0.825}{13.6} \right)}{74.08 + 460} = 50.640$$

Where:

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

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

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

$$Vw(std) = (0.04707 \times 24.0) + (0.04715 \times 14.6) = 1.82$$

Where:

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

3. Moisture content

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

$$bws = \frac{1.82}{1.82 + 50.640} = 0.035$$

Where:

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

4. Mole fraction of dry gas.

$$Md = 1 - bws$$

$$Md = 1 - 0.035 = 0.965$$

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.

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

$$MWs = (28.84 \times 0.965) +(18 (1 - 0.965)) = 28.46$$

Where:

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

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

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

$$Vs = 85.49 \times 0.84 \times 1.08978 \times \left(\frac{548}{29.86 \times 28.46} \right)^{\wedge}1/2 = 62.8$$

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.

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

$$Qs(act) = 60 \times 62.8 \times 7.07 = 26646$$

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.

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

$$Qs(std) = 17.64 \times 0.965 \times \frac{29.86}{547.6} \times 26646$$

$$Qs(std) = 24747$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 548 \times 50.640}{62.8 \times 96 \times 29.86 \times 0.965 \times (0.160)\text{^}2} = 108.0$$

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

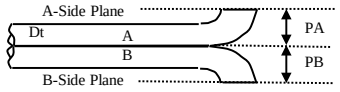
Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-705**

Inspection Date 2/19/19 Individual Conducting Inspection KS

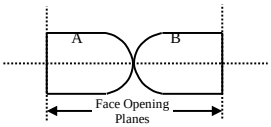
If all Criteria PASS
Cp is equal to 0.84

		PASS/FAIL
Distance to A Plane (PA) - inches	0.454	PASS
Distance to B Plane (PB) - inches	0.454	PASS
Pitot OD (D_t) - inches	0.375	

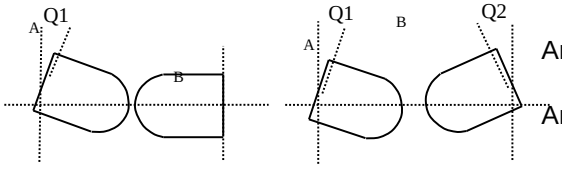


$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB



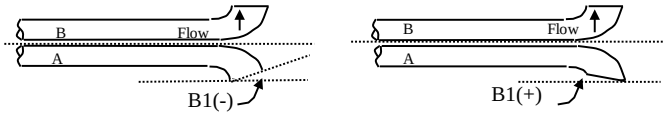
Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



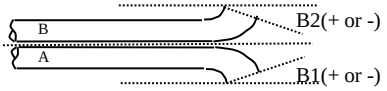
Angle of Q1 from vertical A Tube- degrees (absolute) 0 PASS

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

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



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

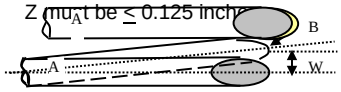


Angle of B1 from vertical B Tube- degrees (absolute) 0 PASS

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

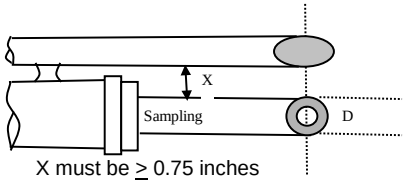
Horizontal offset between A and B Tubes (Z) - inches 0.009 PASS

Z must be $\leq$ 0.125 inches



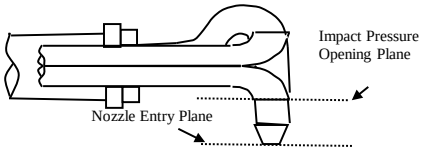
Vertical offset between A and B Tubes (W) - inches 0.016 PASS

