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The Chemours Company – Fayetteville, North Carolina

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Report

Date

August 2020

SOURCE EMISSIONS TESTING OF THE VINYL ETHERS SOUTH CARBON BED

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SOURCE EMISSIONS TESTING OF THE VINYL ETHERS SOUTH CARBON BED

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Prepared by	**Patrick Grady, Project Associate**
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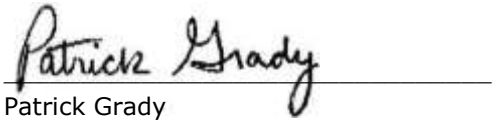
This report has been reviewed and to the best of our knowledge the report is complete, and the results presented herein are accurate, error free, legible, and representative of the actual emissions measured during testing.



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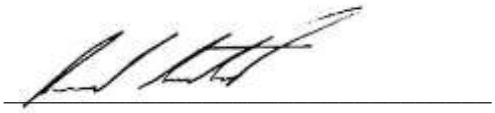

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1. INTRODUCTION AND BACKGROUND

O'Brien & Gere Engineers, Inc., a Ramboll Company (Ramboll) was retained by The Chemours Company (Chemours) to conduct source emissions testing at its facility located in Fayetteville, North Carolina. Ramboll has prepared the following test report summarizing the results of the testing on behalf of Chemours.

1.1 Testing Objective

As provided in their Title V Air Permit, Chemours is required to evaluate hexafluoro-propylene oxide-dimer acid (HFPO-DA) emissions from a carbon bed adsorber at the Fayetteville Works facility. The objective of this test program was to collect field sample data from the inlet and outlet to the carbon bed serving the Vinyl Ethers South (VES) process area to determine carbon bed replacement frequency.

The source emissions test program was performed on June 23, 2020. Messrs. Patrick Grady, Jeff Sheldon, Steve Milo, Nate Woolley and Antonio Anderson of Ramboll conducted the emissions testing. Ms. Christel Compton and Mr. Edward Vega coordinated process operations with the emissions testing. Dr. William Anderson of Europhins/Test America was present to assist with the testing and serve as sample custodian. There were no representatives from any of the regulatory agencies present to observe the field test program.

This report presents a description of the sources tested, a summary of the scope of work conducted, sampling methods used, QA/QC procedures, and emission test results. The following section lists the testing program's participants and their contact information.

1.2 Emissions Testing Program Participants

Facility

Name:	The Chemours Company
Site Address:	22828 Hwy 87 W Fayetteville, NC 28306
Contact:	Christel E. Compton
e-mail:	christel.e.compton@chemours.com

Source Testing Firm

Name:	Ramboll
Address:	7600 Morgan Road Liverpool, NY 13090
Contact:	Patrick Grady
e-mail:	Patrick.grady@ramboll.com

Sample Analysis Laboratory

Name:	Eurofins TestAmerica, Knoxville
Address:	5815 Middlebrook Pike Knoxville, Tennessee 37921
Contact:	Courtney Adkins
e-mail:	courtney.adkins@testamericainc.com

2. PROCESS DESCRIPTION

This section provides a description of the VES process.

2.1 Process Description

VES is part of the fluoromonomer area at the Fayetteville facility. This area produces fluorocarbon compounds used to produce Chemours products, such as Nafion® Krytox® and Viton®. Indoor air fugitive emissions from VES are vented to a carbon bed which is then vented to atmosphere through a process stack (NEP-Hdr2).

2.2 Operating Conditions During Testing

Source emissions testing was performed during normal operations of the VES process. Facility personnel monitored and recorded process operations during the testing. These operating data were provided to Ramboll and are included in Appendix A of this report.

3. SUMMARY OF TEST PROGRAM

This section provides a summary of the testing scope of work conducted. Test methods used during the sampling program can be found in Section 4 of this report.

3.1 Test Program Summary

Emissions testing was conducted simultaneously at the inlet and outlet of the VES carbon bed in order to evaluate potential emissions and removal efficiencies of HFPO-DA. The testing at each location was conducted in triplicate and each test run was 96 minutes in duration. Results of the source emission testing are reported in units of milligrams per dry standard cubic meter (mg/dscm) and pounds per hour (lb/hr).

4. SAMPLING AND ANALYTICAL PROCEDURES

This section provides a description of the test methods that were utilized during the test program.

4.1 Test Methods

The test procedures were conducted in accordance with the most recent updates to the United States Environmental Protection Agency (USEPA) Reference Methods (RM) described in 40 CFR 60; Appendix A.

RM 1:	Sample and velocity traverses for stationary sources
RM 2:	Determination of stack gas velocity and volumetric flow rate (Type S pitot tube)
RM 3:	Determination of oxygen and carbon dioxide concentrations in emissions from stationary sources
RM 4:	Determination of moisture content in stationary sources
Modified 0010:	Determination of PFAS emissions from stationary sources (modified)

4.2 Sampling Locations

The sampling ports at the 36-inch inside diameter (ID) carbon bed inlet duct are located approximately 35 inches (1.0 diameters) downstream of a bend and approximately 41 inches (1.1 diameters) upstream of another bend. Test ports in the 41½ -inch ID carbon bed outlet stack are located approximately 12 ½ feet (3.6 diameters) downstream of a bend and approximately 31 feet (8.9 diameters) upstream from another bend. A total of 12 traverse points were sampled on each diameter during each test run for a total of 24 traverse points at each test location. Traverse points were located in accordance with USEPA RM 1. Schematics of the sample locations along with traverse point locations are provided in Appendix A.

4.3 Gas Velocity and Volumetric Flow Rate

Velocity was evaluated from differential pressure measurements using a stainless-steel Type-S pitot tube and oil manometer in accordance with USEPA RMs 1 and 2. These methods were conducted in conjunction with each test run. Exhaust gas volumetric flow rate in units of dry standard cubic feet per minute (dscfm) were derived from velocity, temperature, molecular weight, and moisture measurements. Pollutant mass emission rates (lb/hr) were calculated using these volumetric flow rate data and pollutant concentrations.

4.4 Oxygen and Carbon Dioxide Concentrations

Concentrations of oxygen (O_2) and carbon dioxide (CO_2) were evaluated at both locations in accordance with modified USEPA RM 3 procedures using a Fyrite® combustion analyzer. A grab sample was collected and introduced into the Fyrite® for O_2 and CO_2 analysis.

4.5 Moisture Content

The moisture content of the sample trains was quantified utilizing procedures identified in USEPA RM 4. A sample of gas was continuously collected from each traverse point using a dry gas meter stack sampling system along with a series of impingers. The moisture content of the gas was measured as a change in the volume of the water collected in each impinger solution and the increased weight of the desiccant during the sampling period.

4.6 HFPO-DA Emissions

HFPO-DA emissions were evaluated in accordance with a modified USEPA Method 0010. The sample train consisted of a stainless-steel nozzle attached directly to a heated borosilicate glass-lined probe. The probe was connected directly to a heated borosilicate glass filter holder containing a solvent-extracted glass fiber filter. In order to minimize possible thermal degradation of the HFPO-DA, the probe and particulate filter were heated to just above stack temperature to minimize water vapor condensation before the filter. The filter holder exit was connected to a water-cooled coil condenser followed by a water-cooled sorbent module containing approximately 40 grams of XAD-2 resin. The XAD-2 inlet temperature was monitored to ensure that the module is maintained at a temperature below 20°C.

The XAD-2 resin trap was followed by a condensate knockout impinger and a series of two impingers each containing 100-ml of high purity deionized water. The water impingers were followed by another condensate knockout impinger equipped with a second XAD-2 resin trap to account for any sample breakthrough. The final impinger contained approximately 250 grams of dry pre-weighed silica gel. The water impingers and condensate impingers were submerged in an ice bath through the duration of the testing. The water in the ice bath was also used to circulate around the coil condenser and the XAD-2 resin traps.

Exhaust gases were extracted from the sample locations isokinetically using a metering console equipped with a vacuum pump, a calibrated orifice, oil manometer and probe/filter heat controllers.

4.6.1 HFPO-DA Sample Train and Equipment Preparation

Prior to conducting the field work the following procedures were conducted to prepare the field sampling glassware and sample recovery tools.

1. Wash all glassware, brushes, and ancillary tools with low residue soap and hot water.
2. Rinse all glassware, brushes, and ancillary tools three (3) times with D.I. H_20.
3. Bake glassware (with the exception of probe liners) at 450°C for approximately 2 hours, (XAD-2 resin tube glassware will be cleaned by Eurofins/TestAmerica by this same procedure).
4. Solvent rinse three (3) times all glassware, brushes, and ancillary tools with the following sequence of solvents: acetone, methylene chloride, hexane, and methanol.
5. Clean glassware and tools will be sealed in plastic bags or aluminum foil for transport to the sampling site.

