FLUOROMONOMERS
MANUFACTURING PROCESS
VE SOUTH
EMISSIONS TEST REPORT
TEST DATES: 23 AUGUST 2018

THE CHEMOURS COMPANY
FAYETTEVILLE, NORTH CAROLINA

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W.O. No. 15418.002.007

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1. INTRODUCTION

1.1 FACILITY AND BACKGROUND INFORMATION

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

Chemours contracted Weston Solutions, Inc. (WESTON) to perform HFPO Dimer Acid emission testing on the Vinyl Ethers (VE) South Stack. Testing was performed on 23 August 2018 and generally followed the "Emissions Test Protocol" reviewed and approved by the North Carolina Department of Environmental Quality (NCDEQ). This report provides the results from the emission test program.

1.2 TEST OBJECTIVES

The specific objectives for this test program were as follows:

- Measure the emissions concentrations and mass emissions rates of HFPO Dimer Acid from the VE South stack which is located in the Fluoromonomers process.
- 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 on the VE South Stack. HFPO Dimer Acid Fluoride was being filled into an ISO container at the time of this testing. This is one condition that had yet to be tested. VE North manufactures the HFPO Dimer Acid Fluoride and fills an ISO container, that is located in VE South and vents to the VE South scrubber.

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

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

Appendix C includes the summary reports for the laboratory analytical results. The full laboratory data packages are provided in electronic format and on CD with each hard copy.

Table 1-1
Sampling Plan for VE South Stack

Sampling Point & Location	**VE South Stack**				
Number of Tests:	2				
Parameters To Be Tested:	HFPO Dimer Acid (HFPO-DA)	Volumetric Flow Rate and Gas Velocity	Carbon Dioxide	Oxygen	Water Content
Sampling or Monitoring Method	EPA M-0010	EPA M1, M2, M3A, and M4 in conjunction with M-0010 tests	EPA M3A		EPA M4 in conjunction with M-0010 tests
Sample Extraction/ Analysis Method(s):	LC/MS/MS	NA[6]	NA		NA
Sample Size	> 1m^3	NA	NA	NA	NA
Total Number of Samples Collected[1]	2	2	2	2	2
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	6[5]	2	2	2	2

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

Two tests were performed on the VE South stack. Table 2-1 provides a summary of the HFPO Dimer Acid emission test results. Detailed test results summaries are provided in Section 6.

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

Table 2-1

Summary of HFPO Dimer Acid Test Results

Source	Run No.	Emission Rates	
		lb/hr	g/sec
VE South Stack	1	2.62E-02	3.30E-03
	2	2.04E-02	2.57E-03
	Average	2.33E-02	2.94E-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 Teflon Polymers and Viton®, as well as sales to outside customers.

The VE South Waste Gas Scrubber is vented to a process stack (NEP-Hdr2). In addition, the following building air systems are vented to this stack:

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

3.2 PROCESS OPERATIONS AND PARAMETERS

Source	Operation/Product	Batch or Continuous
VE South	ISO Container Filling/ PMVE/PEVE	Semi-continuous – Condensation is continuous, Two Agitated Bed Reactors are batch for 30-40 mins at end of each run, Refining (ether column) is batch

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

- Fluoromonomers Processes
    - VE South Waste Gas Scrubber
        - Caustic recirculation flow rate

4. DESCRIPTION OF TEST LOCATIONS

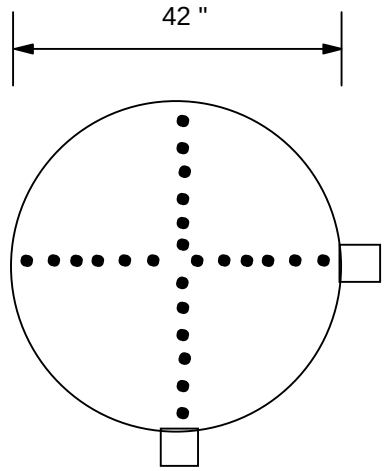
4.1 VE SOUTH SCRUBBER STACK

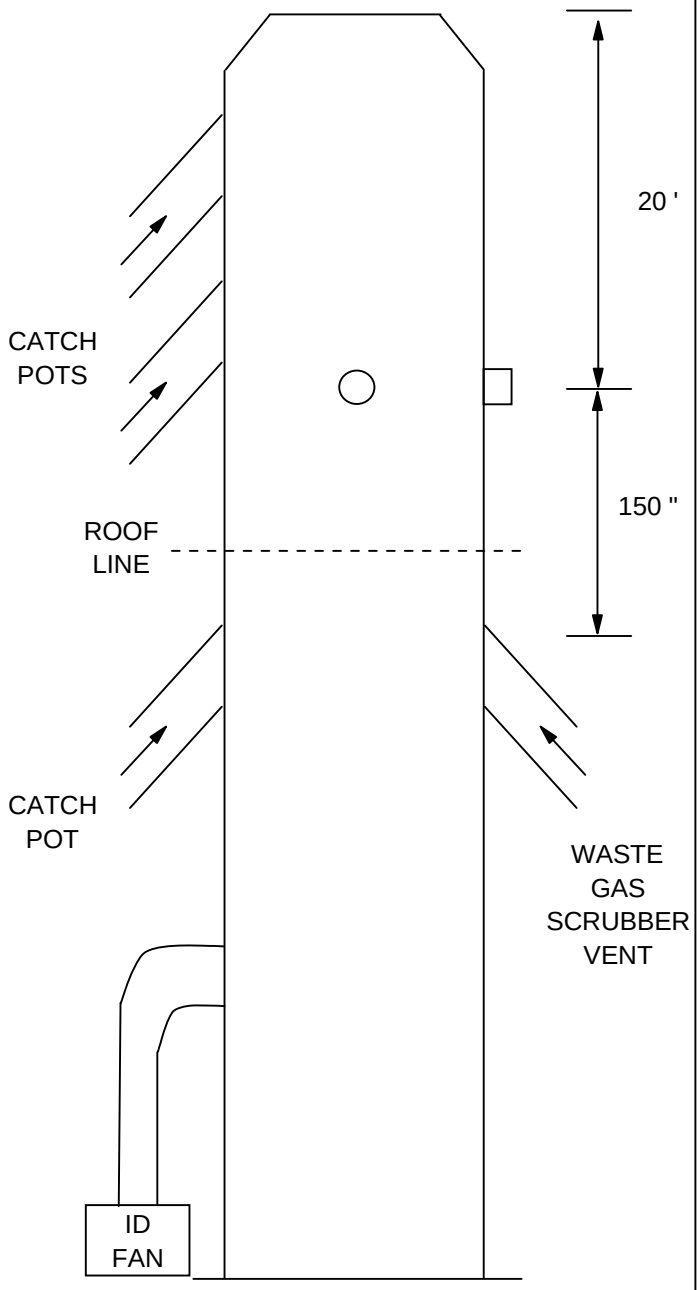
Two 6” ID test ports are installed on the 42” ID steel stack. The ports are placed 150” (3.6 diameters) from the location where the waste gas scrubber vent enters the stack and 20’ (5.7 diameters) from the stack exit.

Per EPA Method 1, a total of 24 traverse points (12 per axis) were used for M0010 isokinetic sampling. It should be noted that near the port locations are a number of small ducts leading to the stack. These are catch pots which, under normal operation, do not discharge to the stack. They are used to vent process gas to the stack in the event of a process upset. For the purpose of test port location, and given the fact that there is no flow from these catch pots, they are not considered a flow contributor or a disturbance.

See Figure 4-1 for a schematic of the test port and traverse point locations.

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





TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1
2	2 7/8
3	5
4	7 3/8
5	10 1/2
6	15
7	27
8	31 1/2
9	34 5/8
10	37
11	39 1/8
12	41

DRAWING NOT TO SCALE

FIGURE 4-1
VE SOUTH SCRUBBER STACK TEST PORT
AND TRAVERSE POINT LOCATION

IASDATA\CHEMOURS\15418.002.007\FIGURE 4-1 VE SOUTH SCRUBBER STACK

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 conducted at each test location. The cyclonic flow checks were negative (< 20°) verifying that both sources were acceptable for testing.

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

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

5.2 STACK PARAMETERS

5.2.1 EPA Method 0010

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

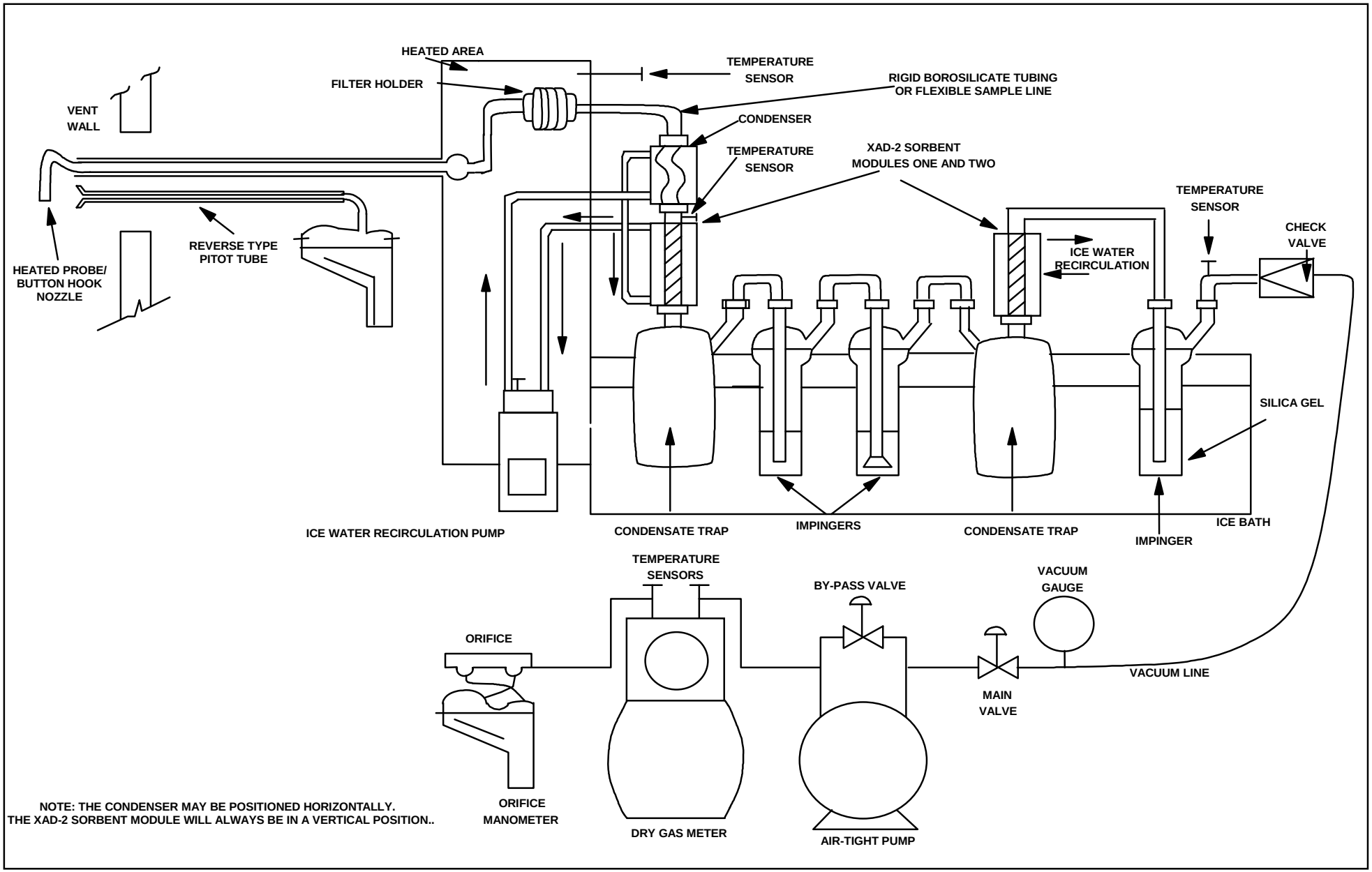


FIGURE 5-1
EPA METHOD 0010 SAMPLING TRAIN

IASDATA\CHEMOURS\15418.002.007\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 icewater-jacketed sorbent module containing approximately 40 grams of XAD-2 resin. The XAD-2 resin tube was equipped with an inlet temperature sensor. The XAD-2 resin trap was followed by a condensate knockout impinger and a series of two impingers that contained 100-ml of high purity distilled water. The train also included a second XAD-2 resin trap behind the impinger section to evaluate possible sampling train breakthrough. Each XAD-2 resin trap was connected to a 1-L condensate knockout trap. The final impinger contained 300 grams of dry pre-weighed silica gel. All impingers and the condensate traps were maintained in an ice bath. Ice water was continuously circulated in the condenser and both XAD-2 modules to maintain method required temperature. A control console with a leakless vacuum pump, a calibrated orifice, and dual inclined manometers was connected to the final impinger via an umbilical cord to complete the sample train.