W must be $\leq$ 0.03125 inches

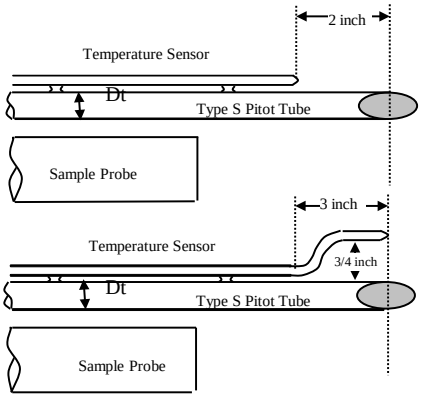


Distance between Sample Nozzle and Pitot (X) - inches 0.89 PASS

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

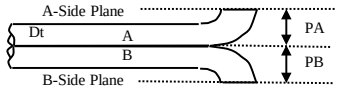
Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-707**

Inspection Date 6/15/18 Individual Conducting Inspection KS

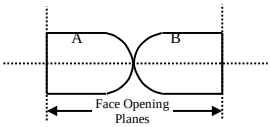
If all Criteria PASS
Cp is equal to 0.84

		PASS/FAIL
Distance to A Plane (PA) - inches	0.44	PASS
Distance to B Plane (PB) - inches	0.44	PASS
Pitot OD (D_t) - inches	0.375	

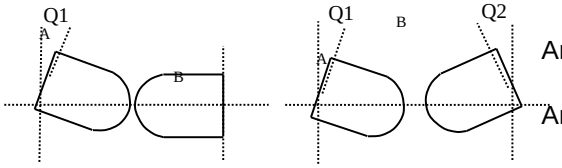


$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB



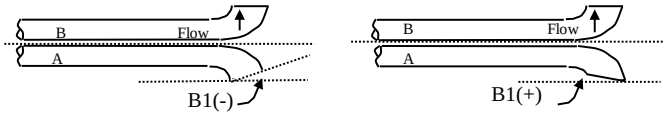
Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



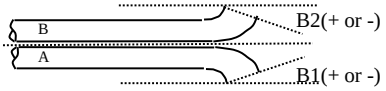
Angle of Q1 from vertical A Tube- degrees (absolute): 0 — PASS

Angle of Q2 from vertical B Tube- degrees (absolute): 0 — PASS

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



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

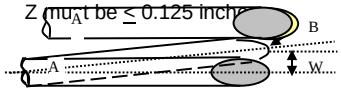


Angle of B1 from vertical B Tube- degrees (absolute): 0 — PASS

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

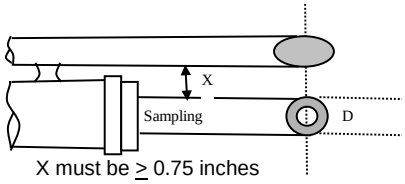
Horizontal offset between A and B Tubes (Z) - inches: 0.007 — PASS

Z must be $\leq$ 0.125 inches



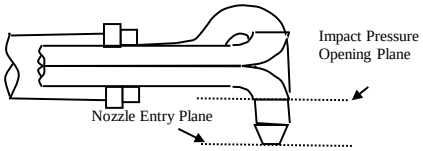
Vertical offset between A and B Tubes (W) - inches: 0.018 — PASS

W must be $\leq$ 0.03125 inches

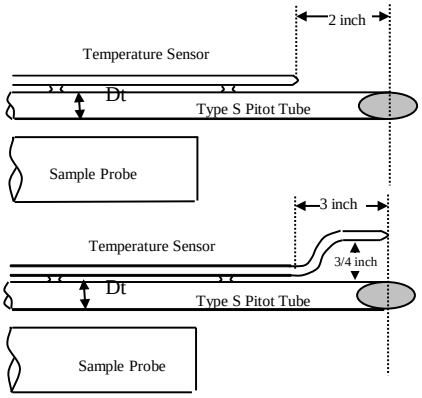


Distance between Sample Nozzle and Pitot (X) - inches: 0.86 — PASS

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

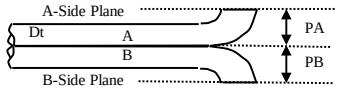
Type S Pitot Tube Inspection Data Form

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

Inspection Date 2/19/19 Individual Conducting Inspection ks

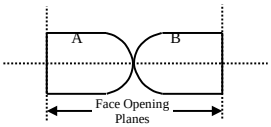
If all Criteria PASS
Cp is equal to 0.84