6. Squirt bottles will be new dedicated bottles of known history and dedicated to the D.I. Water and methanol/ammonium hydroxide (MeOH/ 5% NH_4OH) solvent contents. Squirt bottles will be labelled with the solvent content it contains.

4.6.2 HFPO-DA Sample Train Recovery

Following completion of each test run, the sample probe, nozzle and front-half of the filter holder were brushed and rinsed three times each with the MeOH/ 5% NH_4OH solution (Container #1). The glass fiber filter was removed from its housing and transferred to a polyethylene bottle (Container #2). Any particulate matter and filter fibers which adhered to the filter holder and gasket were also placed in Container #2. The XAD-2 resin trap was sealed, labelled and placed in an iced sample cooler. The back-half of the filter holder, coil condenser condensate trap and connecting glassware were rinsed with the same MeOH/ 5% NH_4OH solution and placed in Container #3.

The volume of water collected in the second and third impingers was measured for moisture determinations and then placed in Container #4. Impingers #2 and #3 were then rinsed with the MeOH/ 5% NH_4OH solution and placed in Container #5. The second (breakthrough) XAD-2 resin trap was sealed, labelled and placed in an iced sample cooler. The second condensate trap was rinsed with the MeOH/ 5% NH_4OH solution and placed in Container #5. The contents of the fifth impinger were placed in its original container and weighed for moisture determinations.

Containers were sealed with Teflon® tape[1] and labeled with the appropriate sample information. Samples remained chilled until analysis. HFPO-DA analysis was conducted using liquid chromatography/dual mass spectrometry (LC/MS/MS).

[1] The tape is used to seal the *outside* of the container and does not come into contact with the sample contents. This procedure was confirmed as appropriate by the analytical laboratory.

5. EMISSIONS TEST RESULTS

A detailed summary of the test results is presented in Table 1 in the appendix. Supporting field data and calculations can be found in Appendix C. The laboratory report is presented in Appendix D. A brief discussion of the test results is presented below.

5.1 Emission Test Results

Table 1 presents a detailed summary of the HFPO-DA test results. HFPO-DA concentrations at the carbon bed inlet ranged from 3.35E-04 mg/dscm to 6.85E-03 mg/dscm and averaged 4.93E-03 mg/dscm. Corresponding mass emissions of HFPO-DA ranged from 2.44E-04 lb/hr to 4.86E-04 lb/hr and averaged 3.52E-04 lb/hr.

Concentrations of HFPO-DA at the carbon bed outlet ranged from 2.16E-03 mg/dscm to 2.72E-03 mg/dscm and averaged 2.35E-03 mg/dscm. Mass emission rates of HFPO-DA from the carbon bed outlet ranged from 1.44E-04 lb/hr to 1.75E-04 lb/hr and averaged 1.55E-04 lb/hr. The resulting HFPO-DA removal efficiency of the VES carbon bed ranged from 40 percent to 64 percent and averaged greater than 56 percent.

Note that for test Run 1 HFPO-DA emissions were calculated without including the analytical data for the breakthrough XAD module. It is believed there was contamination on the breakthrough XAD module from Run 1 at the carbon bed outlet. A review of the analytical reports confirms that, with the exception of Run 1 at the carbon bed outlet, the highest concentration of HFPO-DA is captured in the front-half of the sampling train and then descending through the back-half and condenser portion (impingers) of the sample train. All test runs were conducted on the same day and a review of production data indicates there was no change or upset in the process during the testing. The carbon bed currently only controls VES indoor air fugitives and there were no leaks during the testing. Therefore, it is believed that the contamination of the breakthrough XAD module did not come from the carbon bed outlet.

5.2 Discussion and Conclusion

With the exception of the breakthrough XAD module from Run 1 at the carbon bed inlet, there were no sampling or process operating problems encountered during the field testing that impacted the test results. Therefore, all test data are believed to be representative of actual emissions in evidence during the test program.

6. QUALITY ASSURANCE/QUALITY CONTROL

QA/QC was based on the recommended QA/QC procedures of the various sampling and analytical methods that were used for the test program. This section summarizes the pertinent QA/QC procedures that were employed during the emissions testing program.

6.1 Equipment Calibration

An important aspect of pre-sampling preparations is the inspection and calibration of all equipment planned to be used for the field effort. Equipment is inspected for proper operation and durability prior to calibration. Calibration of equipment is conducted in accordance with the procedures outlined in the USEPA document entitled "Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III—Stationary Source Specific Methods" (EPA-600/4-77-027b). Equipment calibration is performed in accordance with USEPA guidelines and/or manufacturer's recommendations. Examples of the typical calibration requirements of the field equipment being used are as follows:

- Pitot tubes (QA Handbook Section 3.1.2, pp. 1-13) - measured for appropriate spacing and dimensions or calibrate in a wind tunnel. Rejection criteria given on the calibration sheet. Post-test check - inspect for damage.
- Probe nozzles (QA Handbook Section 3.4.2, pg. 19) - make three measurements of the nozzle ID (to the nearest 0.001 in.) using different diameters with a micrometer. Difference between the high and low values should not exceed 0.004 in. Post-test check - inspect for damage.
- Thermocouples (QA Handbook Section 3.4.2, pp. 15-18) - verify against a mercury-in-glass thermometer at two or more points including the anticipated measurement range. Acceptance limits - impinger ±2°F; DGM ±5.4°F; stack ±1.5 percent of stack temperature.
- Dry gas meters (QA Handbook Section 3.4.2, pp. 1-12) - Dry gas meters are calibrated using critical orifices. The procedure entails four runs using four separate critical orifices running at an actual vacuum 1-2 in. greater than the theoretical critical vacuum. The minimum sample volume required per orifice is 5 ft^3. Meter boxes are calibrated annually and then verified by use of the alternative USEPA RM 5 post-test calibration procedure. This procedure is referenced as Approved Alternate Method ALT-009 (June 21, 1994) by USEPA's Emission Measurement Center. The average Y-value obtained by this method must be within 5% of the initial Y-value.

6.2 Equipment Leak Checks

Pitot tube leak checks were conducted in accordance with USEPA RM 2. Leak checks were conducted on the HFPO-DA sample trains prior to and following each test run in accordance with the procedures outlined in USEPA RM 5, Sections 8.4.1 and 8.4.2.

6.3 Reagent Blanks and Field Blanks

A field blank for the Modified USEPA RM 0010 sample train was collected as part of the test program. The blank train was assembled and set-up near one of the carbon bed outlet test locations and as close to the outlet sample train as possible. The blank train remained in place for the duration of the sampling run. The blank train was heated to the same temperature as used for the outlet sampling train, and the impinger portion of the train was iced down and chilled water circulated through the coil condenser as described in SW-846 Method 0010. The blank train was recovered in the same location, and by the same procedures as the actual sampling trains.

Additionally, a proof blank train rinse sample was collected one time during the sampling campaign. The glassware components of the train received a thorough solvent rinse after samples were recovered and put away for a sampling run. This secondary rinse was used to prove that the sampling breakdown collection processes capture all HFPO-DA material, and generally leave none of the target analytes uncaptured on the sample glassware. All sampling train glassware parts, including brushes and other tools used, were thoroughly rinsed with MeOH / 5% NH_4OH solution to evaluate the general rinsing efficiency of the sampling train recovery process.

Reagent blanks of the diH_2O used in the sample trains and MeOH/5% NH_4OH solution used for sample recovery were also submitted to the laboratory for analysis along with the field samples. The field blank train was collected during test Run 1. The proof blank was collected following completion of Run 1. Results of the field blank, proof blank and reagent blanks and are included with the laboratory reports in Appendix D.

6.4 Test Data and Report Review

Test data input and emission calculations were double-checked for accuracy. The test results were reviewed by senior personnel for reasonableness and accuracy. The final report was peer reviewed by senior personnel and certified by the project manager.