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

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

5.2.2 EPA Method 0010 Sample Recovery

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

A consistent procedure was employed for sample recovery:

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

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

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

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

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

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

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

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

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

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

During each test campaign, a M-0010 blank train was setup near the test location, leak checked and recovered along with the respective sample train. Following sample recovery, all samples were transported to the TestAmerica Inc. for sample extraction and analysis.

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

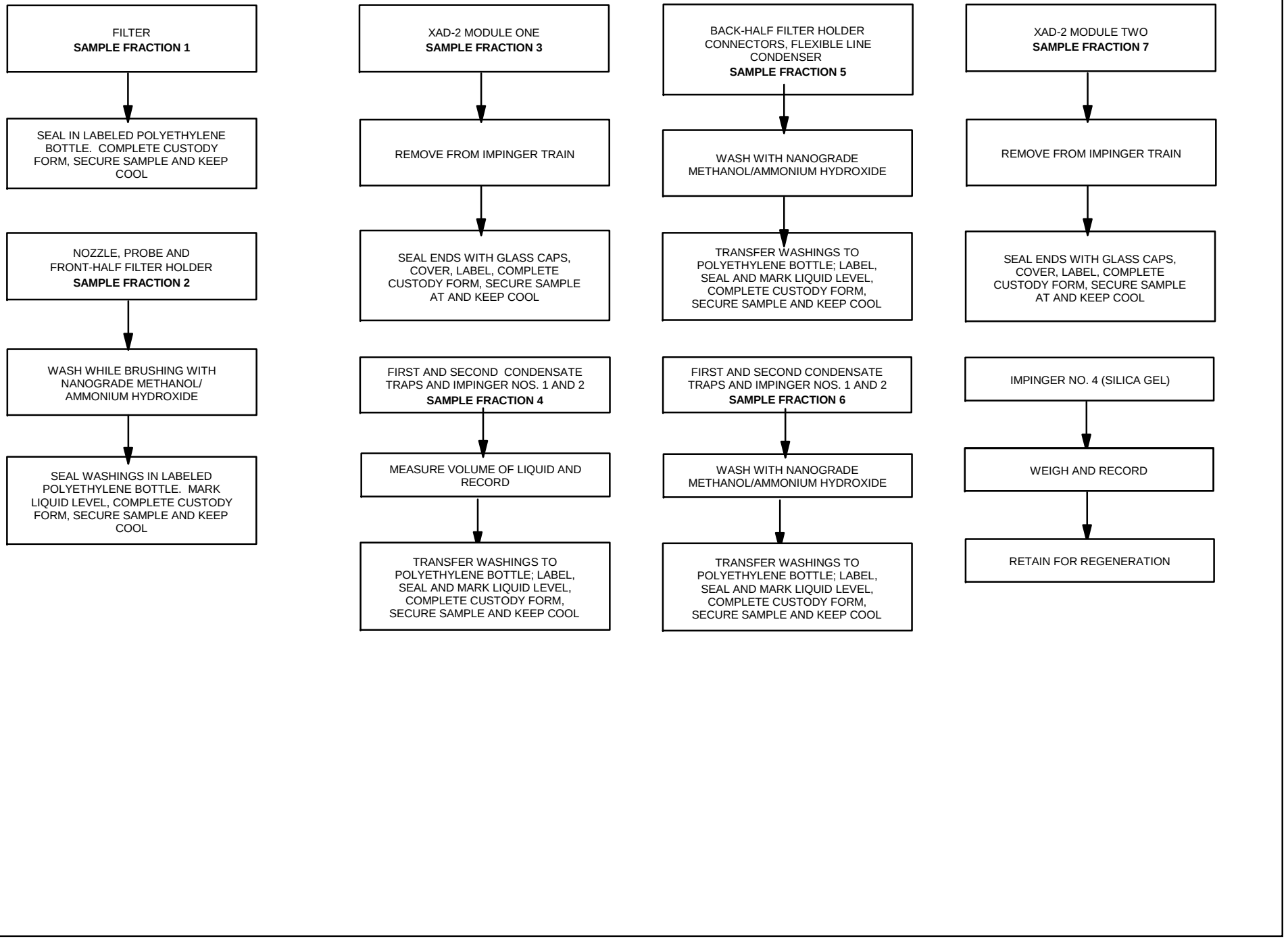


FIGURE 5-2
HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010

IASDATA\CHEMOURS\15418.002.007\FIGURE 5-2 EPA 0010

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

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

5.3 GAS COMPOSITION

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

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

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

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

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

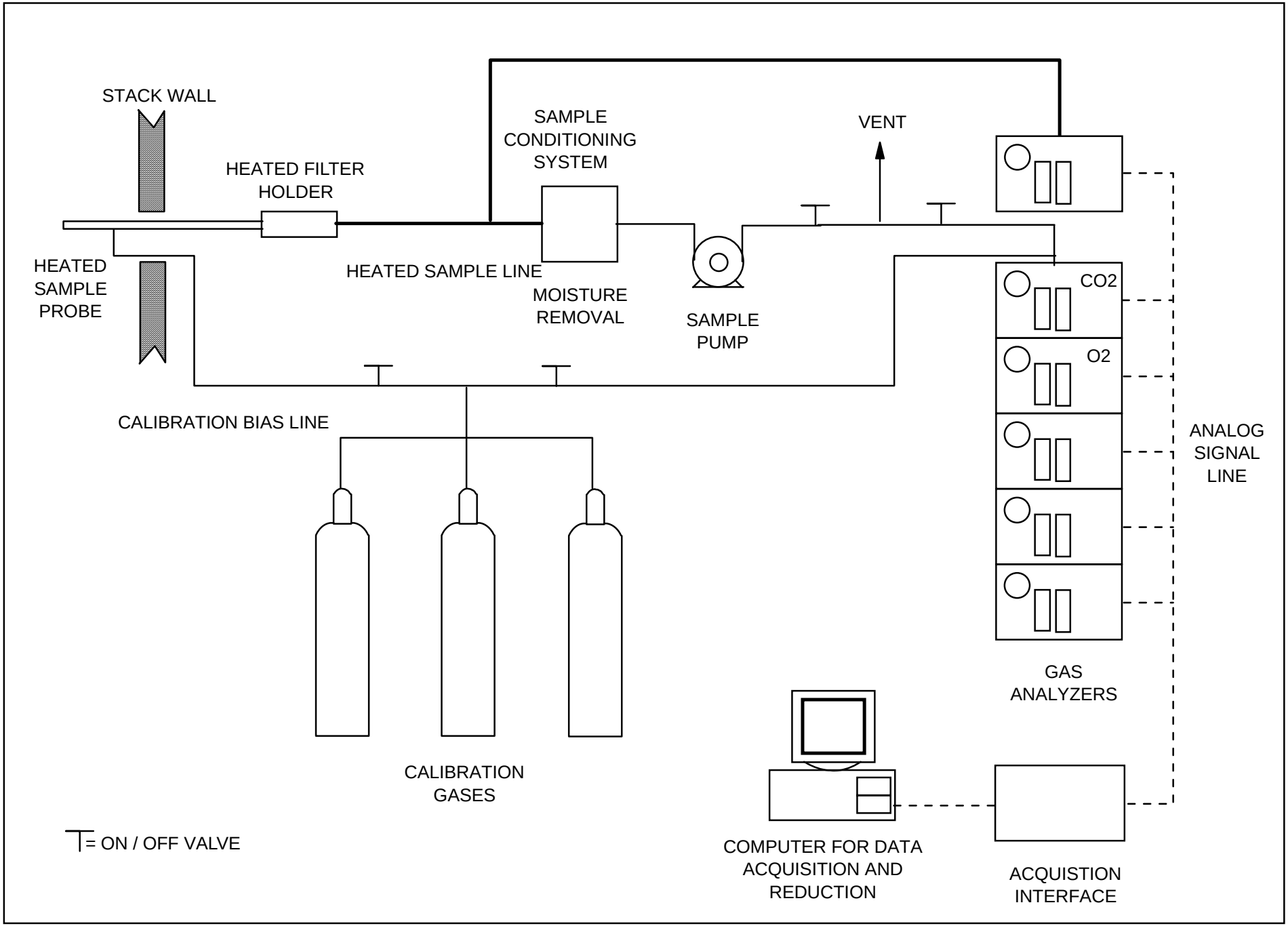


FIGURE 5-3
WESTON SAMPLING SYSTEM

IASDATA\CHEMOURS\15418.002.007\FIGURE 5-3 WESTON SAMPLING SYSTEM

6. DETAILED TEST RESULTS AND DISCUSSION

Preliminary testing and the associated analytical results required significant sample dilution to bring the HFPO Dimer Acid concentration within instrument calibration, therefore, sample times and sample volumes were reduced for the formal test program. This was approved by the North Carolina Department of Environmental Quality (NCDEQ).

Each test was a minimum of 96 minutes in duration. A total of two test runs were performed on the VE South stack.

Table 6-1 provides detailed test data and test results for the VE South stack.

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

TABLE 6-1
CHEMOURS - FAYETTEVILLE, NC
SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS
VE SOUTH STACK OUTLET

Test Data		
Run number	1	2
Location	VES-Stack	VES-Stack
Date	8/23/2018	8/23/2018
Time period	0850-1041	1130-1317
SAMPLING DATA:		
Sampling duration, min.	96.0	96.0
Nozzle diameter, in.	0.300	0.300
Cross sectional nozzle area, sq.ft.	0.000491	0.000491
Barometric pressure, in. Hg	30.05	30.05
Avg. orifice press. diff., in H_2O	1.22	1.11
Avg. dry gas meter temp., deg F	72.5	78.8
Avg. abs. dry gas meter temp., deg. R	533	539
Total liquid collected by train, ml	29.5	27.1
Std. vol. of H_2O vapor coll., cu.ft.	1.4	1.3
Dry gas meter calibration factor	0.9960	0.9960
Sample vol. at meter cond., dcf	59.061	57.101
Sample vol. at std. cond., dscf [(1)]	58.728	56.101
Percent of isokinetic sampling	105.1	105.3
GAS STREAM COMPOSITION DATA:		
CO_2, % by volume, dry basis	0.0	0.0
O_2, % by volume, dry basis	20.9	20.9
N_2, % by volume, dry basis	79.1	79.1
Molecular wt. of dry gas, lb/lb mole	28.84	28.84
H_20 vapor in gas stream, prop. by vol.	0.023	0.022
Mole fraction of dry gas	0.977	0.978
Molecular wt. of wet gas, lb/lb mole	28.59	28.59
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:		
Static pressure, in. H_2O	0.50	0.50
Absolute pressure, in. Hg	30.09	30.09
Avg. temperature, deg. F	79	81
Avg. absolute temperature, deg.R	539	541
Pitot tube coefficient	0.84	0.84
Total number of traverse points	24	24
Avg. gas stream velocity, ft./sec.	20.6	19.7
Stack/duct cross sectional area, sq.ft.	9.62	9.62
Avg. gas stream volumetric flow, wacf/min.	11874	11348
Avg. gas stream volumetric flow, dscf/min.	11413	10881