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

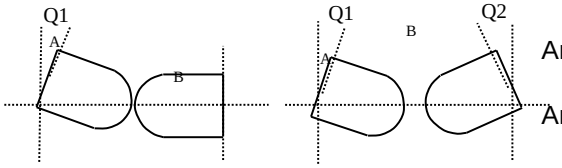


$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB



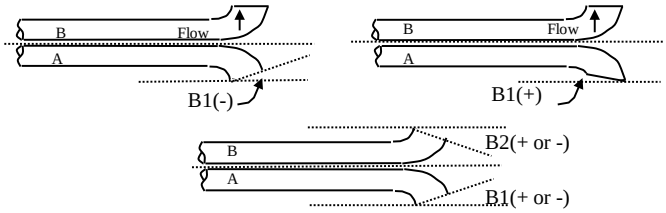
Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



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

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

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



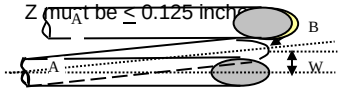
Angle of B1 from vertical A Tube- degrees (absolute) 0 PASS

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

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

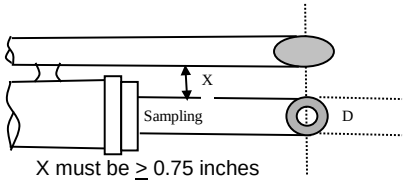
Horizontal offset between A and B Tubes (Z) - inches 0.003 PASS

Z must be $\leq$ 0.125 inches



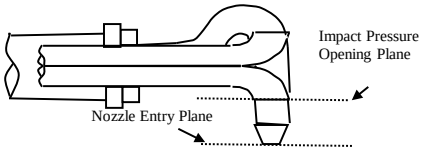
Vertical offset between A and B Tubes (W) - inches 0.012 PASS

W must be $\leq$ 0.03125 inches

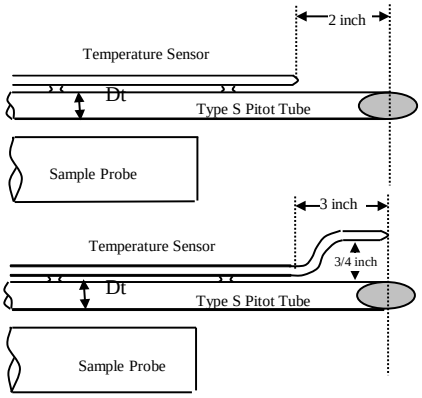


Distance between Sample Nozzle and Pitot (X) - inches 0.93 PASS

X must be $\geq$ 0.75 inches



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



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

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

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

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

Date 17-Aug-18 | **Wet Test Meter Number** P-2952 | **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 17087363

Baro Press, in Hg (Pb)	29.68

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.00	165.901	72.0	76.00	76.00	76.5	12.8	0.9917	1.8463
		170.979		77.00	77.00				
		5.078		76.50	76.50				
1.0	5.0	173.050	72.0	77.00	77.00	77.5	9.1	1.0024	1.8629
		178.077		78.00	78.00				
		5.027		77.50	77.50				
1.5	10.0	179.100	72.0	78.00	78.00	78.5	15.1	0.9948	1.9199
		189.237		79.00	79.00				
		10.137		78.50	78.50				
2.0	10.0	190.250	72.0	79.00	79.00	79.0	13.2	0.9928	1.9544
		200.405		79.00	79.00				
		10.155		79.00	79.00				
3.0	10.0	201.439	72.0	80.00	80.00	80.0	11.0	0.9901	2.0320
		211.615		80.00	80.00				
		10.176		80.00	80.00				
							Average	**0.9944**	**1.9231**

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

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

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

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

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

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

2 - Acceptable Temperature Difference less than 1.5 %

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

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN
CARBON BED INLET
METER BOX NO. 24
9/24/19 and 9/25/19