TABLES

Table 1
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed
Fayetteville, North Carolina

Run Identification	Run 1 [a]	Run 2	Run 3	Average	Run 1 [a]	Run 2	Run 3	Average
Source ID:		Carbon Bed Inlet				Carbon Bed Outlet		
Run Date	23Jun20	23Jun20	23Jun20		23Jun20	23Jun20	23Jun20	
Start/Stop Time	0845-1048	1315-1528	1610-1803		0845-1048	1315-1528	1610-1803	
Exhaust Gas Conditions								
Temperature (deg. F)	84	90	92	**89**	88	93	93	**91**
Moisture (volume %)	1.1	1.8	1.1	**1.3**	1.0	1.2	1.3	**1.1**
Oxygen (dry volume %)	20.9	20.9	20.9	**20.9**	20.9	20.9	20.9	**20.9**
Carbon Dioxide (dry volume %)	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Volumetric Flow Rate								
acfm	20,399	20,286	20,238	**20,308**	18,827	18,172	18,588	**18,529**
dscfm	19,457	18,953	18,975	**19,128**	18,038	17,184	17,529	**17,584**
HFPO - Dimer Acid								
mg/dscm	3.35E-03	6.85E-03	4.58E-03	**4.93E-03**	2.16E-03	2.72E-03	2.19E-03	**2.35E-03**
lb/hr	2.44E-04	4.86E-04	3.26E-04	**3.52E-04**	1.46E-04	1.75E-04	1.44E-04	**1.55E-04**
Carbon Bed Removal Efficiency								
percent	40	64	56	56				

APPENDIX A
PROCESS OPERATING DATA

Date	6/23/2020														
Time	800				900				1000				1100		
Stack Testing			RUN 1 - 0845-1048												
VES Product	PM/PE														
VES Precursor															
VES Condensation (HFPO)															
VES ABR (East)															
VES ABR (West)							Burnout								
VES Refining															

Date	6/23/2020													
Time			1300					1400				1500		
Stack Testing				RUN 2 - 1315-1528										
VES Product									PM/PE					
VES Precursor														
VES Condensation (HFPO)														
VES ABR (East)														
VES ABR (West)														
VES Refining														

Date	6/23/2020													
Time			1600				1700				1800			
Stack Testing				RUN 3 - 1610-1803										
VES Product		PM/PE												
VES Precursor														
VES Condensation (HFPO)														
VES ABR (East)														
VES ABR (West)														
VES Refining														

APPENDIX B
SCHEMATICS OF THE TEST LOCATIONS

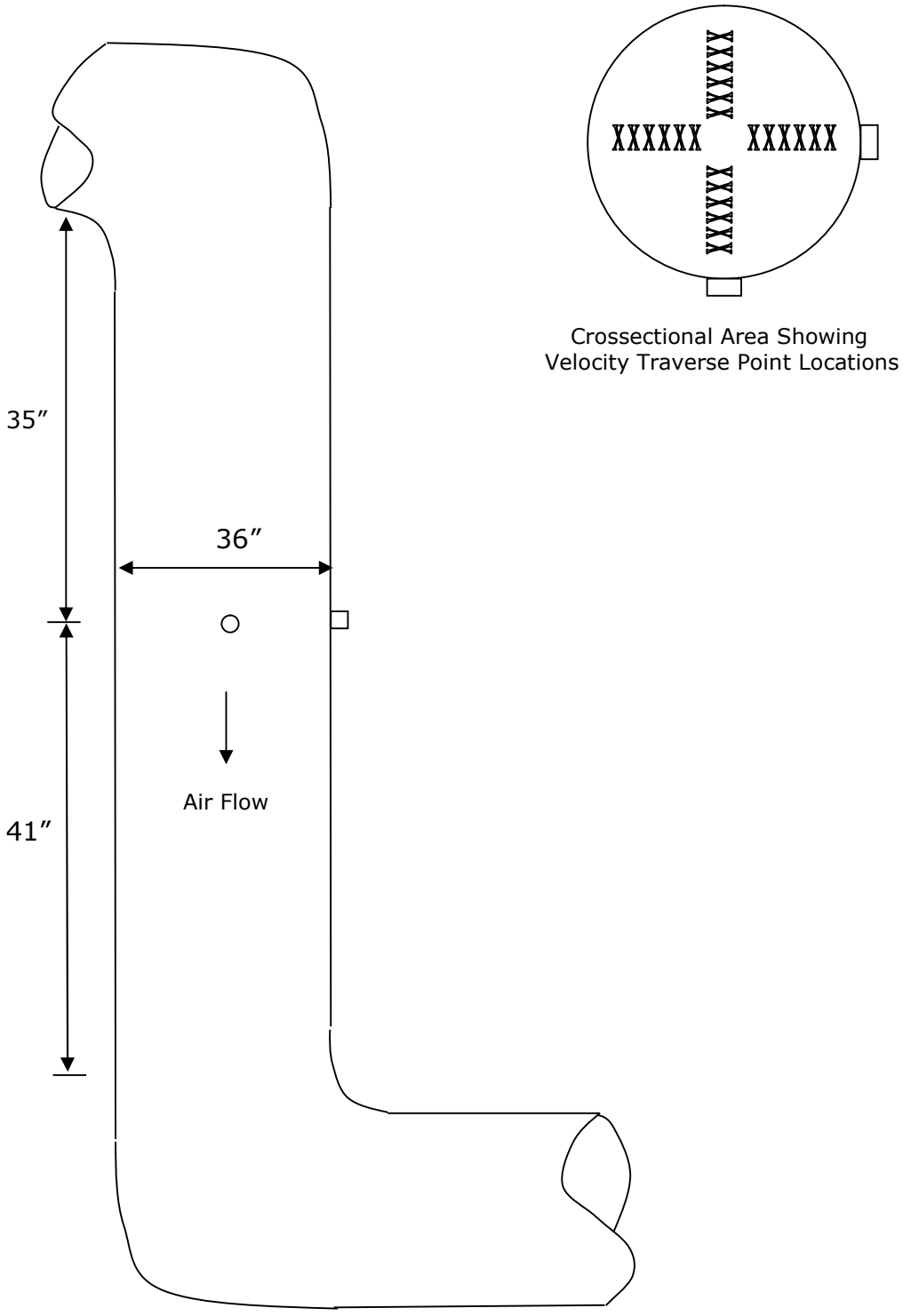


Figure 1
Carbon Bed Inlet Sampling Location
Vinyl Ethers South
The Chemours Company
Fayetteville, North Carolina

Sample Traverse Point Locations for Circular Stacks

Facility: The Chemours Company

Source Identification: VES Carbon Bed Inlet

Stack Diameter: 36 inches

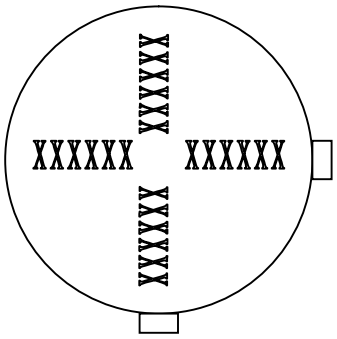
Sampling Locations: 1.0 diameters downstream
1.1 diameters upstream

Minimum Number of Traverse points as specified by EPA Method 1: 24

Number of traverse points sampled: 24

Traverse Point Number	Percent of Stack Diameter From Inside Wall	Distance in Inches From Inside Wall*
1	2.1	1.0
2	6.7	2.4
3	11.8	4.2
4	17.7	6.4
5	25.0	9.0
6	35.6	12.8
7	64.4	23.2
8	75.0	27.0
9	82.3	29.6
10	88.2	31.8
11	93.3	33.6
12	97.9	35.0

*Traverse points located within 1.00" to the stack wall for stacks having an inside diameter greater than 24" will be relocated as well as traverse points located within 0.50 inches to the stack wall on stacks with a 24" ID or less to meet criteria.