[(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
VE SOUTH STACK OUTLET

TEST DATA		
Run number	1	2
Location	VES-Stack	VES-Stack
Date	8/23/2018	8/23/2018
Time period	0850-1041	1130-1317
LABORATORY REPORT DATA, ug.		
HFPO Dimer Acid	1019.43	795.00
EMISSION RESULTS, ug/dscm.		
HFPO Dimer Acid	612.88	500.33
EMISSION RESULTS, lb/dscf.		
HFPO Dimer Acid	3.83E-08	3.12E-08
EMISSION RESULTS, lb/hr.		
HFPO Dimer Acid	2.62E-02	2.04E-02
EMISSION RESULTS, g/sec.		
HFPO Dimer Acid	3.30E-03	2.57E-03

APPENDIX A
PROCESS OPERATIONS DATA

Date	8/23/2018																													
Time	800				900				1000				1100				1200				1300				1400						
Stack Testing				850-1041 (RUN1)											1130-1317 (RUN 2)																
VES Product	PMPE																													
VES Precursor																														
VES Condensation (HFPO)																														
VES ABR																														
VES Refining																														
VES WGS Recirculation Flow	18500 kg/h																													
Dimer ISO venting																														

Christel Compton
Program Manager

APPENDIX B
RAW AND REDUCED TEST DATA

CHEMOURS - FAYETTEVILLE, NC
INPUTS FOR HFPO DIMER ACID CALCULATIONS
VE SOUTH STACK OUTLET

Test Data		
Run number	1	2
Location	VES-Stack	VES-Stack
Date	8/23/2018	8/23/2018
Time period	0850-1041	1130-1317
Operator	CH	CH
Inputs For Calcs.		
Sq. rt. delta P	0.36172	0.34518
Delta H	1.2204	1.1096
Stack temp. (deg.F)	79.4	81.2
Meter temp. (deg.F)	72.5	78.8
Sample volume (act.)	59.061	57.101
Barometric press. (in.Hg)	30.05	30.05
Volume H_2O imp. (ml)	14.0	12.0
Weight change sil. gel (g)	15.5	15.1
% CO_2	0.0	0.0
% O_2	20.9	20.9
% N_2	79.1	79.1
Area of stack (sq.ft.)	9.620	9.620
Sample time (min.)	96.0	96.0
Static pressure (in.H_2O)	0.50	0.50
Nozzle dia. (in.)	0.300	0.300
Meter box cal.	0.9960	0.9960
Cp of pitot tube	0.84	0.84
Traverse points	24	24

Sample and Velocity Traverse Point Data Sheet - Method 1

Client: Chemours
Location/Plant: Fayetteville, NC
Source: U/E Scrubber

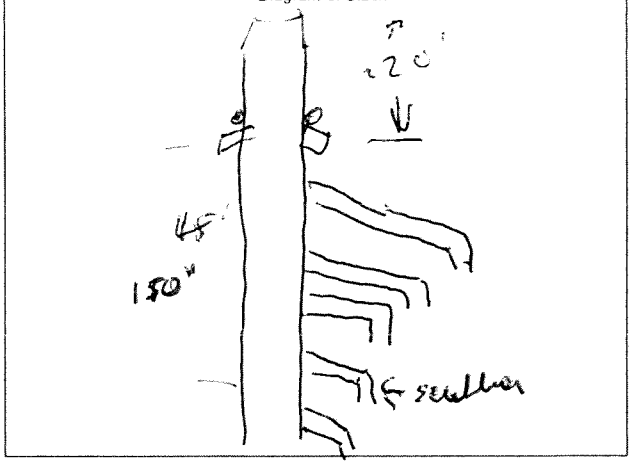
Operator: Pam
Date: 1/10/18
W.O. Number: 15413.002.002.0001

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

Distance from far wall to outside of port (in.) = C	10
Port Depth (in.) = D	4 9/16
Depth of Duct, diameter (in.) = C-D	49
Area of Duct (ft²)	9.62
Total Traverse Points	24
Total Traverse Points per Port	12
Port Diameter (in.) ---(Flange-Threaded-Hole)	4"
Monorail Length	
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	
Equivalent Diameter = (2*L*W)/(L+W)	

Flow Disturbances	
Upstream - A (ft)	720'
Downstream - B (ft)	12.5'
Upstream - A (duct diameters)	>5
Downstream - B (duct diameters)	~3.6

Diagram of Stack



Traverse Point Locations

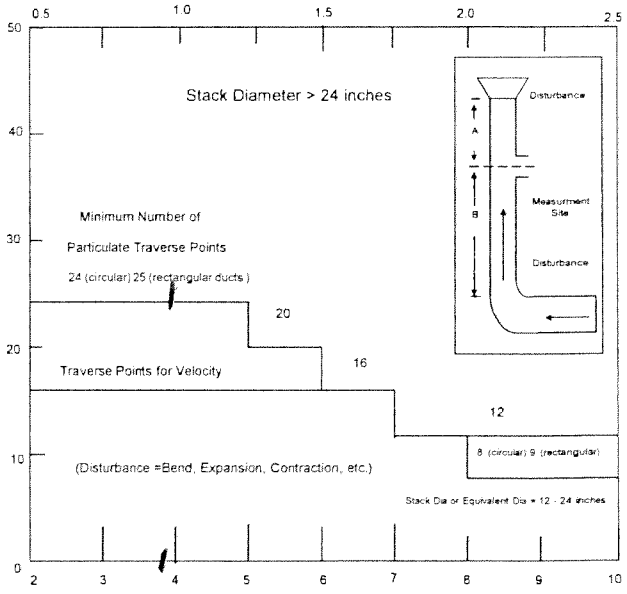
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	2.1	0.88	19.9 20.0
2	6.7	2.81	21.0
3	11.8	4.96	23.9 3/8
4	17.7	7.4	26.1
5	25.0	10.5	29.1/2
6	35.6	14.95	33.3/4 34
7	64.4	27.0	46.0
8	75	31.5	50.5
9	82.3	34.57	53 5/8
10	88.2	37.0	56.0
11	93.3	39.2	58.1/8
12	97.9	41.1	60.0

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

ISOKINETIC FIELD DATA SHEET

EPA Method 0010- HFPO Dimer Acid

Client	The Chemours Company
W.O.#	15418.002.007
Project ID	Chemours
Mode/Source ID	VE South
Samp. Loc. ID	STK
Run No.ID	1
Test Method ID	M0010
Date ID	21AUG2018
Source/Location	VE South Stack
Sample Date	8-23-18
Baro. Press (in Hg)	30.05
Operator	CH

Stack Conditions	Assumed	Actual
% Moisture	3	
Impinger Vol (ml)		
Silica gel (g)		
CO2, % by Vol	0	
O2, % by Vol	21	
Temperature (°F)	80	
Meter Temp (°F)	80	
Static Press (in H_2O)	0.5	0.6
Ambient Temp (°F)		

Meter Box ID	25
Meter Box Y	0.9960
Meter Box Del H	1.9921
Probe ID / Length	P611
Probe Material	Boro
Pitot / Thermocouple ID	
Pitot Coefficient	0.84
Nozzle ID	6.300
Nozzle Measurements	0.300 / 0.301 / 0.300
Avg Nozzle Dia (in)	0.300
Area of Stack (ft^2)	9.620
Sample Time	96
Total Traverse Pts	12 24 (4)

K Factor 9.22

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.010	0.000	0.000
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	72		75
Reference Temp	72		75
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	~~0815~~			726.484									
1	4	0850 (4)	0.13	1.2	728.8	81	70	100	100	64	3.5	74		
2	8		0.13	1.2	731.3	81	70	100	100	62	3.5	70		
3	12		0.15	1.4	733.8	80	70	99	100	64	3.5	69		
4	16		0.15	1.4	736.5	79	71	101	101	64	3.5	64		
5	20		0.16	1.5	739.1	78	71	99	100	62	3.5	60		V = 30.024
6	24		0.16	1.5	741.9	78	71	100	100	64	3.5	58		
7	28		0.16	1.5	744.7	78	71	101	101	65	3.5	52		
8	32		0.15	1.4	747.3	78	71	101	100	66	3.5	49		
9	36		0.14	1.3	749.9	79	71	100	100	66	3.5	51		
10	40		0.11	1.0	752.1	79	72	100	101	65	3.0	52		
11	44		0.10	0.92	754.3	80	72	100	98	66	3.0	53		
12	48	0938	0.10	0.93	756.508	80	72	101	101	64	2.5	54		
(4)		0953			756.645									
1	4		0.13	1.2	759.1	81	73	99	100	67	3.0	59		V = 29.037
2	8		0.12	1.1	761.4	79	73	100	100	66	3.0	57		
3	12		0.14	1.3	763.9	79	74	99	100	64	3.0	54		
4	16		0.14	1.3	766.7	79	74	100	100	63	3.0	52		
5	20		0.14	1.3	769.0	79	74	100	102	64	3.5	51		
6	24		0.15	1.4	771.6	79	74	100	100	65	4.0	53		
7	28		0.14	1.3	774.1	79	74	99	98	66	3.5	55		
8	32		0.13	1.2	776.8	79	74	101	102	66	3.5	54		
9	36		0.13	1.2	779.1	79	74	100	100	67	3.5	56		
10	40		0.11	1.0	781.1	80	75	100	100	65	3.0	56		
11	44		0.10	0.92	783.6	81	75	100	100	64	3.0	55		
12	46	1641	0.09	0.83	785.682	81	75	100	100	63	3.0	52		
			Avg Delta P 0.13167	Avg Delta H 1.22042	Total Volume 59.061	Avg Ts 79.42	Avg Tm 72.54	Min/Max 99/101	Min/Max 98/102	Max 67	Max Vac 4.0	Min/Max 49/74		
			Avg Sqrt Delta P 0.36172	Avg Sqrt Del H 1.10094	Comments:									

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

ISOKINETIC FIELD DATA SHEET

EPA Method 0010- HFPO Dimer Acid

		Stack Conditions	Assumed	Actual
Client	The Chemours Company			
W.O.#	15418.002.007			
Project ID	Chemours	% Moisture	3	
Mode/Source ID	VE South	Impinger Vol (ml)		
Samp. Loc. ID	STK	Silica gel (g)		
Run No.ID	2	CO2, % by Vol	0	
Test Method ID	M0010	O2, % by Vol	21	
Date ID	21AUG2018	Temperature (°F)	90	
Source/Location	VE South Stack	Meter Temp (°F)	60	
Sample Date	8-23-18	Static Press (in H_2O)	0.5	
Baro. Press (in Hg)	30.05			
Operator	CH	Ambient Temp (°F)	80	

Meter Box ID	25			
Meter Box Y	0.9960			
Meter Box Del H	1.9921			
Probe ID / Length	P611			
Probe Material	Boro			
Pitot / Thermocouple ID				
Pitot Coefficient	0.84			
Nozzle ID				
Nozzle Measurements	0.301	0.301	0.301	
Avg Nozzle Dia (in)	0.300			
Area of Stack (ft^2)	9.620			
Sample Time	96			
Total Traverse Pts	24			