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

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

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

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

MWd =	28.84	28.84	28.84

Tma = Source Temperature, absolute(^{o}R)			
Tm = Average dry gas meter temperature , deg F.	96.3	101.7	90.8

$$Tma = Ts + 460$$

$$Tma = 96.25 + 460$$

Tma =	556.25	561.71	550.79

Ps = Absolute meter pressure, inches Hg.			
13.60 = Specific gravity of mercury.			
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	1.11	1.16	1.05
Pb = Barometric Pressure, in Hg.	29.95	29.95	29.98

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

$$Pm = 29.95 + (1.11333333333333 / 13.6)$$

Pm =	30.03	30.04	30.06

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.	55.120	56.473	54.769
Y = Dry gas meter calibration factor (based on full calibration)	0.9944	0.9944	0.9944
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.9231	1.9231	1.9231
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.0522	1.0740	1.0238
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 55.12) * SQRT (0.0319 * 556.25 * 29) / (1.92 * 30.03 * 28.84) * 1.05$$

$$Yqa = 1.742 * SQRT\ 514.587 / 1{,}665.299 * 1.05$$

Yqa =	1.019	1.020	0.992

Diff = Absolute difference between Yqa and Y	2.47	2.57	0.24

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

$$Diff = ((0.9944 - 1.019) / 0.9944) * 100$$

Average Diff = 1.76

Allowable = 5.0

DRY GAS METER CALIBRATION REPORT

Customer: Weston Solutions Date: March 27, 2019

Console Serial # 2381 Console Model # C-5000 SOL

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

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

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

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

Calibration Performed By:

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

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN
CARBON BED OUTLET
METER BOX NO. WC 32
9/24/2019 + 9/25/2019

	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(^{o}R)			
Tm = Average dry gas meter temperature , deg F.	89.3	99.0	77.5

$$Tma = Ts + 460$$

$$Tma = 89.25 + 460$$

Tma =	549.25	559.00	537.54

Ps = Absolute meter pressure, inches Hg.			
13.60 = Specific gravity of mercury.			
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	1.13	1.22	1.24
Pb = Barometric Pressure, in Hg.	29.95	29.95	29.94

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

$$Pm = 29.95 + (1.13375 / 13.6)$$

Pm =	30.03	30.04	30.03

Yqa = dry gas meter calibration check value, dimensionless.			
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.			
29.00 = dry molecular weight of air, lb/lb-mole.			
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	55.877	60.071	61.740
Y = Dry gas meter calibration factor (based on full calibration)	0.9834	0.9834	0.9834
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.7175	1.7175	1.7175
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.0465	1.0915	1.0999
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 55.88) * SQRT (0.0319 * 549.25 * 29) / (1.72 * 30.03 * 28.84) * 1.05$$

$$Yqa = 1.718 * SQRT\ 508.111 / 1{,}487.261 * 1.05$$

Yqa =	1.0510	1.0284	0.9889

Diff = Absolute difference between Yqa and Y	6.87	4.58	0.56

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

$$Diff = ((0.9834 - 1.051) / 0.9834) * 100$$

Average Diff = 4

Allowable = 5.0

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

Calibrator MDW | **Meter Box Number** 22 | **Ambient Temp** 72

Date 29-Jul-19 | **Wet Test Meter Number** P-2952 | **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 15550528

Baro Press, in Hg (Pb)	29.88

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	836.525	72.0	72.00	72.00	73.0	12.5	1.0037	1.7605
		841.510		74.00	74.00				
		4.985		73.00	73.00				
1.0	5.0	842.500	72.0	74.00	74.00	74.0	9.0	1.0023	1.8218
		847.495		74.00	74.00				
		4.995		74.00	74.00				
1.5	10.0	848.472	72.0	75.00	75.00	75.5	14.8	1.0000	1.8423
		858.501		76.00	76.00				
		10.029		75.50	75.50				
2.0	10.0	859.524	72.0	75.00	75.00	75.5	13.0	0.9941	1.8952
		869.600		76.00	76.00				
		10.076		75.50	75.50				
3.0	10.0	870.662	72.0	77.00	77.00	77.5	10.70	0.9893	1.9187
		880.800		78.00	78.00				
		10.138		77.50	77.50				
							Average	**0.9979**	**1.8477**