Crossectional Area Showing
Velocity Traverse Point Locations

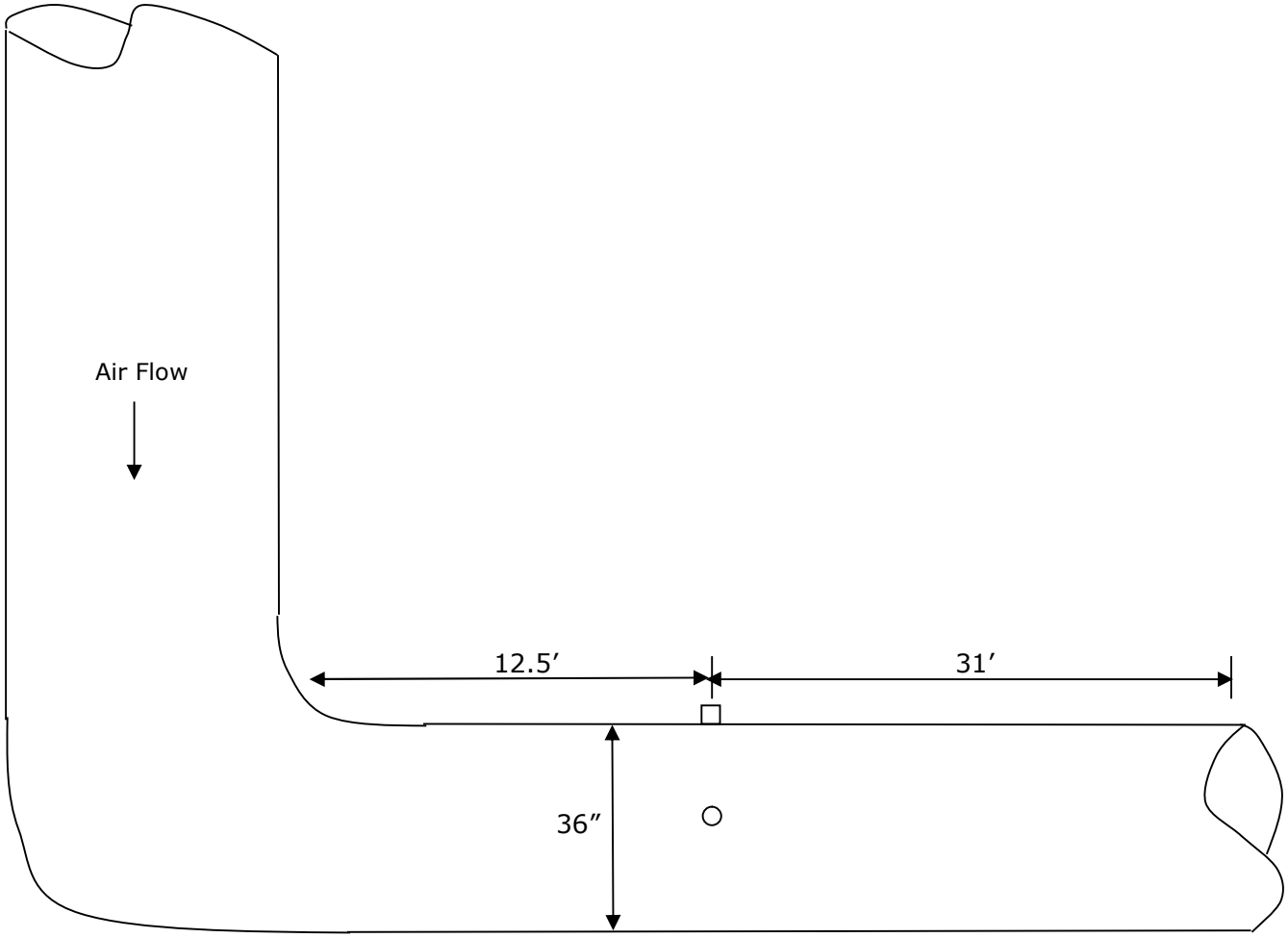


Figure 2
Carbon Bed Outlet Sampling Location
Vinyl Ethers South
The Chemours Company
Fayetteville, North Carolina

Sample Traverse Point Locations for Circular Stacks

Facility: The Chemours Company

Source Identification: VES Carbon Bed Outlet

Stack Diameter: 41.5 inches

Sampling Locations: 3.6 diameters downstream
8.9 diameters upstream

Minimum Number of Traverse points as specified by EPA Method 1: 24

Number of traverse points sampled: 24

Traverse Point Number	Percent of Stack Diameter From Inside Wall	Distance in Inches From Inside Wall*
1	2.1	1.0
2	6.7	2.8
3	11.8	4.9
4	17.7	7.3
5	25.0	10.4
6	35.6	14.8
7	64.4	26.7
8	75.0	31.1
9	82.3	34.2
10	88.2	36.6
11	93.3	38.7
12	97.9	35.0

*Traverse points located within 1.00" to the stack wall for stacks having an inside diameter greater than 24" will be relocated as well as traverse points located within 0.50 inches to the stack wall on stacks with a 24" ID or less to meet criteria.

APPENDIX C
FIELD DATA AND CALCULATIONS

VES Carbon Bed Inlet Field Test Data

Field Data Summary
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Inlet
Fayetteville, North Carolina

	Run 1							Run 2							Run 3					
Traverse Point	Stack Temp(F)	Delta P	Delta H	Tm(F) in	Tm(F) out	SQRT Delta P		Stack Temp(F)	Delta P	Delta H	Tm(F) in	Tm(F) out	SQRT Delta P		Stack Temp(F)	Delta P	Delta H	Tm(F) in	Tm(F) out	SQRT Delta P
A1	83	0.83	0.91	77	77	0.9110		89	1.05	1.15	94	94	1.0247		92	0.83	0.91	94	94	0.9110
2	83	0.80	0.88	78	77	0.8944		89	1.05	1.15	95	94	1.0247		92	0.81	0.89	94	94	0.9000
3	83	0.80	0.88	79	77	0.8944		89	1.10	1.21	96	94	1.0488		92	0.80	0.88	96	94	0.8944
4	83	0.83	0.91	80	77	0.9110		89	1.00	1.10	98	95	1.0000		91	0.83	0.91	97	94	0.9110
5	83	0.84	0.92	81	78	0.9165		89	0.96	1.05	99	95	0.9798		91	0.83	0.91	98	94	0.9110
6	83	0.84	0.92	82	78	0.9165		89	0.90	0.99	99	95	0.9487		92	0.84	0.92	98	95	0.9165
7	84	0.74	0.81	83	78	0.8602		90	0.67	0.73	100	96	0.8185		91	0.73	0.80	99	95	0.8544
8	83	0.66	0.72	83	78	0.8124		90	0.48	0.52	100	96	0.6928		92	0.65	0.71	99	96	0.8062
9	83	0.63	0.69	83	79	0.7937		90	0.38	0.41	99	96	0.6164		92	0.63	0.69	99	96	0.7937
10	83	0.58	0.63	84	79	0.7616		90	0.30	0.30	99	97	0.5477		92	0.60	0.66	99	96	0.7746
11	83	0.58	0.63	84	79	0.7616		90	0.24	0.26	99	97	0.4899		92	0.57	0.62	99	96	0.7550
12	83	0.59	0.64	84	80	0.7681		90	0.22	0.24	98	97	0.4690		92	0.60	0.66	98	96	0.7746
B1	84	1.05	1.15	84	81	1.0247		91	0.81	0.89	97	96	0.9000		92	1.05	1.15	94	94	1.0247
2	84	1.10	1.21	82	81	1.0488		91	0.80	0.88	98	97	0.8944		92	1.10	1.21	95	94	1.0488
3	84	1.05	1.15	84	81	1.0247		91	0.80	0.88	99	97	0.8944		92	1.05	1.15	96	93	1.0247
4	84	1.00	1.10	86	82	1.0000		91	0.83	0.91	100	97	0.9110		92	1.05	1.15	96	93	1.0247
5	84	0.95	1.04	87	82	0.9747		91	0.84	0.92	101	97	0.9165		92	0.97	1.06	96	93	0.9849
6	84	0.91	1.00	88	83	0.9539		91	0.83	0.91	101	98	0.9110		92	0.90	0.99	95	92	0.9487
7	84	0.70	0.77	88	83	0.8367		91	0.73	0.80	102	99	0.8544		92	0.65	0.71	95	92	0.8062
8	85	0.85	0.60	89	84	0.9220		91	0.66	0.72	102	99	0.8124		92	0.49	0.53	95	92	0.7000
9	85	0.41	0.45	89	84	0.6403		91	0.61	0.67	102	99	0.7810		92	0.35	0.38	94	92	0.5916
10	85	0.28	0.30	89	85	0.5292		91	0.62	0.68	102	99	0.7874		92	0.24	0.26	93	91	0.4899
11	85	0.24	0.26	89	85	0.4899		91	0.60	0.66	102	99	0.7746		92	0.23	0.25	93	91	0.4796
12	85	0.24	0.26	89	85	0.4899		91	0.59	0.64	101	99	0.7681		92	0.23	0.25	92	91	0.4796
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
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						0.0000							0.0000							0.0000
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						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
Average	84	0.73	0.79	84	81	0.8390		90	0.71	0.78	99	97	0.8278		92	0.71	0.78	96	94	0.8252

Test Data Summary and Calculations
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Inlet
Fayetteville, North Carolina

Parameter	**Run 1**	**Run 2**	**Run 3**
Run Date	6/23/20	6/23/20	6/23/20
Start/Stop Time	0845-1048	1315-1528	1610-1803
Duration of Run, Minutes	96	96	96
Ave. Nozzle Diameter, inches	0.183	0.183	0.183
Pitot Calibration Factor, CF	0.84	0.84	0.84
Meter Gamma	0.992	0.992	0.992
Meter Delta H, inches of H2O	1.58	1.58	1.58
Stack Diameter, inches	36	36	36
Rectangular Width, inches	0	0	0
Rectangular Length, inches	0	0	0
Stack Area, sq.ft.	7.07	7.07	7.07
Barometric Pressure, inches of Hg	29.92	29.86	29.81
Static Pressure, inches of H2O	-2.9	-2.5	-2.4
Dry Gas Meter Sample Volume, (VM)ft3			
Initial	489.715	539.423	590.567
Final	539.276	590.443	643.009
Total Volume	49.481	50.989	52.375
Ave. Stack Temperature, Ts(F)	83.8	90.3	91.9
Ave. Meter Temperature, Tm(F)	82.4	98.0	94.8
Ave. Run Delta H, inches of H2O	0.79	0.78	0.78
Ave. Square Root of Delta P	0.8390	0.8278	0.8252
Moisture Data			
Volume of water collected, mls	0.6	10	2
Silica Gel, grams	10.4	9	9.2
Total Collected, mls	11	19	11.2
ORSAT Data			
%O2	20.90	20.90	20.90
%CO2	0.0	0.0	0.0
%CO			