K Factor 9.22

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.008	0.008	0.000
Leak Check @ (in Hg)	15	13	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	75		78
Reference Temp	75		79
Pass/Fail (+/- 2°)	~~Pass~~ / Fail		~~Pass~~ / Fail
Temp Change Response ?	~~yes~~ / no		~~yes~~ / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM OUTLET TEMP (oF)	PROBE TEMP (oF)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (oF)	SAMPLE TRAIN VAC (in Hg)	XAD EXIT TEMP (F)		COMMENTS
	0	1130			785.964 ~~785.943~~									
A 1	4		0.12	1.1	788.41	83	77	113	104	66	3.5	60		
2	8		0.13	1.2	790.8	82	77	107	99	65	3.5	56		
3	12		0.13	1.2	793.2	81	77	104	99	66	3.5	54		
4	16		0.14	1.3	795.6	80	77	100	102	64	4.0	56		
5	20		0.14	1.3	798.3	80	77	100	99	64	4.0	52		V=28,020
6	24		0.15	1.4	800.9	80	78	101	98	63	4.0	52		
7	28		0.14	1.3	803.5	80	78	101	100	64	4.0	53		
8	32		0.12	1.0	805.8	80	78	100	99	65	3.5	54		
9	36		0.10	0.92	808.1	80	~~78~~	100	99	64	3.0	54		
10	40		0.09	0.83	810.1	80	78	99	100	65	3.0	53		
11	44		0.08	0.74	812.1	81	78	99	99	65	2.5	53		
12	48	1218	0.08	0.74	813.984	81	78	100	101	65	2.5	53		
		1229			814.167									
B 1	41		0.13	1.2	816.7	84	78	100	102	65	3.5	52		
2	8		0.13	1.2	818.9	81	79	100	100	64	3.5	54		
3	12		0.13	1.2	821.41	81	80	100	101	65	3.5	56		
4	16		0.14	1.3	824.0	81	79	100	99	64	4.0	56		
5	20		0.15	1.4	829.2	80	80	100	104	66	4.5	54		V=29,061
6	24		0.15	1.4	831.8	80	80	101	102	66	4.5	53		
7	28		0.14	1.3	834.3	80	80	101	100	64	4.0	54		
8	32		0.13	1.2	836.9	81	80	100	100	64	3.5	55		
9	36		0.11	1.0	837.8	82	80	101	101	65	3.0	55		
10	40		0.10	0.92	839.2	83	81	100	100	66	3.0	56		
11	44		0.08	0.74	841.3	84	82	100	100	66	3.0	58		
12	48	1317	0.68	0.74	843.248	84	82	100	100	65	3.0	60		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max	Max Vac	Min/Max		
			0.12042	1.10958	57.101	81.21	78.83	99/113	98/104	66	4.5	60		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.3452	1.04760										
			0.34518											

EPA Method 0010 from EPA SW-846

SAMPLE RECOVERY FIELD DATA

EPA Method 0010

Client	The Chemours Company	W.O. #	15418.002.007
Location/Plant	Fayetteville, NC	Source & Location	VE South Stack

Run No. 1 — Sample Date 8/23/18 — Recovery Date 8/23/18

Sample I.D. Chemours - VE South - STK - 1 - M0010 - — Analyst Pmm — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20	Empty					Silica Gel	
Final	2	102	107	103					315.5	
Initial	0	100	100	0					300	
Gain	2	2	7	3				14	15.5	29.5

Impinger Color clear — Labeled? ✓

Silica Gel Condition Good — Sealed? ✓

Run No. 2 — Sample Date 8/23/18 — Recovery Date 8/24/18

Sample I.D. Chemours - VE South - STK - 2 - M0010 - — Analyst PMM — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20	Empty					Silica Gel	
Final	7	98	105	2					315.1	
Initial	0	100	100	0					300	
Gain	7	-2	5	2				12	15.1	27.1

Impinger Color ~~Clear~~ Clear — Labeled? ✓

Silica Gel Condition Good — Sealed?

Run No. 3 — Sample Date _____ — Recovery Date _____

Sample I.D. Chemours - VE South - STK - 3 - M0010 - — Analyst _____ — Filter Number _____

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

Impinger Color _____ — Labeled? _____

Silica Gel Condition _____ — Sealed? _____

Check COC for Sample IDs of Media Blanks

SAMPLE RECOVERY FIELD DATA

EPA Method 0010

Client	The Chemours Company	W.O. #	15418.002.003
Location/Plant	Fayetteville, NC	Source & Loaction	VE South STACK

Run No. BT Sample Date 8/03/18 Recovery Date 8/27/18

Sample I.D. Chemours - VE South - BT - 1 - M0010 - Analyst [illegible] Filter Number [illegible]

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	HPLC H20	HPLC H20						Silica Gel	
Final	0	101	98	0					300.0	
Initial	0	100	100	0					300	
Gain	0	1	-1	0				0	0.0	

Impinger Color Clear Labeled? ✓

Silica Gel Condition Good Sealed?

Run No. ___ Sample Date ___ Recovery Date ___

Sample I.D. Chemours - VE South - BT - 2 - M0010 - Analyst ___ Filter Number ___

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

Impinger Color ___ Labeled? ___

Silica Gel Condition ___ Sealed? ___

Run No. ___ Sample Date ___ Recovery Date ___

Sample I.D. Chemours - VE South - BT - 3 - M0010 - Analyst ___ Filter Number ___

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

Impinger Color ___ Labeled? ___

Silica Gel Condition ___ Sealed? ___

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

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

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **22 Aug 2018**

File: E:\Chemours\August 2018\Chemours VE South August 2018.cem
Program Version: 2.1, built 19 May 2017 **File Version:** 2.02
Computer: WSWCEQUIP2 **Trailer:**
Analog Input Device: MCC USB-1608G

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 1440, S/N 0144001**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**20.9**

Channel 2

Analyte	**CO_2**
Method	**EPA 6C**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 1440 S/N 0144001**
Full-Scale Output, mv	**1000**
Analyzer Range, %	**20.0**
Span Concentration, %	**16.3**

CALIBRATION DATA

Number 1

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

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **22 Aug 2018**

Start Time: 15:01

O_2

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

Calibration Standards

%	**Cylinder ID**
12.0	XC016060B
20.9	CC72346

Calibration Results

Zero	10 mv
Span, 20.9 %	846 mv

Curve Coefficients

Slope	**Intercept**
40.04	10

CO_2

Method: EPA 6C
Calibration Type: Linear Zero and High Span

Calibration Standards

%	**Cylinder ID**
8.9	XC016060B
16.3	CC72346

Calibration Results

Zero	-1 mv
Span, 16.3 %	829 mv

Curve Coefficients

Slope	**Intercept**
51.01	-1

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.007.0001**
Location: **Fayetteville, NC** | Operator: **Steve Dryden**
Source: **VE South** | Calibration **1** | Date: **22 Aug 2018**

Start Time: 15:01

O_2

Method: EPA 3A
Span Conc. 20.9 %
Slope 40.04 **Intercept** 10.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.0	0.0	0.0	Pass
20.9	20.9	0.0	0.0	Pass

CO_2

Method: EPA 6C
Span Conc. 16.3 %
Slope 51.01 **Intercept** -1.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.9	8.9	0.0	0.0	Pass
16.3	16.3	0.0	0.0	Pass

BIAS

Number 1

Client: **Chemours** | Project Number: **15418.002.007.0001**
Location: **Fayetteville, NC** | Operator: **Steve Dryden**
Source: **VE South** | Calibration **1** | Date: **22 Aug 2018**

Start Time: 15:04

O_2
Method: EPA 3A
Span Conc. 20.9 %

Bias Results

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

CO_2
Method: EPA 6C
Span Conc. 16.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.9	8.9	0.0	0.0	Pass

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number: **15418.002.007.0001**
Location: **Fayetteville, NC** | Operator: **Steve Dryden**
Source: **VE South** | Calibration **1** | Date: **23 Aug 2018**

Start Time: 07:18

O_2
Method: EPA 3A
Span Conc. 20.9 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.0	11.9	-0.1	-0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.0	11.9	-0.1	-0.5	Pass

*Bias No. 1

CO_2
Method: EPA 6C
Span Conc. 16.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.9	8.9	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.9	8.9	0.0	0.0	Pass

*Bias No. 1

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **23 Aug 2018**

Time	O_2 %	CO_2 %
08:51	20.7	0.0
08:52	20.7	0.1
08:53	20.6	0.3
08:54	20.7	0.3
08:55	20.7	0.3
08:56	20.7	0.3
08:57	20.7	0.3
08:58	20.7	0.3
08:59	20.7	0.3
09:00	20.7	0.3
09:01	20.7	0.3
09:02	20.7	0.3
09:03	20.7	0.2
09:04	20.7	0.1
09:05	20.7	0.1
09:06	20.7	0.1
09:07	20.7	0.1
09:08	20.7	0.1
09:09	20.7	0.1
09:10	20.7	0.1
09:11	20.7	0.1
09:12	20.7	0.1
09:13	20.7	0.1
09:14	20.7	0.1
09:15	20.7	0.1
09:16	20.7	0.2
09:17	20.7	0.2
09:18	20.7	0.2
09:19	20.7	0.2
09:20	20.7	0.2
09:21	20.7	0.2
09:22	20.7	0.2
09:23	20.7	0.2
09:24	20.7	0.2
09:25	20.7	0.2
09:26	20.7	0.1
09:27	20.7	0.1
09:28	20.7	0.0
09:29	20.7	0.0
09:30	20.7	0.0

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **23 Aug 2018**

Time	O_2 %	CO_2 %
09:31	20.7	0.0
09:32	20.7	0.0
09:33	20.7	0.0
09:34	20.7	0.0
09:35	20.7	0.0
09:36	20.7	0.0
09:37	20.7	0.0
09:38	20.7	0.1
Sample Port Change		
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	20.7	0.0
09:58	20.7	0.1
09:59	20.7	0.1
10:00	20.7	0.1
10:01	20.7	0.1
10:02	20.7	0.2
10:03	20.7	0.2
10:04	20.7	0.2
10:05	20.7	0.2
10:06	20.7	0.2
10:07	20.7	0.2
10:08	20.7	0.3
10:09	20.7	0.2
10:10	20.7	0.2
10:11	20.7	0.3
10:12	20.7	0.2
10:13	20.7	0.2
10:14	20.7	0.1
10:15	20.7	0.1
10:16	20.7	0.1
10:17	20.7	0.0
10:18	20.7	0.0
10:19	20.7	0.0
10:20	20.7	0.0
10:21	20.7	0.1
10:22	20.7	0.1
10:23	20.7	0.1

RUN DATA

Number 1

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

Calibration **1**

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **23 Aug 2018**

Time	O_2 %	CO_2 %
10:24	20.7	0.1
10:25	20.7	0.2
10:26	20.7	0.2
10:27	20.7	0.2
10:28	20.6	0.3
10:29	20.6	0.3
10:30	20.6	0.3
10:31	20.6	0.3
10:32	20.6	0.3
10:33	20.6	0.3
10:34	20.6	0.3
10:35	20.6	0.3
10:36	20.6	0.2
10:37	20.6	0.1
10:38	20.6	0.1
10:39	20.6	0.1
10:40	20.6	0.1
10:41	20.6	0.1
Avgs	**20.7**	**0.1**

RUN SUMMARY

Number 1

Client:	**Chemours**	Project Number:	**15418.002.007.0001**
Location:	**Fayetteville, NC**	Operator:	**Steve Dryden**
Source:	**VE South**	Calibration **1**	Date: **23 Aug 2018**

	O_2	CO_2
Method	EPA 3A	EPA 6C
Conc. Units	%	%

Time: 08:50 to 10:41

Run Averages

20.7	0.1

Pre-run Bias at 07:18

Zero Bias	0.0	0.0
Span Bias	11.9	8.9
Span Gas	12.0	8.9

Post-run Bias at 10:44

Zero Bias	0.0	-0.1
Span Bias	11.9	8.9
Span Gas	12.0	8.9

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

20.8	0.2

BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours** | Project Number: **15418.002.007.0001**
Location: **Fayetteville, NC** | Operator: **Steve Dryden**
Source: **VE South** | Calibration **1** | Date: **23 Aug 2018**

Start Time: 10:44

O_2
Method: EPA 3A
Span Conc. 20.9 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.0	11.9	-0.1	-0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

*Bias No. 2

CO_2
Method: EPA 6C
Span Conc. 16.3 %

Bias Results

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

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	-0.1	-0.1	-0.6	Pass
Span	8.9	8.9	0.0	0.0	Pass