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

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

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

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

Reference Temperature	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	33	33	32	33	33		32.8	-0.2%
212	212	213	211	211	211		211.6	0.1%
932	933	933	933	933	932		932.8	-0.1%
1832	1833	1833	1833	1832	1832		1832.6	0.0%

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

2 - Acceptable Temperature Difference less than 1.5 %

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

Y Factor Calibration Check Calculation

MODIFIED METHOD 0010 TEST TRAIN

DIVISION STACK

METER BOX NO. 22

9/24/2019 + 9/25/2019

	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(^{o}R)			
Tm = Average dry gas meter temperature , deg F.	85.2	94.3	74.1

$$Tma = Ts + 460$$

$$Tma = 85.21 + 460$$

Tma =	545.21	554.25	534.08

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	1.00	1.09	0.83
Pb = Barometric Pressure, in Hg.	29.94	29.78	29.89

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

$$Pm = 29.94 + (1.00083333333333 / 13.6)$$

Pm =	30.01	29.86	29.95

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.	55.361	59.405	51.299
Y = Dry gas meter calibration factor (based on full calibration)	0.9979	0.9979	0.9979
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.8477	1.8477	1.8477
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	0.9948	1.0377	0.9004
O = Total sampling time, minutes.	96	96	96

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

$$Yqa = (96.00 / 55.36) * SQRT (0.0319 * 545.21 * 29) / (1.85 * 30.01 * 28.84) * 0.99$$

$$Yqa = 1.734 * SQRT 504.372 / 1,598.941 * 0.99$$

Yqa =	0.9689	0.9520	0.9376

Diff = Absolute difference between Yqa and Y	2.91	4.60	6.04

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

$$Diff = ((0.9979 - 0.969) / 0.9979) * 100$$

Average Diff = 4.52

Allowable = 5.0

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
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Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	160-401424145-1
Cylinder Number:	ALM053372	Cylinder Volume:	150.5 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Feb 26, 2019

Expiration Date: Feb 26, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a 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 %	9.020 %	G1	+/- 0.6% NIST Traceable	02/26/2019
OXYGEN	12.00 %	12.07 %	G1	+/- 0.3% NIST Traceable	02/26/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	061507	K014984	13.94 % CARBON DIOXIDE/NITROGEN	0.57%	Jan 30, 2024
NTRM	16060507	CC401541	23.204 % OXYGEN/NITROGEN	0.2%	Dec 24, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA VA5011 T5V6VU9P NDIR CO2	NDIR	Feb 12, 2019
SIEMENS OXYMAT 61 S01062 O2	PARAMAGNETIC	Feb 18, 2019

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

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

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI62E15A0224	Reference Number:	82-401196512-1
Cylinder Number:	CC112489	Cylinder Volume:	157.2 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 12, 2018

Expiration Date: May 12, 2026

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

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	17.00 %	17.05 %	G1	+/- 0.7% NIST Traceable	05/12/2018
OXYGEN	21.00 %	20.98 %	G1	+/- 0.5% NIST Traceable	05/12/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060731	CC413777	16.939 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 08, 2019
NTRM	09061420	CC273671	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

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

Triad Data Available Upon Request

Signature on file
Approved for Release

APPENDIX F
LIST OF PROJECT PARTICIPANTS

The following WESTON employees participated in this project.

Paul Meeter	Senior Project Manager
Jeff O'Neill	Senior Project Manager
Brandon Berger	Team Member
Nick Guarino	Team Member
Kris Ansley	Team Member
Kyle Schweitzer	Team Member
Austin Squires	Team Member
Matt Winkeler	Team Member
Steve Rathfon	Team Member