Calculations

Vw(std), scf =	0.518	0.894	0.527
Vm(std), dscf =	47.874	47.855	49.356
Bws=	0.011	0.018	0.011
Md=	28.84	28.84	28.84
Ms=	28.72	28.64	28.72
Vs, ft/sec =	48.1	47.8	47.7
Qs, acfm =	20,399	20,286	20,238
Qs(std), dscfm =	19,457	18,953	18,975
Isokinetic Sampling Rate, %	99.2	101.8	104.9

Where:
An = area of the nozzle
As = area of the stack
Vw(std) = volume of water vapor in gas, standard conditions = 0.04707*Vlc
Vm(std) = vol. of gas sampled, standard conditions = 17.647 x Vm x gamma x [Pb + (dH/13.6)]/Tm(R)
Bws = water vapor in gas stream, proportion by volume = Vw(std)/(Vm(std) + Vw(std))
Md = molecular weight of stack gas, dry basis = (0.44 x%CO2) + (0.32 x%O2) + [0.28 x (%N2 + %CO)]
Ms = molecular weight of stack gas, wet basis = [Md x (1-Bws)] + (18.0 x Bws)
Vs = stack gas velocity = 85.49 x Cp x (avg. Sq.Rt. dP) x [Sq.Rt. (Ts(R))/(Ms x Ps)]
Qs = stack gas flow rate = Vs x As x 60
Qs(std) = stack gas flow rate, standard conditions = Qs x (1-Bws) x (528/(Ts(R)) x (Ps/29.92)
Isokinetic sampling rate = {(Ts(R)) x [(0.00267 x Vlc) + (Vm(std)/17.647)] x 100}/(Time x vs x Ps x An x60)

Results Summary
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Inlet
Fayetteville, North Carolina

Parameter:		Run 1				Run 2				Run 3				Average			
	Mol. Wt.	mg	mg/dscm	ppm	lb/hr	mg	mg/dscm	ppm	lb/hr	mg	mg/dscm	ppm	lb/hr	mg	mg/dscm	ppm	lb/hr
HFPO - Dimer Acid	330	0.00454	3.35E-03	2.44E-04	2.44E-04	0.00928	6.85E-03	4.99E-04	4.86E-04	0.00641	4.58E-03	3.34E-04	3.26E-04	0.01	4.93E-03	3.59E-04	3.52E-04

Where:
Pollutant Emission Concentration:
mg= total sample collected, milligrams
mg/dscm = milligrams of pollutant per dry standard cubic meter sampled = (mg/dscf) x (35.314 cubic feet/cubic meter)
ppm = parts per million =((mg/dscm x 24.04 liters/mol)/mol.wt))

Pollutant Emission Rate:
lb/hr = pounds of pollutant emitted per hour = mg/1000/[(453.59 g/lb)/(dscf)] x dscfm x 60 min/hr

Example Calculations

The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Inlet
Fayetteville, North Carolina
Note: Values are shown for example purposes only.

Vm,a = Dry gas volume at actual conditions (acf)

Initial gas meter volume:	489.715
Final gas meter volume:	539.276
Difference:	49.561

Vm,std = Volume of dry gas at standard conditions (dscf)

= 17.647x Vm, a x Gamma*[Pbar+(DeltaH/13.6)]/Tm(R)
= 17.647 x 0.000 x 0.992 x (29.92 + [(1.580 /13.6) / 542
= 47.874

Vl,c = Volume of water collected in impingers and silica gel (ml)

impinger catch (mls):	1
silica gel (g)	10.4
total:	11.0

Vw,std = Volume of water vapor in gas at standard conditions (cu.ft.)

= (0.04707) x (Vl,c)
= 0.04707 x 11.0
= 0.518

Bwo = Proportion by volume of water vapor in gas stream

= Vw,std/(Vw,std+Vm,std)
= 0.52 / (0.52 + 47.874)
= 0.011

Ps = Stack gas static pressure (in. Hg)

= St/13.6
= -2.90 / 13.6
= -0.213

Pa = Absolute stack gas pressure (in. Hg)

= Ps+Pbar
= -0.213 + 29.92
= 29.71

MFD = Dry mole fraction of stack gas

= 1-Bwo
= 1 - 0.011
= 0.989

Md = Dry molecular weight of stack gas (lb/lb-mol)

= (0.32 x %O2) + (0.44 x %CO2) + (0.28 x %N2)
= (0.32 x 20.90)+(0.44 x 0.00) + (0.28 x 79.10)
= 28.84

Mw = Wet molecular weight of stack gas (lb/lb-mol)

= (Md) x (MFD) + (0.18) x (Bwo*100)
= 28.84 x 0.989 + 0.18 x 1.06994
= 28.72

Example Calculations

The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Inlet
Fayetteville, North Carolina
Note: Values are shown for example purposes only.

Vs,avg = **Average stack gas velocity (fps)**
= Kp x (Cp) x (sqrt,deltaP) x sqrt((Ts + 460°R)/Mw*Pa))
= 85.48 x 0.84 x 0.84 x sqrt (0.64)
= 48.1

A **Cross sectional areas of stack (sq. ft)**
= pi/4*d^2
= 3.14159/4 x 3.00 ^2
= 7.07

Qa **Volumetric flow rate at actual conditions (acfm)**
= (60)sec/min(A)(Vs, avg)
= 60 x 7.0686 x 48.09
= 20,397

Qstd **Volumetric flow rate at standard conditions (scfm)**
= Qa x (528/Ts,avg + 460) x Pa/29.92
= 20,397 x (528 / 544) x 0.993
= 19,665

Qstd,dry **Volumetric flow rate at dry standard conditions per minute(dscfm)**
= Qstd x (1-Bwo)
= 19,665 x 0.9893
= 19,455

mg/dscm **HFPO-DA concentration**
= (mg/dscf) x 35.314 cu. ft./cu. meter
= (0.005 / 47.87) x 35.314
= 3.48E-03

lb/hr **HFPO-DA Mass Emission Rate**
= mg/1000/[(453.59 g/lb)/(dscf)] x dscfm x 60 min/hr
= 0.005 / 1,000 /[453.59) / 47.87)] x 19,457 x 60
= 2.54E-04

EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	1	Pitot Number	P4-2
Location	Fayetteville, NC	Stack Diameter	36"	Pitot Coefficient	0.84
Source	VES CB Inlet	Barometric Pres.	29.92	Stack TC I.D.	P4-2
Date	6/23/20	Static Pressure	-2.9	Oven Box I.D.	CB-2
Operators	AA/NW	Meter Box #	2	Impinger Out I.D.	03
Start Time	0945	Meter delta H	1.58	Nozzle Size	.183
End Time		Meter Gamma	.992	XAD Trap I.D.	NA

K = 1.1

Leak Check Rates	Sample Rate in.	Sample Rate cfm	Pitot +	Pitot -
Initial	6	0.002	✓	✓
Mid	10	0.002		
Mid				
Final	6	0.007	✓	✓

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
A1	4	.83	.91	489.715	83	89	91	58	42	77	77	4	K=1.1
2	8	.80	.88	491.80	83	89	91	48	41	78	77	4	
3	12	.80	.88	493.89	83	90	92	45	40	79	77	4	
4	16	.83	.91	495.96	83	90	92	47	41	80	77	4	
5	20	.84	.92	498.11	83	90	92	48	41	81	78	4	
6	24	.84	.92	500.30	83	90	92	48	41	82	78	4	
7	28	.74	.81	502.475	84	90	92	49	43	83	79	4	
8	32	.66	.72	504.50	83	90	93	49	42	83	78	4	
9	36	.63	.69	506.53	83	90	92	49	42	83	79	4	
10	40	.59	.63	508.49	83	90	92	48	40	84	79	4	
11	44	.58	.63	510.385	83	90	92	47	39	84	79	4	
12	48	.59	.64	512.29	83	90	93	47	39	84	80	4	514.229 0933EDT
B1	52	1.05	1.15	514.309	84	90	93	59	39	82	81	4	1000 Restart
2	56	1.1	1.21	516.79	84	90	92	46	37	84	81	4	
3	60	1.05	1.15	519.355	84	90	92	45	37	86	81	4	
4	64	1.0	1.10	521.93	84	90	92	45	37	87	82	4	
5	68	.95	1.04	524.48	84	90	93	46	39	88	82	5	
6	72	.91	1.00	526.96	84	90	92	47	39	88	83	5	
7	76	.70	.77	529.35	84	90	93	47	39	89	83	4	
B	80	.85	.60	531.49	85	89	92	48	40	89	84	3	
9	84	.41	.45	533.45	85	90	92	49	41	89	84	3	
10	88	.28	.30	535.13	85	90	92	50	42	89	85	2.5	
11	92	.24	.26	536.57	85	91	93	51	41	89	85	2	
12	96	.24	.26	537.92	85	91	92	52	43	89	85	2	
				VF=539.276									1048 END