*Bias No. 2

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **23 Aug 2018**

Time	O_2 %	CO_2 %
11:31	20.8	0.0
11:32	20.8	0.0
11:33	20.7	0.2
11:34	20.7	0.1
11:35	20.8	0.1
11:36	20.8	0.1
11:37	20.8	0.1
11:38	20.8	0.1
11:39	20.8	0.1
11:40	20.8	0.1
11:41	20.8	0.1
11:42	20.8	0.1
11:43	20.8	0.1
11:44	20.8	0.0
11:45	20.8	0.0
11:46	20.8	0.0
11:47	20.8	0.0
11:48	20.8	0.0
11:49	20.8	0.0
11:50	20.8	0.0
11:51	20.8	0.0
11:52	20.8	0.0
11:53	20.8	0.0
11:54	20.8	0.0
11:55	20.8	0.0
11:56	20.8	0.1
11:57	20.7	0.1
11:58	20.8	0.1
11:59	20.8	0.1
12:00	20.8	0.2
12:01	20.7	0.1
12:02	20.7	0.2
12:03	20.7	0.2
12:04	20.7	0.2
12:05	20.7	0.2
12:06	20.7	0.1
12:07	20.7	0.0
12:08	20.7	0.0
12:09	20.7	0.0
12:10	20.7	0.0

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **23 Aug 2018**

Time	O_2 %	CO_2 %
12:11	20.7	0.0
12:12	20.7	0.0
12:13	20.7	0.0
12:14	20.6	0.0
12:15	20.6	0.0
12:16	20.7	0.0
12:17	20.7	0.0
12:18	20.7	0.0
Sample Port Change		
12:30	20.8	0.0
12:31	20.8	0.0
12:32	20.7	0.0
12:33	20.7	0.0
12:34	20.7	0.0
12:35	20.7	0.0
12:36	20.7	0.0
12:37	20.7	0.0
12:38	20.7	0.0
12:39	20.7	0.0
12:40	20.7	0.0
12:41	20.7	0.1
12:42	20.7	0.1
12:43	20.7	0.1
12:44	20.8	0.2
12:45	20.7	0.1
12:46	20.7	0.1
12:47	20.7	0.2
12:48	20.7	0.2
12:49	20.7	0.1
12:50	20.7	0.2
12:51	20.7	0.1
12:52	20.7	0.1
12:53	20.8	0.0
12:54	20.7	0.0
12:55	20.7	0.0
12:56	20.7	0.0
12:57	20.7	0.0
12:58	20.7	0.0
12:59	20.7	0.0
13:00	20.7	0.0

RUN DATA

Number 2

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

Calibration **1**

Project Number: **15418.002.007.0001**
Operator: **Steve Dryden**
Date: **23 Aug 2018**

Time	O_2 %	CO_2 %
13:01	20.7	0.0
13:02	20.7	0.0
13:03	20.7	0.0
13:04	20.7	0.1
13:05	20.7	0.1
13:06	20.7	0.1
13:07	20.7	0.1
13:08	20.7	0.1
13:09	20.8	0.1
13:10	20.7	0.1
13:11	20.8	0.1
13:12	20.8	0.1
13:13	20.8	0.1
13:14	20.8	0.1
13:15	20.8	0.0
13:16	20.7	0.0
13:17	20.8	0.0
Avgs	**20.7**	**0.1**

RUN SUMMARY

Number 2

Client: **Chemours**		Project Number:	**15418.002.007.0001**
Location: **Fayetteville, NC**		Operator:	**Steve Dryden**
Source: **VE South**	Calibration **1**	Date:	**23 Aug 2018**

	O_2	CO_2
Method	EPA 3A	EPA 6C
Conc. Units	%	%

Time: 11:30 to 13:17

Run Averages

20.7	0.1

Pre-run Bias at 10:44

Zero Bias	0.0	-0.1
Span Bias	11.9	8.9
Span Gas	12.0	8.9

Post-run Bias at 13:20

Zero Bias	0.0	0.0
Span Bias	11.9	8.9
Span Gas	12.0	8.9

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

20.9	0.1

BIAS AND CALIBRATION DRIFT

Number 4

Client: **Chemours** | Project Number: **15418.002.007.0001**
Location: **Fayetteville, NC** | Operator: **Steve Dryden**
Source: **VE South** | Calibration **1** | Date: **23 Aug 2018**

Start Time: 13:20

O_2
Method: EPA 3A
Span Conc. 20.9 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.0	11.9	-0.1	-0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

*Bias No. 3

CO_2
Method: EPA 6C
Span Conc. 16.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.9	8.9	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	-0.1	0.0	0.1	0.6	Pass
Span	8.9	8.9	0.0	0.0	Pass

*Bias No. 3

APPENDIX C
LABORATORY ANALYTICAL DESCRIPTION AND ANALYTICAL REPORT

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

ANALYTICAL REPORT

Job Number: 140-12485-1

Job Description: Vinyl Ethers South Stack & QC

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
9/25/2018 8:28 AM

Courtney M Adkins, Project Manager I
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
09/25/2018

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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.
H	Sample was prepped or analyzed beyond the specified holding time

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: Vinyl Ethers South Stack & QC

TestAmerica Job ID: 140-12485-1

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

Sample Summary

Client: Chemours Company FC, LLC The
Project/Site: Vinyl Ethers South Stack & QC

TestAmerica Job ID: 140-12485-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-12485-1	Z-1947,1948 VE SOUTH R1 M0010 FH	Air	08/23/18 00:00	08/24/18 07:00
140-12485-2	Z-1949,1950,1952 VE SOUTH R1 M0010 BH	Air	08/23/18 00:00	08/24/18 07:00
140-12485-3	Z-1951 VE SOUTH R1 M0010 IMPINGERS 1,2&3 CONDENSAT	Air	08/23/18 00:00	08/24/18 07:00
140-12485-4	Z-1953 VE SOUTH R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	08/23/18 00:00	08/24/18 07:00
140-12485-5	Z-1954,1955 VE SOUTH R2 M0010 FH	Air	08/23/18 00:00	08/24/18 07:00
140-12485-6	Z-1956,1957,1959 VE SOUTH R2 M0010 BH	Air	08/23/18 00:00	08/24/18 07:00
140-12485-7	Z-1958 VE SOUTH R2 M0010 IMPINGERS 1,2&3 CONDENSAT	Air	08/23/18 00:00	08/24/18 07:00
140-12485-8	Z-1960 VE SOUTH R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE	Air	08/23/18 00:00	08/24/18 07:00
140-12485-9	B-1947,1948 QC VE SOUTH M0010 FH BT	Air	08/23/18 00:00	08/24/18 07:00
140-12485-10	B-1949,1950,1952 QC VE SOUTH M0010 BH BT	Air	08/23/18 00:00	08/24/18 07:00
140-12485-11	B-1951 QC VE SOUTH M0010 IMPINGERS 1,2&3 CONDENSA BT	Air	08/23/18 00:00	08/24/18 07:00
140-12485-12	B-1953 QC VE SOUTH M0010 BREAKTHROUGH XAD-2 RESI TUBE BT	Air	08/23/18 00:00	08/24/18 07:00
140-12485-13	B-1954 QC VE SOUTH M0010 DI WATER RB	Air	08/23/18 00:00	08/24/18 07:00
140-12485-14	B-1955 QC VE SOUTH M0010 MEOH WITH 5% NH4OH RB	Air	08/23/18 00:00	08/24/18 07:00
140-12485-15	B-1956 QC VE SOUTH M0010 CAD-2 RESIN TUBE RB	Air	08/23/18 00:00	08/24/18 07:00
140-12485-16	B-1957 QC VE SOUTH M0010 MEOH WITH 5% NH4OH TB	Air	08/23/18 00:00	08/24/18 07:00
140-12485-17	B-1958 QC VE SOUTH M0010 XAD-2 RESIN TUBE TB	Air	08/23/18 00:00	08/24/18 07:00
140-12485-18	B-1959 QC VE SOUTH M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB	Air	08/23/18 00:00	08/24/18 07:00

Job Narrative
140-12485-1

Sample Receipt

The samples were received on August 24, 2018 at 7:00 AM in good condition and properly preserved. The temperatures of the 2 coolers at receipt time were 1.7º C and 2.4º C.

Quality Control and Data Interpretation

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

Method 0010/Method 3542 Sampling Train Preparation

Train fractions were extracted and prepared for analysis in TestAmerica's Knoxville laboratory. Extracts and condensate samples were forwarded to the 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

The following Condensate samples were prepared outside of preparation holding time: Z-1951 VE SOUTH R1 M0010 IMPINGERS 1,2&3 CONDENSATE (140-12485-3), Z-1958 VE SOUTH R2 M0010 IMPINGERS 1,2&3 CONDENSATE (140-12485-7), B-1951 QC VE SOUTH M0010 IMPINGERS 1,2&3 CONDENSATE BT (140-12485-11) and B-1954 QC VE SOUTH M0010 DI WATER RB (140-12485-13).

No additional analytical or quality issues were noted, other than those described above or 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.

The expanded deliverable section of the package is split into two sections: 8321A_HFPO_DU is specific to condensates, and Method DV-LC-0012 contains the XAD and Filter data. Both methods share the same calibration on 8/3/18. A single instance of this calibration and the associated detection limit check (DLCK) and Initial calibration verification (ICV) can be found in the 8321A_HFPO_DU section of the package as part of our automated package generation procedures.

LCMS

Analysis Batch: 424829

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-424829/13	Lab Control Sample	Total/NA	Air	8321A	

Prep Batch: 427809

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-3	Z-1951 VE SOUTH R1 M0010 IMPINGERS 1,2&	Total/NA	Air	None	
140-12485-7	Z-1958 VE SOUTH R2 M0010 IMPINGERS 1,2&	Total/NA	Air	None	
140-12485-11	B-1951 QC VE SOUTH M0010 IMPINGERS 1,28	Total/NA	Air	None	
140-12485-13	B-1954 QC VE SOUTH M0010 DI WATER RB	Total/NA	Air	None	
MB 280-427809/1-A	Method Blank	Total/NA	Air	None	
LCS 280-427809/2-A	Lab Control Sample	Total/NA	Air	None	
LCSD 280-427809/17-A	Lab Control Sample Dup	Total/NA	Air	None	
LLCS 280-427809/18-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 428542

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-2	Z-1949,1950,1952 VE SOUTH R1 M0010 BH	Total/NA	Air	None	
140-12485-4	Z-1953 VE SOUTH R1 M0010 BREAKTHROUGH	Total/NA	Air	None	
140-12485-6	Z-1956,1957,1959 VE SOUTH R2 M0010 BH	Total/NA	Air	None	
140-12485-8	Z-1960 VE SOUTH R2 M0010 BREAKTHROUGH	Total/NA	Air	None	
140-12485-10	B-1949,1950,1952 QC VE SOUTH M0010 BH BT	Total/NA	Air	None	
140-12485-12	B-1953 QC VE SOUTH M0010 BREAKTHROUG	Total/NA	Air	None	
140-12485-14	B-1955 QC VE SOUTH M0010 MEOH WITH 5%	Total/NA	Air	None	
140-12485-15	B-1956 QC VE SOUTH M0010 CAD-2 RESIN TU	Total/NA	Air	None	
140-12485-16	B-1957 QC VE SOUTH M0010 MEOH WITH 5%	Total/NA	Air	None	
140-12485-17	B-1958 QC VE SOUTH M0010 XAD-2 RESIN TU	Total/NA	Air	None	
140-12485-18	B-1959 QC VE SOUTH M0010 COMBINED GLA	Total/NA	Air	None	
MB 280-428542/1-A	Method Blank	Total/NA	Air	None	
LCS 280-428542/2-A	Lab Control Sample	Total/NA	Air	None	

Prep Batch: 428590

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-1	Z-1947,1948 VE SOUTH R1 M0010 FH	Total/NA	Air	None	
140-12485-5	Z-1954,1955 VE SOUTH R2 M0010 FH	Total/NA	Air	None	
140-12485-9	B-1947,1948 QC VE SOUTH M0010 FH BT	Total/NA	Air	None	
MB 280-428590/1-A	Method Blank	Total/NA	Air	None	
LCS 280-428590/2-A	Lab Control Sample	Total/NA	Air	None	

Analysis Batch: 429056

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-7	Z-1958 VE SOUTH R2 M0010 IMPINGERS 1,2&	Total/NA	Air	8321A	427809
MB 280-427809/1-A	Method Blank	Total/NA	Air	8321A	427809
LCS 280-427809/2-A	Lab Control Sample	Total/NA	Air	8321A	427809
LCSD 280-427809/17-A	Lab Control Sample Dup	Total/NA	Air	8321A	427809
LLCS 280-427809/18-A	Lab Control Sample	Total/NA	Air	8321A	427809

Analysis Batch: 429061

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-3	Z-1951 VE SOUTH R1 M0010 IMPINGERS 1,2&	Total/NA	Air	8321A	427809
140-12485-11	B-1951 QC VE SOUTH M0010 IMPINGERS 1,28	Total/NA	Air	8321A	427809
140-12485-13	B-1954 QC VE SOUTH M0010 DI WATER RB	Total/NA	Air	8321A	427809

LCMS (Continued)

Analysis Batch: 429343

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-2	Z-1949,1950,1952 VE SOUTH R1 M0010 BH	Total/NA	Air	8321A	428542
140-12485-6	Z-1956,1957,1959 VE SOUTH R2 M0010 BH	Total/NA	Air	8321A	428542
MB 280-428542/1-A	Method Blank	Total/NA	Air	8321A	428542
LCS 280-428542/2-A	Lab Control Sample	Total/NA	Air	8321A	428542

Analysis Batch: 429346

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-4	Z-1953 VE SOUTH R1 M0010 BREAKTHROUGH	Total/NA	Air	8321A	428542
140-12485-8	Z-1960 VE SOUTH R2 M0010 BREAKTHROUGH	Total/NA	Air	8321A	428542
140-12485-10	B-1949,1950,1952 QC VE SOUTH M0010 BH BT	Total/NA	Air	8321A	428542
140-12485-12	B-1953 QC VE SOUTH M0010 BREAKTHROUG	Total/NA	Air	8321A	428542
140-12485-14	B-1955 QC VE SOUTH M0010 MEOH WITH 5%	Total/NA	Air	8321A	428542
140-12485-15	B-1956 QC VE SOUTH M0010 CAD-2 RESIN TU	Total/NA	Air	8321A	428542
140-12485-16	B-1957 QC VE SOUTH M0010 MEOH WITH 5%	Total/NA	Air	8321A	428542
140-12485-17	B-1958 QC VE SOUTH M0010 XAD-2 RESIN TU	Total/NA	Air	8321A	428542
140-12485-18	B-1959 QC VE SOUTH M0010 COMBINED GLA	Total/NA	Air	8321A	428542

Analysis Batch: 429576

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-1	Z-1947,1948 VE SOUTH R1 M0010 FH	Total/NA	Air	8321A	428590
140-12485-5	Z-1954,1955 VE SOUTH R2 M0010 FH	Total/NA	Air	8321A	428590
MB 280-428590/1-A	Method Blank	Total/NA	Air	8321A	428590
LCS 280-428590/2-A	Lab Control Sample	Total/NA	Air	8321A	428590

Analysis Batch: 429579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-12485-9	B-1947,1948 QC VE SOUTH M0010 FH BT	Total/NA	Air	8321A	428590

Client Sample ID: Z-1947,1948 VE SOUTH R1 M0010 FH

Lab Sample ID: 140-12485-1

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	330		3.75	0.405	ug/Sample		09/05/18 10:57	09/13/18 11:39	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*159*	*D*	*50 - 200*	*09/05/18 10:57*	*09/13/18 11:39*	*50*

Client Sample ID: Z-1949,1950,1952 VE SOUTH R1 M0010 BH

Lab Sample ID: 140-12485-2

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	689		10.0	2.00	ug/Sample		09/05/18 01:57	09/11/18 13:00	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*164*	*D*	*50 - 200*	*09/05/18 01:57*	*09/11/18 13:00*	*50*

Client Sample ID: Z-1951 VE SOUTH R1 M0010 IMPINGERS 1,2&3 CONDENSATE

Lab Sample ID: 140-12485-3

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.430	H	0.0495	0.00253	ug/Sample		09/06/18 21:47	09/07/18 15:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*119*		*50 - 200*	*09/06/18 21:47*	*09/07/18 15:11*	*1*

Client Sample ID: Z-1953 VE SOUTH R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-12485-4

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
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		09/05/18 01:57	09/11/18 15:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*132*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:10*	*1*

Client Sample ID: Z-1954,1955 VE SOUTH R2 M0010 FH

Lab Sample ID: 140-12485-5

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	229		3.75	0.405	ug/Sample		09/05/18 10:57	09/13/18 11:42	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*172*	*D*	*50 - 200*	*09/05/18 10:57*	*09/13/18 11:42*	*50*

Client Sample ID: Z-1956,1957,1959 VE SOUTH R2 M0010 BH

Lab Sample ID: 140-12485-6

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	191		10.0	2.00	ug/Sample		09/05/18 01:57	09/11/18 13:07	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*154*	*D*	*50 - 200*	*09/05/18 01:57*	*09/11/18 13:07*	*50*

Client Sample ID: Z-1958 VE SOUTH R2 M0010 IMPINGERS 1,2&3 CONDENSATE

Lab Sample ID: 140-12485-7

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	375	H	2.55	0.130	ug/Sample		09/06/18 21:47	09/07/18 11:52	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*129*	*D*	*50 - 200*	*09/06/18 21:47*	*09/07/18 11:52*	*50*

Client Sample ID: Z-1960 VE SOUTH R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-12485-8

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
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		09/05/18 01:57	09/11/18 15:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*148*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:13*	*1*

Client Sample ID: B-1947,1948 QC VE SOUTH M0010 FH BT

Lab Sample ID: 140-12485-9

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.171		0.0250	0.00270	ug/Sample		09/05/18 10:57	09/13/18 12:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*138*		*50 - 200*	*09/05/18 10:57*	*09/13/18 12:50*	*1*

Client Sample ID: B-1949,1950,1952 QC VE SOUTH M0010 BH BT

Lab Sample ID: 140-12485-10

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.194	J	0.200	0.0400	ug/Sample		09/05/18 01:57	09/11/18 15:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*143*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:17*	*1*

Client Sample ID: B-1951 QC VE SOUTH M0010 IMPINGERS 1,2&3 CONDENSATE BT

Lab Sample ID: 140-12485-11

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0555	H	0.0500	0.00255	ug/Sample		09/06/18 21:47	09/07/18 15:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*120*		*50 - 200*	*09/06/18 21:47*	*09/07/18 15:15*	*1*

Client Sample ID: B-1953 QC VE SOUTH M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT

Lab Sample ID: 140-12485-12

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
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		09/05/18 01:57	09/11/18 15:20	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*150*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:20*	*1*

Client Sample ID: B-1954 QC VE SOUTH M0010 DI WATER RB

Lab Sample ID: 140-12485-13

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - HFPO-DA

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND	H	0.00250	0.000128	ug/Sample		09/06/18 21:47	09/07/18 15:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*115*		*50 - 200*	*09/06/18 21:47*	*09/07/18 15:18*	*1*

Client Sample ID: B-1955 QC VE SOUTH M0010 MEOH WITH 5% NH4OH RB

Lab Sample ID: 140-12485-14

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0250	0.00500	ug/Sample		09/05/18 01:57	09/11/18 15:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*156*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:23*	*1*

Client Sample ID: B-1956 QC VE SOUTH M0010 CAD-2 RESIN TUBE RB

Lab Sample ID: 140-12485-15

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
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		09/05/18 01:57	09/11/18 15:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*144*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:26*	*1*

Client Sample ID: B-1957 QC VE SOUTH M0010 MEOH WITH 5% NH4OH TB

Lab Sample ID: 140-12485-16

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00
Sample Container: Air Train

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0250	0.00500	ug/Sample		09/05/18 01:57	09/11/18 15:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*152*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:30*	*1*

Client Sample ID: B-1958 QC VE SOUTH M0010 XAD-2 RESIN TUBE TB

Lab Sample ID: 140-12485-17

Date Collected: 08/23/18 00:00
Date Received: 08/24/18 07:00
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		09/05/18 01:57	09/11/18 15:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*149*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:33*	*1*

Client Sample ID: B-1959 QC VE SOUTH M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB

Lab Sample ID: 140-12485-18

Date Collected: 08/23/18 00:00
Date Received: 08/24/18 07:00
Sample Container: Air Train

Matrix: Air

Method: 8321A - PFOA and PFOS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	**0.0447**		0.0250	0.00500	ug/Sample		09/05/18 01:57	09/11/18 15:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*148*		*50 - 200*	*09/05/18 01:57*	*09/11/18 15:36*	*1*

Default Detection Limits

Client: Chemours Company FC, LLC The
Project/Site: Vinyl Ethers South Stack & QC

TestAmerica Job ID: 140-12485-1

Method: 8321A - HFPO-DA

Prep: None

Analyte	RL	MDL	Units	Method
HFPO-DA	0.00250	0.00128	ug/Sample	8321A

Method: 8321A - PFOA and PFOS

Prep: None

Analyte	RL	MDL	Units	Method
HFPO-DA	0.0250	0.00270	ug/Sample	8321A
HFPO-DA	0.100	0.0200	ug/Sample	8321A

Surrogate Summary

Client: Chemours Company FC, LLC The
Project/Site: Vinyl Ethers South Stack & QC

TestAmerica Job ID: 140-12485-1

Method: 8321A - HFPO-DA

Matrix: Air **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	HFPODA (50-200)
140-12485-3	Z-1951 VE SOUTH R1 M0010 II	119
140-12485-7	Z-1958 VE SOUTH R2 M0010 II	129 D
140-12485-11	B-1951 QC VE SOUTH M0010 I	120
140-12485-13	B-1954 QC VE SOUTH M0010 I	115
DLCK 280-424829/13	Lab Control Sample	99
LCS 280-427809/2-A	Lab Control Sample	108
LCSD 280-427809/17-A	Lab Control Sample Dup	114
LLCS 280-427809/18-A	Lab Control Sample	113
MB 280-427809/1-A	Method Blank	108

Surrogate Legend

HFPODA = 13C3 HFPO-DA

Method: 8321A - PFOA and PFOS

Matrix: Air **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	HFPODA (50-200)
140-12485-1	Z-1947,1948 VE SOUTH R1 M0	159 D
140-12485-2	Z-1949,1950,1952 VE SOUTH F	164 D
140-12485-4	Z-1953 VE SOUTH R1 M0010 B	132
140-12485-5	Z-1954,1955 VE SOUTH R2 M0	172 D
140-12485-6	Z-1956,1957,1959 VE SOUTH F	154 D
140-12485-8	Z-1960 VE SOUTH R2 M0010 B	148
140-12485-9	B-1947,1948 QC VE SOUTH M(	138
140-12485-10	B-1949,1950,1952 QC VE SOU	143
140-12485-12	B-1953 QC VE SOUTH M0010 E	150
140-12485-14	B-1955 QC VE SOUTH M0010 I	156
140-12485-15	B-1956 QC VE SOUTH M0010 (	144
140-12485-16	B-1957 QC VE SOUTH M0010 I	152
140-12485-17	B-1958 QC VE SOUTH M0010)	149
140-12485-18	B-1959 QC VE SOUTH M0010 (	148
LCS 280-428542/2-A	Lab Control Sample	141
LCS 280-428590/2-A	Lab Control Sample	141
MB 280-428542/1-A	Method Blank	147
MB 280-428590/1-A	Method Blank	146

Surrogate Legend

HFPODA = 13C3 HFPO-DA

Method: 8321A - HFPO-DA

Lab Sample ID: DLCK 280-424829/13
Matrix: Air
Analysis Batch: 424829

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	DLCK Result	DLCK Qualifier	Unit	D	%Rec	%Rec. Limits		
HFPO-DA			0.250	0.2532		ug/L		101	70 - 130		