Impinger Data (vol) #	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm) #	Initial	Final
1		
2		

Moisture Gain

_____ ml.

_____ gm

_____ Total

Filter Data #	Number	Tare
1		
2		
3		

Molecular Weight Data (% #	O_2	CO_2
1		
2		
3		
Avg		

RAMBOLL

EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	2	Pitot Number	P4-2
Location	Fayetteville, NC	Stack Diameter	36"	Pitot Coefficient	0.84
Source	VES CB Inlet	Barometric Pres.	29.86	Stack TC I.D.	P4-2
Date	6/23/20	Static Pressure	-2.5	Oven Box I.D.	CB-2
Operators	AA/NW	Meter Box #	2	Impinger Out I.D.	D-0734
Start Time	1315	Meter delta H	1.58	Nozzle Size	.183
End Time		Meter Gamma	.992	XAD Trap I.D.	N/A

Leak Check Rates	Sample Rate in.	Sample Rate cfm	Pitot +	Pitot -
Initial	10	0.001	✓	✓
Mid	10	0.002		
Mid	1			
Final	6	0.002	✓	✓

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
A 1	4	1.05	1.15	539.423	89	95	96	65	68	94	94	5	
2	8	1.05	1.15	541.60	89	94	95	46	67	95	94	5	
3	12	1.10	1.21	544.14	89	93	94	41	69	96	94	5	
4	16	1.08	1.18	546.76	89	94	94	42	68	98	95	5	1.00, 1.10
5	20	.96	1.05	549.33	89	96	93	43	66	99	95	5	
6	24	.90	.99	551.78	89	95	93	44	57	99	95	4.5	
7	28	.67	.73	554.17	90	95	95	45	55	100	96	3.5	
8	32	.48	.52	556.26	90	94	95	45	55	100	96	3	
9	36	.38	.41	558.095	90	95	95	47	56	99	96	3	
10	40	.30	.33	559.74	90	95	96	49	53	99	97	2.5	.33
11	44	.24	.26	561.24	90	94	94	50	55	99	97	2.5	
12	48	.22	.24	562.61	90	95	95	51	58	98	97	2	563.848 1403 STOP
B 1	52	.81	.89	563.879	91	95	94	68	68	97	96	4	1440
2	56	.80	.88	566.09	91	92	92	51	68	98	97	4	
3	60	.80	.88	568.36	91	95	95	47	68	99	97	4	
4	64	.83	.91	570.69	91	95	95	46	68	100	97	4	
5	68	.84	.92	573.2	91	94	93	46	62	101	97	4	
6	72	.83	.91	575.5	91	94	92	46	58	101	98	4	
7	76	.73	.80	577.86	91	95	93	47	53	102	99	4	
8	80	.66	.72	580.10	91	94	92	49	57	102	99	3.5	
9	84	.61	.67	582.23	91	95	95	49	57	102	99	3.5	
10	88	.62	.68	584.—	91	95	97	50	55	102	99	3.5	
11	92	.60	.66	586.37	91	95	100	49	55	102	99	3.5	
12	96	.59	.64	588.43	91	95	99	49	56	101	99	3.5	
				590.443									1528 END

Impinger Data (vol) #	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm) #	Initial	Final
1		
2		

Moisture Gain	
	ml.
	gm
	Total

Filter Data #	Number	Tare
1		
2		
3		

Molecular Weight Data (% #	O_2	CO_2
1		
2		
3		
Avg		

RAMBOLL

EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	3	Pitot Number	P4-2
Location	Fayetteville, NC	Stack Diameter	36"	Pitot Coefficient	0.84
Source	VES CB Inlet	Barometric Pres.	29.81	Stack TC I.D.	P4-2
Date	6/23/20	Static Pressure	-2.4	Oven Box I.D.	OB-2
Operators	AA / NW	Meter Box #	2	Impinger Out I.D.	
Start Time	1610	Meter delta H	1.58	Nozzle Size	.183
End Time	1803	Meter Gamma	.992	XAD Trap I.D.	N/A

Leak Check Rates	Sample Rate in.	Sample Rate cfm	Pitot +	Pitot -
Initial	10	0.000	✓	✓
Mid	10	0.000		
Mid			✓	✓
Final	6	0.000		

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
A1	4	.83	.91	590.567	92	94	94	60	43	94	94	4	K=1.1
2	8	.81	.89	593.05	92	98	100	48	44	96	94	4	
3	12	.80	.88	595.39	92	95	100	48	44	96	44	4	
4	16	.83	.91	597.725	91	95	99	49	44	97	94	4	
5	20	.83	.91	@599600.08	91	95	98	50	45	98	94	4	
6	24	.84	.92	602.48	92	94	99	50	43	98	95	4	
7	28	.73	.80	604.93	91	94	98	50	45	99	95	4	
8	32	.65	.71	607.19	92	95	98	52	46	99	96	3.5	
9	36	.63	.69	609.33	92	94	98	52	46	99	96	3.5	
10	40	.60	.66	611.41	92	94	99	53	46	99	96	3.5	
11	44	.57	.62	613.44	92	95	98	53	47	99	96	3	
12	48	.60	.66	615.44	92	95	98	53	48	98	96	3	617.51 1658 Stop
B1	52	1.05	1.15	617.577	92	95	98	67	50	94	94	4.5	1715 Restart
2	56	1.10	1.21	620.15	92	95	99	54	49	95	94	4.5	
3	60	1.05	1.15	622.85	92	95	98	53	46	96	93	4.5	
4	64	1.05	1.15	625.53	92	95	97	52	45	96	93	4.5	
5	68	.97	1.06	628.22	92	95	98	52	45	96	93	4.5	
6	72	.90	.99	630.78	92	95	98	52	46	95	92	4	
7	76	.65	.71	633.30	92	95	99	52	45	95	92	3.5	
8	80	.49	.53	635.47	92	95	98	52	46	95	92	3	
9	84	.35	.38	637.35	92	95	99	52	47	94	92	3	
10	88	.24	.26	—	92	95	99	54	46	93	91	2	
11	92	.23	.25	640.36	92	95	98	55	46	93	91	2	
12	96	.23	.25	641.71	92	95	98	56	47	92	91	2	
				643.009									1803 END

Impinger Data (vol) #	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm) #	Initial	Final
1		
2		

Moisture Gain	
	ml.
	gm
	Total

Filter Data #	Number	Tare
1		
2		
3		

Molecular Weight Data (% #	O_2	CO_2
1		
2		
3		
Avg		

RAMBOLL

Velocity Determination Data Sheet

Client: Chemours
Location: Fayetteville, NC
Source: Inlet VES
Date: 6/23/20
Operator: AA/NW

Stack Diameter: 36"
Barometric Pressure: 29.81
Probe ID: P4-2
Velocity Guage ID: MB#2

Leak Check	pos.	neg
Initial		
Post		

Run No. Cyclonic

	Traverse Point Number	Delta P (in. H20)	Stack Temp (°F)
A	1	5°	
	2	18°	
	3	4°	
	4	2°	
	5	0°	
	6	2°	
B	1	3°	
	2	3°	
	3	5°	
	4	0°	
	5	1°	
	6	5°	

Static Pressure	
Oxygen (%)	
Carbon Dioxide (%)	
Wet Bulb (°F)	
Dry Bulb (°F)	

Run No. _____

Traverse Point Number	Delta P (in. H20)	Stack Temp (°F)

Static Pressure	
Oxygen (%)	
Carbon Dioxide (%)	
Wet Bulb (°F)	
Dry Bulb (°F)	

Run No. _____

Traverse Point Number	Delta P (in. H20)	Stack Temp (°F)

Static Pressure	
Oxygen (%)	
Carbon Dioxide (%)	
Wet Bulb (°F)	
Dry Bulb (°F)	

Sample Train Recovery Data Sheet

Client Chemours Location Fayetteville NC Source VES Inlet Method M 0010 Date _____

Run # 1

	Final ml or gm	Initial ml or gm	Net Gain
Impinger #1	493.0	493.0	0
Impinger #2	716.2	716.0	0.2
Impinger #3	774.6	774.4	0.2
Impinger #4	500.2	500.0	0.2
Impinger #5	893.6	883.2	10.4
Impinger #6			
Impinger #7			
Impinger #8			
		Total Gain	11.0 ml/gm

Filter #1 M0010
Filter #2 _____
Filter #3 _____
Nozzle D
Run Start Time 0845
Run End Time 1048
Recovery Technician PG

Run # 2

	Final ml or gm	Initial ml or gm	Net Gain
Impinger #1	504.6	497.8	6.8
Impinger #2	762.0	760.8	1.2
Impinger #3	750.0	751.0	-1
Impinger #4	471.0	468.0	3.0
Impinger #5	843.0	834.0	9.0
Impinger #6			
Impinger #7			
Impinger #8			
		Total Gain	19 ml/gm