Surrogate	*DLCK %Recovery*	*DLCK Qualifier*	*Limits*
13C3 HFPO-DA	*99*		*50 - 200*

Lab Sample ID: MB 280-427809/1-A
Matrix: Air
Analysis Batch: 429056

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 427809

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.00250	0.000128	ug/Sample		09/06/18 21:47	09/07/18 11:16	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*108*		*50 - 200*	*09/06/18 21:47*	*09/07/18 11:16*	*1*

Lab Sample ID: LCS 280-427809/2-A
Matrix: Air
Analysis Batch: 429056

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 427809

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
HFPO-DA			0.0500	0.04903		ug/Sample		98	50 - 150		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*108*		*50 - 200*

Lab Sample ID: LCSD 280-427809/17-A
Matrix: Air
Analysis Batch: 429056

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 427809

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA			0.0500	0.04943		ug/Sample		99	50 - 150	1	35

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*114*		*50 - 200*

Lab Sample ID: LLCS 280-427809/18-A
Matrix: Air
Analysis Batch: 429056

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 427809

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits		
HFPO-DA			0.00500	0.004718		ug/Sample		94	50 - 150		

Surrogate	*LLCS %Recovery*	*LLCS Qualifier*	*Limits*
13C3 HFPO-DA	*113*		*50 - 200*

Method: 8321A - PFOA and PFOS

Lab Sample ID: MB 280-428542/1-A
Matrix: Air
Analysis Batch: 429343

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 428542

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.200	0.0400	ug/Sample		09/05/18 01:57	09/11/18 12:54	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*147*		*50 - 200*	*09/05/18 01:57*	*09/11/18 12:54*	*1*

Lab Sample ID: LCS 280-428542/2-A
Matrix: Air
Analysis Batch: 429343

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 428542

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HFPO-DA	4.00	3.333		ug/Sample		83	50 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*141*		*50 - 200*

Lab Sample ID: MB 280-428590/1-A
Matrix: Air
Analysis Batch: 429576

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 428590

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0250	0.00270	ug/Sample		09/05/18 10:57	09/13/18 11:32	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*146*		*50 - 200*	*09/05/18 10:57*	*09/13/18 11:32*	*1*

Lab Sample ID: LCS 280-428590/2-A
Matrix: Air
Analysis Batch: 429576

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 428590

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HFPO-DA	0.500	0.4239		ug/Sample		85	50 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*141*		*50 - 200*

Client Sample ID: Z-1947,1948 VE SOUTH R1 M0010 FH

Lab Sample ID: 140-12485-1

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	150 mL	428590	09/05/18 10:57		TAL DEN
Total/NA	Analysis	8321A		50			429576	09/13/18 11:39	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1949,1950,1952 VE SOUTH R1 M0010 BH

Lab Sample ID: 140-12485-2

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		50			429343	09/11/18 13:00	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1951 VE SOUTH R1 M0010 IMPINGERS 1,2&3 CONDENSATE

Lab Sample ID: 140-12485-3

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.05048 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429061	09/07/18 15:11	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1953 VE SOUTH R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-12485-4

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:10	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1954,1955 VE SOUTH R2 M0010 FH

Lab Sample ID: 140-12485-5

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	150 mL	428590	09/05/18 10:57		TAL DEN
Total/NA	Analysis	8321A		50			429576	09/13/18 11:42	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1956,1957,1959 VE SOUTH R2 M0010 BH

Lab Sample ID: 140-12485-6

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		50			429343	09/11/18 13:07	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1958 VE SOUTH R2 M0010 IMPINGERS 1,2&3 CONDENSATE

Lab Sample ID: 140-12485-7

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.04902 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		50			429056	09/07/18 11:52	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Z-1960 VE SOUTH R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-12485-8

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:13	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1947,1948 QC VE SOUTH M0010 FH BT

Lab Sample ID: 140-12485-9

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	428590	09/05/18 10:57		TAL DEN
Total/NA	Analysis	8321A		1			429579	09/13/18 12:50	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1949,1950,1952 QC VE SOUTH M0010 BH BT

Lab Sample ID: 140-12485-10

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:17	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1951 QC VE SOUTH M0010 IMPINGERS 1,2&3 CONDENSATE BT

Lab Sample ID: 140-12485-11

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.05 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429061	09/07/18 15:15	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1953 QC VE SOUTH M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT

Lab Sample ID: 140-12485-12

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:20	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1954 QC VE SOUTH M0010 DI WATER RB

Lab Sample ID: 140-12485-13

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429061	09/07/18 15:18	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1955 QC VE SOUTH M0010 MEOH WITH 5% NH4OH RB

Lab Sample ID: 140-12485-14

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:23	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1956 QC VE SOUTH M0010 CAD-2 RESIN TUBE RB

Lab Sample ID: 140-12485-15

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:26	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1957 QC VE SOUTH M0010 MEOH WITH 5% NH4OH TB

Lab Sample ID: 140-12485-16

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:30	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1958 QC VE SOUTH M0010 XAD-2 RESIN TUBE TB

Lab Sample ID: 140-12485-17

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:33	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: B-1959 QC VE SOUTH M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB

Lab Sample ID: 140-12485-18

Date Collected: 08/23/18 00:00
Matrix: Air
Date Received: 08/24/18 07:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429346	09/11/18 15:36	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Method Blank

Lab Sample ID: MB 280-427809/1-A

Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429056	09/07/18 11:16	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Method Blank

Lab Sample ID: MB 280-428542/1-A

Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429343	09/11/18 12:54	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Method Blank — Lab Sample ID: MB 280-428590/1-A

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	428590	09/05/18 10:57		TAL DEN
Total/NA	Analysis	8321A		1			429576	09/13/18 11:32	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Lab Control Sample — Lab Sample ID: DLCK 280-424829/13

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8321A		1			424829	08/03/18 12:14	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 280-427809/2-A

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429056	09/07/18 11:20	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 280-428542/2-A

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	400 mL	428542	09/05/18 01:57		TAL DEN
Total/NA	Analysis	8321A		1			429343	09/11/18 12:57	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 280-428590/2-A

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	428590	09/05/18 10:57		TAL DEN
Total/NA	Analysis	8321A		1			429576	09/13/18 11:36	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 280-427809/17-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429056	09/07/18 11:23	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Client Sample ID: Lab Control Sample

Lab Sample ID: LLCS 280-427809/18-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	5 mL	427809	09/06/18 21:47	KSA	TAL DEN
Total/NA	Analysis	8321A		1			429056	09/07/18 11:26	AGCM	TAL DEN
	Instrument ID: LC_LCMS7									

Laboratory References:

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

Accreditation/Certification Summary

Client: Chemours Company FC, LLC The
Project/Site: Vinyl Ethers South Stack & QC

TestAmerica Job ID: 140-12485-1

Laboratory: TestAmerica Knoxville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
	AFCEE		N/A	
ANAB	DoD ELAP		L2311	02-13-19
Arkansas DEQ	State Program	6	88-0688	06-16-19
California	State Program	9	2423	06-30-19
Colorado	State Program	8	TN00009	02-28-19
Connecticut	State Program	1	PH-0223	09-30-19
Florida	NELAP	4	E87177	06-30-19
Georgia	State Program	4	906	04-13-20
Hawaii	State Program	9	N/A	04-13-19
Kansas	NELAP	7	E-10349	10-31-18
Kentucky (DW)	State Program	4	90101	12-31-18
Louisiana	NELAP	6	83979	06-30-19
Louisiana (DW)	NELAP	6	LA160005	12-31-18
Maryland	State Program	3	277	03-31-19
Michigan	State Program	5	9933	04-13-20
Nevada	State Program	9	TN00009	07-31-19
New Jersey	NELAP	2	TN001	06-30-19
New York	NELAP	2	10781	03-31-19
North Carolina (DW)	State Program	4	21705	07-31-19
North Carolina (WW/SW)	State Program	4	64	12-31-18
Ohio VAP	State Program	5	CL0059	08-28-20
Oklahoma	State Program	6	9415	08-31-19
Oregon	NELAP	10	TNI0189	01-01-19
Pennsylvania	NELAP	3	68-00576	12-31-18
Tennessee	State Program	4	2014	04-13-20
Texas	NELAP	6	T104704380-16-9	08-31-19
US Fish & Wildlife	Federal		LE-058448-0	07-31-19
USDA	Federal		P330-16-00262	08-20-19
Utah	NELAP	8	TN00009	07-31-18 *
Virginia	NELAP	3	460176	09-14-19
Washington	State Program	10	C593	01-19-19
West Virginia (DW)	State Program	3	9955C	12-31-18
West Virginia DEP	State Program	3	345	04-30-19
Wisconsin	State Program	5	998044300	08-31-19

Laboratory: TestAmerica Denver

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-19
A2LA	ISO/IEC 17025		2907.01	10-31-19
Alabama	State Program	4	40730	09-30-12 *
Alaska (UST)	State Program	10	UST-30	01-08-19
Arizona	State Program	9	AZ0713	12-20-18
California	State Program	9	2513	01-18-19
Connecticut	State Program	1	PH-0686	09-30-18
Florida	NELAP	4	E87667	06-30-19
Georgia	State Program	4	N/A	01-08-19 *
Illinois	NELAP	5	200017	04-30-19
Iowa	State Program	7	370	12-01-18

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Laboratory: TestAmerica Denver (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Kansas	NELAP	7	E-10166	04-30-19
Louisiana	NELAP	6	02096	06-30-19
Maine	State Program	1	CO0002	03-03-19
Minnesota	NELAP	5	8-999-405	12-31-18
Nevada	State Program	9	CO0026	07-31-19
New Hampshire	NELAP	1	205310	04-28-19
New Jersey	NELAP	2	CO004	06-30-19
New York	NELAP	2	11964	04-01-19
North Carolina (WW/SW)	State Program	4	358	12-31-18
North Dakota	State Program	8	R-034	01-08-19
Oklahoma	State Program	6	8614	08-31-19
Oregon	NELAP	10	4025	01-08-19
Pennsylvania	NELAP	3	68-00664	07-31-19
South Carolina	State Program	4	72002001	01-08-19
Texas	NELAP	6	T104704183-17-14	09-30-18
US Fish & Wildlife	Federal			07-31-19
USDA	Federal			03-26-21
Utah	NELAP	8	CO00026	07-31-19
Virginia	NELAP	3	460232	06-14-19
Washington	State Program	10	C583	08-03-19
West Virginia DEP	State Program	3	354	12-31-18
Wisconsin	State Program	5	999615430	08-31-19 *
Wyoming (UST)	A2LA	8	2907.01	10-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 140-12485-1

SDG No.:

Instrument ID: LC_LCMS7 Analysis Batch Number: 424829

Lab Sample ID: STD001 280-424829/3 IC Client Sample ID:

Date Analyzed: 08/03/18 11:42 Lab File ID: hfpo718H02173.d GC Column: Synergi Hydro ID:

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
HFPO-DA	1.03	Baseline	meyera	08/03/18 15:54

Lab Sample ID: STD002 280-424829/4 IC Client Sample ID:

Date Analyzed: 08/03/18 11:45 Lab File ID: hfpo718H02174.d GC Column: Synergi Hydro ID:

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
HFPO-DA	1.03	Baseline	meyera	08/03/18 15:54

Lab Sample ID: DLCK 280-424829/13 Client Sample ID:

Date Analyzed: 08/03/18 12:14 Lab File ID: hfpo718H02183.d GC Column: Synergi Hydro ID:

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
HFPO-DA	1.04	Assign Peak	meyera	08/03/18 15:53

APPENDIX D
SAMPLE CALCULATIONS

EXAMPLE CALCULATIONS FOR
VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

Client: Chemours	Facility: Fayetteville, NC
Test Number: Run 1	Test Date: 8/23/18
Test Location: VES-Stack	Test Period: 0850-1041

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

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

$$Vm(std) = \frac{17.64 \times 0.9960 \times 59.061 \times \left(30.05 + \frac{1.220}{13.6} \right)}{72.54 + 460} = 28.585$$

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.