Filter #1 M0010
Filter #2 _____
Filter #3 _____
Run Start Time 1315
Run End Time 1528
Recovery Technician PG

Run # 3

	Final ml or gm	Initial ml or gm	Net Gain
Impinger #1	492.8	491.6	1.2
Impinger #2	737.6	739.0	-1.4
Impinger #3	738.8	738.0	0.8
Impinger #4	501.4	500.0	1.4
Impinger #5	902.6	893.4	9.2
Impinger #6			
Impinger #7			
Impinger #8			
		Total Gain	11.2 ml/gm

Filter #1 M0010
Filter #2 _____
Filter #3 _____
Run Start Time 1610
Run End Time 1803
Recovery Technician PG

Nozzle Calibration Form

Plant I.D. Chemours

Project No. 75812

Source I.D. VES

Personnel P. Grady

Date 6/23/20

Nozzle ID:	SS D
Diameter 1	.182
Diameter 2	.183
Diameter 3	.183
Average	.183

< 0.004" between high & low diameters

VES Carbon Bed Outlet Field Test Data

Field Data Summary
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Outlet
Fayetteville, North Carolina

	Run 1							Run 2							Run 3					
Traverse Point	Stack Temp(F)	Delta P	Delta H	Tm(F) in	Tm(F) out	SQRT Delta P		Stack Temp(F)	Delta P	Delta H	Tm(F) in	Tm(F) out	SQRT Delta P		Stack Temp(F)	Delta P	Delta H	Tm(F) in	Tm(F) out	SQRT Delta P
A1	86	0.40	1.48	77	77	0.6325		92	0.25	0.92	93	93	0.5000		93	0.26	0.96	93	93	0.5099
2	87	0.40	1.48	79	79	0.6325		94	0.25	0.92	94	94	0.5000		93	0.26	0.96	93	93	0.5099
3	87	0.42	1.55	79	79	0.6481		92	0.25	0.92	94	94	0.5000		93	0.29	1.03	93	93	0.5385
4	87	0.46	1.70	79	79	0.6782		93	0.30	1.11	94	94	0.5477		93	0.24	0.88	93	93	0.4899
5	87	0.40	1.48	80	80	0.6325		93	0.30	1.11	94	94	0.5477		93	0.26	0.96	93	93	0.5099
6	87	0.39	1.44	80	80	0.6245		93	0.30	1.11	94	94	0.5477		93	0.29	1.03	93	93	0.5385
7	87	0.34	1.25	80	80	0.5831		93	0.30	1.11	94	94	0.5477		93	0.33	1.22	93	93	0.5745
8	87	0.35	1.29	81	81	0.5916		93	0.34	1.25	95	95	0.5831		92	0.37	1.36	94	94	0.6083
9	88	0.29	1.07	81	81	0.5385		93	0.34	1.25	95	95	0.5831		93	0.44	1.62	94	94	0.6633
10	87	0.26	0.96	81	81	0.5099		92	0.36	1.33	95	95	0.6000		93	0.44	1.62	94	94	0.6633
11	87	0.25	0.92	81	81	0.5000		92	0.38	1.40	95	95	0.6164		93	0.48	1.77	94	94	0.6928
12	88	0.25	0.92	81	81	0.5000		92	0.40	1.48	95	95	0.6325		92	0.44	1.62	94	94	0.6633
B1	87	0.48	1.77	81	81	0.6928		93	0.36	1.33	95	95	0.6000		92	0.21	0.77	94	94	0.4583
2	87	0.48	1.77	81	81	0.6928		93	0.36	1.33	95	95	0.6000		92	0.22	0.77	94	94	0.4690
3	87	0.48	1.77	81	81	0.6928		93	0.44	1.63	95	95	0.6633		93	0.24	0.88	94	94	0.4899
4	88	0.44	1.62	82	82	0.6633		93	0.48	1.77	95	95	0.6928		93	0.24	0.88	94	94	0.4899
5	88	0.44	1.62	83	83	0.6633		93	0.44	1.63	95	95	0.6633		93	0.24	0.88	94	94	0.4899
6	88	0.38	1.40	85	85	0.6164		93	0.44	1.63	94	94	0.6633		93	0.32	1.18	94	94	0.5657
7	88	0.32	1.18	85	85	0.5657		93	0.32	1.18	94	94	0.5657		93	0.34	1.25	94	94	0.5831
8	89	0.24	0.88	89	89	0.4899		93	0.24	0.88	95	95	0.4899		93	0.37	1.37	94	94	0.6083
9	89	0.24	0.88	90	90	0.4899		93	0.22	0.81	95	95	0.4690		92	0.40	1.48	93	93	0.6325
10	89	0.21	0.77	90	90	0.4583		93	0.19	0.70	95	95	0.4359		92	0.44	1.62	93	93	0.6633
11	89	0.21	0.77	91	91	0.4583		93	0.20	0.74	95	95	0.4472		92	0.44	1.62	93	93	0.6633
12	89	0.21	0.77	93	93	0.4583		93	0.20	0.74	95	95	0.4472		92	0.44	1.62	93	93	0.6633
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
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						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
						0.0000							0.0000							0.0000
Average	88	0.35	1.28	83	83	0.5839		93	0.32	1.18	95	95	0.5602		93	0.33	1.22	94	94	0.5724

Test Data Summary and Calculations
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Outlet
Fayetteville, North Carolina

Parameter	**Run 1**	**Run 2**	**Run 3**
Run Date	6/23/20	6/23/20	6/23/20
Start/Stop Time	0845-1048	1315-1528	1610-1803
Duration of Run, Minutes	96	96	96
Ave. Nozzle Diameter, inches	0.243	0.243	0.243
Pitot Calibration Factor, CF	0.84	0.84	0.84
Meter Gamma	1.013	1.013	1.013
Meter Delta H, inches of H2O	1.73	1.73	1.73
Stack Diameter, inches	41.5	41.5	41.5
Rectangular Width, inches	0	0	0
Rectangular Length, inches	0	0	0
Stack Area, sq.ft.	9.39	9.39	9.39
Barometric Pressure, inches of Hg	29.92	29.86	29.81
Static Pressure, inches of H2O	1.5	1.5	1.5
Dry Gas Meter Sample Volume, (VM)ft3			
Initial	70.718	131.266	189.166
Final	130.668	189.059	247.665
Total Volume	59.791	57.605	58.234
Ave. Stack Temperature, Ts(F)	87.6	92.8	92.7
Ave. Meter Temperature, Tm(F)	82.9	94.6	93.5
Ave. Run Delta H, inches of H2O	1.28	1.18	1.22
Ave. Square Root of Delta P	0.5839	0.5602	0.5724
Moisture Data			
Volume of water collected, mls	-0.2	2.2	2.8
Silica Gel, grams	12.8	11.6	12.8
Total Collected, mls	12.6	13.8	15.6
ORSAT Data			
%O2	20.90	20.90	20.90
%CO2	0.0	0.0	0.0
%CO			

Calculations

Vw(std), scf =	0.593	0.650	0.734
Vm(std), dscf =	59.089	55.606	56.231
Bws=	0.010	0.012	0.013
Md=	28.84	28.84	28.84
Ms=	28.73	28.71	28.70
Vs, ft/sec =	33.4	32.2	33.0
Qs, acfm =	18,827	18,172	18,588
Qs(std), dscfm =	18,038	17,184	17,529
Isokinetic Sampling Rate, %	99.5	98.3	97.5

Where:
An = area of the nozzle
As = area of the stack
Vw(std) = volume of water vapor in gas, standard conditions = 0.04707*Vlc
Vm(std) = vol. of gas sampled, standard conditions = 17.647 x Vm x gamma x [Pb + (dH/13.6)]/Tm(R)
Bws = water vapor in gas stream, proportion by volume = Vw(std)/(Vm(std) + Vw(std))
Md = molecular weight of stack gas, dry basis = (0.44 x%CO2) + (0.32 x%O2) + [0.28 x (%N2 + %CO)]
Ms = molecular weight of stack gas, wet basis = [Md x (1-Bws)] + (18.0 x Bws)
Vs = stack gas velocity = 85.49 x Cp x (avg. Sq.Rt. dP) x [Sq.Rt. (Ts(R))/(Ms x Ps)]
Qs = stack gas flow rate = Vs x As x 60
Qs(std) = stack gas flow rate, standard conditions = Qs x (1-Bws) x (528/(Ts(R)) x (Ps/29.92)
Isokinetic sampling rate = {(Ts(R)) x [(0.00267 x Vlc) + (Vm(std)/17.647)] x 100}/(Time x vs x Ps x An x60)

Results Summary
The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Outlet
Fayetteville, North Carolina

Parameter:		Run 1				Run 2				Run 3				Average			
	Mol. Wt.	mg	mg/dscm	ppm	lb/hr	mg	mg/dscm	ppm	lb/hr	mg	mg/dscm	ppm	lb/hr	mg	mg/dscm	ppm	lb/hr
HFPO - Dimer Acid	330	0.00361	2.16E-03	1.57E-04	1.46E-04	0.00428	2.72E-03	1.98E-04	1.75E-04	0.00348	2.19E-03	1.59E-04	1.44E-04	0.00	2.35E-03	1.71E-04	1.55E-04

Where:
Pollutant Emission Concentration:
mg= total sample collected, milligrams
mg/dscm = milligrams of pollutant per dry standard cubic meter sampled = (mg/dscf) x (35.314 cubic feet/cubic meter)
ppm = parts per million =((mg/dscm x 24.04 liters/mol)/mol.wt))

Pollutant Emission Rate:
lb/hr = pounds of pollutant emitted per hour = mg/1000/[(453.59 g/lb)/(dscf)] x dscfm x 60 min/hr

Example Calculations

The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Outlet
Fayetteville, North Carolina
Note: Values are shown for example purposes only.