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

$$Vw(std) = (0.04707 \times 14.0) + (0.04715 \times 15.5) = 1.39$$

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

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

$$bws = \frac{1.39}{1.39 + 58.728} = 0.023$$

Where:

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

4. Mole fraction of dry gas.

Md = 1 - bws

Md = 1 - 0.023 = 0.977

Where:

Md = Mole fraction of dry gas, dimensionless.

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

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

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

MWd = 28.84

Where:

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

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

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

MWs = (28.84 x 0.977) +(18 (1 - 0.977)) = 28.59

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.

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

$$Vs = 85.49 \times 0.84 \times 0.36172 \times \left(\frac{539}{30.09 \times 28.59}\right)^{\wedge}1/2 = 20.6$$

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.

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

$$Qs(act) = 60 \times 20.6 \times 9.62 = 11874$$

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.

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

$$Qs(std) = 17.64 \times 0.977 \times \frac{30.09}{539.4} \times 11874$$

$$Qs(std) = 11413$$

Where:

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

10. Isokinetic variation calculated from intermediate values, percent.

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

$$I = \frac{17.327 \times 539 \times 58.728}{20.6 \times 96 \times 30.09 \times 0.977 \times (0.300)^{\wedge}2} = 105.1$$

Where:

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

SAMPLE CALCULATIONS FOR
HFPO DIMER ACID (METHOD 0010)

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 8/23/18**
Test Location: VES-Stack | **Test Period: 0850-1041**

1. HFPO Dimer Acid concentration, lbs/dscf.

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

$$C_1 = \frac{1019.4 \times 2.2046 \times 10\text{-}9}{58.728}$$

$$= 3.83E\text{-}08$$

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.

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

$C_2 = 1019.4 / (58.728 \times 0.02832)$

$= 6.13E+02$

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 = 3.83E-08 x 11413 x 60

= 2.62E-02

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 = 2.62E-02 x 453.59 /3600

= 3.30E-03

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 CALCULATION FOR
BIAS CORRECTION OF OXYGEN AND CARBON DIOXIDE.

1. Bias corrected value of Oxygen and Carbon Dioxide, dry basis (%).

$$Cd = \frac{(AVG - Zbias)}{(Sbias - Zbias)} \times SPAN\ GAS$$

Where:

Cd = $O_{2\ and}$ CO_2 concentration measured on a dry basis (percent by volume), bias corrected.

AVG = Average O_2 and CO_2 concentration for the test run.

Zbias = The average of pre and post test zero bias checks.

Sbias = The average of pre and post test span bias check.

SPAN GAS = The calibration gas closest to the gas stream concentration, was used for the BIAS check.

APPENDIX E
EQUIPMENT CALIBRATION RECORDS

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

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	82-124627728-1
Cylinder Number:	XC016060B	Cylinder Volume:	150.5 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52017	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jul 10, 2017

Expiration Date: Jul 10, 2025

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

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.942 %	G1	+/- 0.7% NIST Traceable	07/10/2017
OXYGEN	12.00 %	11.99 %	G1	+/- 0.4% NIST Traceable	07/10/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061336	CC360792	11.002 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2018
NTRMplus	09060208	CC262337	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-19GYCXEG	NDIR	Jun 30, 2017
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Jul 07, 2017

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:	82-124617628-1A
Cylinder Number:	CC72346	Cylinder Volume:	157.2 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52017	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 15, 2017

Expiration Date: May 15, 2025

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

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	17.00 %	16.27 %	G1	+/- 0.7% NIST Traceable	05/15/2017
OXYGEN	21.00 %	20.88 %	G1	+/- 1% NIST Traceable	05/15/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061547	CC354845	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 27, 2018
NTRM	09061419	CC273614	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 CO2	FTIR	May 04, 2017
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	May 11, 2017

Triad Data Available Upon Request

Signature on file
Approved for Release

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: Servomex - O2
Model No: 1440
Serial No: 01420L/898
Calibration Span: 21.09 %
Pollutant: 21.09% O2 - 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	0.09	0.4
NO (445 ppm CC346681)	0.10	0.02	0.5
NO_2 (23.78 ppm CC500749)	NA	NA	NA
N_2O (90.4 ppm CC352661)	0.00	0.05	0.2
CO (461.5 ppm XC006064B)	0.00	0.02	0.0
SO_2 (451.2 ppm CC409079)	0.00	0.05	0.2
CH_4 (453.1 ppm SG901795)	NA	NA	NA
H_2 (552 ppm ALM048043)	0.10	0.09	0.5
HCl (45.1 ppm CC17830)	0.00	0.03	0.1
NH_3 (9.69 ppm CC58181)	0.00	0.09	0.4
TOTAL INTERFERENCE RESPONSE			**2.4**
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 - CO2
Model No: 1440
Serial No: 01415L/711
Calibration Span: 16.65%
Pollutant: 16.65% CO2 - 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	0.1
NO_2 (23.78 ppm CC500749)	0.00	0.10	0.6
N_2O (90.4 ppm CC352661)	0.00	0.01	0.0
CO (461.5 ppm XC006064B)	0.00	0.01	0.0
SO_2 (451.2 ppm CC409079)	0.00	0.01	0.0
CH_4 (453.1 ppm SG901795)	0.00	0.03	0.2
H_2 (552 ppm ALM048043)	0.00	0.04	0.2
HCl (45.1 ppm CC17830)	0.10	0.04	0.6
NH_3 (9.69 ppm CC58181)	0.00	0.02	0.1
TOTAL INTERFERENCE RESPONSE			**1.9**
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

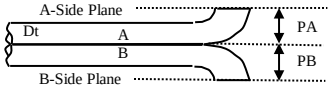
Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-611**

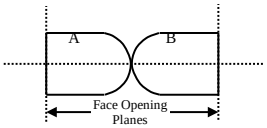
Inspection Date 2/19/18 Individual Conducting Inspection KS

If all Criteria PASS
Cp is equal to 0.84

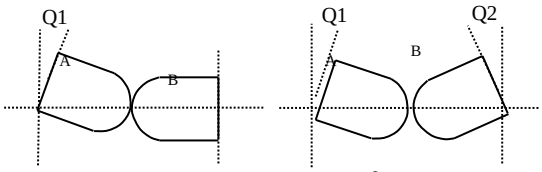
		PASS/FAIL
Distance to A Plane (PA) - inches	0.455	PASS
Distance to B Plane (PB) - inches	0.455	PASS
Pitot OD (D_t) - inches	0.375	



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

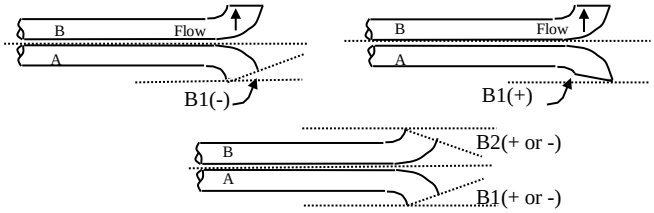


Are Open Faces Aligned Perpendicular to the Tube Axis: (●) YES ( ) NO — PASS



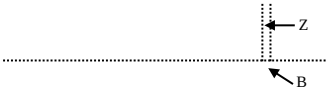
Q1 and Q2 must be ≤ 10°

Angle of Q1 from vertical A Tube- degrees (absolute)	2	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	1	PASS



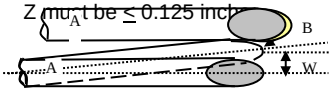
B1 or B2 must be ≤ 5°

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



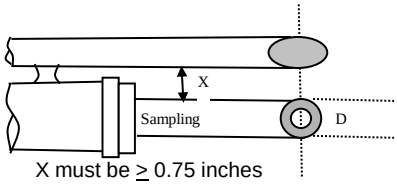
Z must be ≤ 0.125 inch

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



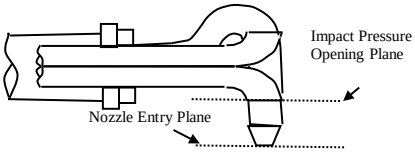
W must be ≤ 0.03125 inches

Vertical offset between A and B Tubes (W) - inches	0.027	PASS

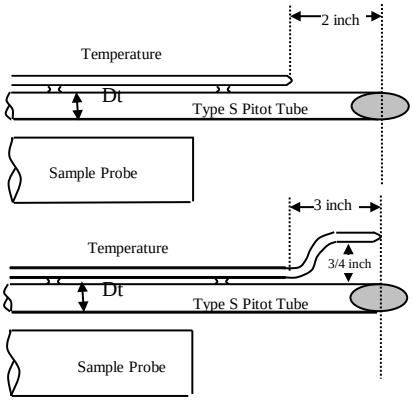


X must be ≥ 0.75 inches

Distance between Sample Nozzle and Pitot (X) - inches	0.847	PASS



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



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

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

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

Calibrator PM | **Meter Box Number** 25 | **Ambient Temp** 71

Date 7-Feb-18 | **Wet Test Meter Number** P-2952 | **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 16300943

Baro Press, in Hg (Pb)	29.74

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	127.282	69.5	71.00	71.00	71.0	12.9	1.0008	1.8731
		132.286		71.00	71.00				
		5.004		71.00	71.00				
1.0	5.0	132.286	69.5	71.00	71.00	71.5	9.2	0.9971	1.9036
		137.307		72.00	72.00				
		5.021		71.50	71.50				
1.5	13.0	137.307	69.5	72.00	72.00	72.5	20.3	0.9959	2.0527
		150.386		73.00	73.00				
		13.079		72.50	72.50				
2.0	10.0	150.386	69.5	74.00	74.00	74.5	13.6	0.9930	2.0683
		160.502		75.00	75.00				
		10.116		74.50	74.50				
3.0	10.0	160.502	69.5	75.00	75.00	75.5	11.1	0.9931	2.0628
		170.611		76.00	76.00				
		10.109		75.50	75.50				
							Average	**0.9960**	**1.9921**

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	213	213	212	212		212.4	-0.1%
932	933	933	933	933	933		933.0	-0.1%
1832	1829	1829	1829	1829	1829		1829.0	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
VE SOUTH STACK
METER BOX NO. 25
8/23/2018

	Run 1	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
% O_2 = Percent oxygen by volume, dry basis.	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

Tma = Source Temperature, absolute(^{o}R)		
Tm = Average dry gas meter temperature , deg F.	72.5	78.8

Tma = Ts + 460

Tma = 72.54 + 460

Tma =	532.54	538.83

Ps = Absolute meter pressure, inches Hg.		
13.60 = Specific gravity of mercury.		
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	1.22	1.11
Pb = Barometric Pressure, in Hg.	30.05	30.05

Pm = Pb + (delta H / 13.6)

Pm = 30.05 + (1.22041666666667 / 13.6)

Pm =	30.14	30.13

Yqa = dry gas meter calibration check value, dimensionless.		
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.		
29.00 = dry molecular weight of air, lb/lb-mole.		
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	59.061	57.101
Y = Dry gas meter calibration factor (based on full calibration)	0.9960	0.9960
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	1.9921	1.9921
avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.1009	1.0476
O = Total sampling time, minutes.	96	96

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

Yqa = (96.00 / 59.06) * SQRT (0.0319 * 532.54 * 29) / (1.99 * 30.14 * 28.84) * 1.10

Yqa = 1.625 * SQRT 492.654 / 1,731.368 * 1.10

Yqa =	0.9546	0.9452

Diff = Absolute difference between Yqa and Y	4.16	5.10

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

Diff = ((0.996 - 0.955) / 0.996) * 100

Average Diff = 4.63

Allowable = 5.0

APPENDIX F
LIST OF PROJECT PARTICIPANTS

The following WESTON employees participated in this project.

Paul Meeter	Senior Project Manager
Steve Dryden	Team Member
Kyle Schweitzer	Team Member
Chris Hartsky	Team Member
John Mills	Team Member