Vm,a = Dry gas volume at actual conditions (acf)

Initial gas meter volume:	70.718
Final gas meter volume:	130.668
Difference:	59.950

Vm,std = Volume of dry gas at standard conditions (dscf)

= 17.647x Vm, a x Gamma*[Pbar+(DeltaH/13.6)]/Tm(R)
= 17.647 x 0.000 x 1.013 x (29.92 + [(1.730 /13.6) / 543
= 59.089

Vl,c = Volume of water collected in impingers and silica gel (ml)

impinger catch (mls):	0
silica gel (g)	12.8
total:	12.6

Vw,std = Volume of water vapor in gas at standard conditions (cu.ft.)

= (0.04707) x (Vl,c)
= 0.04707 x 12.6
= 0.593

Bwo = Proportion by volume of water vapor in gas stream

= Vw,std/(Vw,std+Vm,std)
= 0.59 / (0.59 + 59.089)
= 0.010

Ps = Stack gas static pressure (in. Hg)

= St/13.6
= 1.50 / 13.6
= 0.110

Pa = Absolute stack gas pressure (in. Hg)

= Ps+Pbar
= 0.110 + 29.92
= 30.03

MFD = Dry mole fraction of stack gas

= 1-Bwo
= 1 - 0.010
= 0.990

Md = Dry molecular weight of stack gas (lb/lb-mol)

= (0.32 x %O2) + (0.44 x %CO2) + (0.28 x %N2)
= (0.32 x 20.90)+(0.44 x 0.00) + (0.28 x 79.10)
= 28.84

Mw = Wet molecular weight of stack gas (lb/lb-mol)

= (Md) x (MFD) + (0.18) x (Bwo*100)
= 28.84 x 0.990 + 0.18 x 0.99373
= 28.73

Example Calculations

The Chemours Company - Fayetteville Works
Vinyl Ethers South Carbon Bed Outlet
Fayetteville, North Carolina
Note: Values are shown for example purposes only.

Vs,avg = **Average stack gas velocity (fps)**
= Kp x (Cp) x (sqrt,deltaP) x sqrt((Ts + 460°R)/Mw*Pa))
= 85.48 x 0.84 x 0.58 x sqrt (0.63)
= 33.4

A **Cross sectional areas of stack (sq. ft)**
= pi/4*d^2
= 3.14159/4 x 3.46 ^2
= 9.39

Qa **Volumetric flow rate at actual conditions (acfm)**
= (60)sec/min(A)(Vs, avg)
= 60 x 9.3934 x 33.40
= 18,826

Qstd **Volumetric flow rate at standard conditions (scfm)**
= Qa x (528/Ts,avg + 460) x Pa/29.92
= 18,826 x (528 / 548) x 1.004
= 18,218

Qstd,dry **Volumetric flow rate at dry standard conditions per minute(dscfm)**
= Qstd x (1-Bwo)
= 18,218 x 0.9901
= 18,037

mg/dscm **HFPO-DA concentration**
= (mg/dscf) x 35.314 cu. ft./cu. meter
= (0.007 / 59.09) : 35.314
= 4.11E-03

lb/hr **HFPO-DA Mass Emission Rate**
= mg/1000/[(453.59 g/lb)/(dscf)] x dscfm x 60 min/hr
= 0.01 / 1,000 /[453.59) / 59.09)] x 18,038 x 60
= 2.78E-04

EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	1	Pitot Number	P.43
Location	Fayetteville, NC	Stack Diameter	41.5"	Pitot Coefficient	.84
Source	VES CB Outlet	Barometric Pres.	29.92	Stack TC I.D.	P.43
Date	6-23-20	Static Pressure	+1.5	Oven Box I.D.	45
Operators	JLS, SM	Meter Box #	15	Impinger Out I.D.	1
Start Time	0845	Meter delta H	1.73	Nozzle Size	.243
End Time	1048	Meter Gamma	1.013	XAD Trap I.D.	NA

K= 3.7

Leak Check Rates				
	Sample Rate in.	cfm	Pitot +	Pitot -
Initial	.004	@ 10	✓	✓
Mid	10	.001		
Mid	12	.000		
Final	5	0.001	✓	✓

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
A1	4	.4	1.48	70.715	86	90	88	67	61	77	77	4	
2	8	.4	1.48	74.00	87	90	88	49	54	79	79	4	
3	12	.42	1.55	76 —	87	90	88	49	56	79	79	5	
4	16	.46	1.70	79.2 —	87	90	88	50	57	79	79	5	
5	20	.40	1.48	81.30	87	90	88	51	57	80	80	5	
6	24	.39	1.44	84.40	87	90	88	52	60	80	80	4	
7	28	.34	1.25	87.20	87	90	88	53	57	80	80	4	
8	32	.35	1.29	90.40	87	90	88	53	55	81	81	4	
9	36	.29	1.07	92.90	88	90	88	53	56	81	81	4	
10	40	.26	.96	94.20	87	90	88	54	56	81	81	4	@933
11	44	.25	.92	96.20	87	90	88	54	56	81	81	4	
12	48	.25	.92	97.90	88	90	88	55	54	81	81	4	100.161
B1	52	.48	1.77	100.320	87	93	88	66	54	81	81	4	100.320
2	56	.48	1.77	103 —	87	90	88	51	54	81	81	4	@1000
3	60	.48	1.77	106. —	87	90	88	50	54	81	81	4	
4	64	.44	1.62	108 —	88	90	88	51	56	82	82	4	
5	68	.44	1.62	112 —	88	90	89	48	54	83	83	4	
6	72	.38	1.40	—	88	90	90	48	58	85	85	4	
7	76	.32	1.18	117.80	88	90	89	49	51	85	85	4	
8	80	.24	.88	—	89	92	91	48	58	89	89	4	
9	84	.24	.88	—	89	91	89	48	52	90	90	4	
10	88	.21	.77	124.8	89	91	89	48	48	90	90	4	
11	92	.21	.77	126.50	89	91	89	48	52	91	91	4	
12	96	.21	.77	128 —	89	91	89	48	54	93	93	4	
				130.668									

Impinger Data (vol)		
#	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm)		
#	Initial	Final
1		
2		

Moisture Gain	
	ml.
	gm
	Total

Filter Data		
#	Number	Tare
1		
2		
3		

Molecular Weight Data (%		
#	O_2	CO_2
1		
2		
3		
Avg		

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0137

EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	R2	Pitot Number	P 4.3
Location	Fayetteville, NC	Stack Diameter	41.5"	Pitot Coefficient	.84
Source	OUTLET JESCB	Barometric Pres.	29.86	Stack TC I.D.	P4.3 (7D)
Date	6-23-20	Static Pressure	-1.5	Oven Box I.D.	5
Operators	JLS, SM	Meter Box #	15	Impinger Out I.D.	9
Start Time	1315	Meter delta H	1.73	Nozzle Size	.243
End Time	1528	Meter Gamma	1.013	XAD Trap I.D.	NA

Leak Check Rates	Sample Rate in.	Sample Rate cfm	Pitot +	Pitot -
Initial	10"	.001	✓	✓
Mid	10"	.000		
Mid	10	0.000		
Final	5	.000	✓	✓

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
1	4	.25	.92	131.266	92	98	100	63	54	93	93	3	
2	8	.25	.92	133.40	94	98	103	58	55	94	94	3	
3	12	.25	.92	135.50	92	96	102	56	56	94	94	3	
4	16	.30	1.11	138.20	93	95	101	57	57	94	94	3	
5	20	.30	1.11	140.90	93	94	100	57	58	94	94	3	
6	24	.30	1.11	143.30	93	94	100	58	60	94	94	3	
7	28	.30	1.11	145	93	94	100	58	59	94	94	3	
8	32	.34	1.25	—	93	93	98	50	49	95	95	4	
9	36	.34	1.25	150.00	93	92	97	50	50	95	95	4	
10	40	.36	1.33	153 —	92	95	97	48	49	95	95	4	
11	44	.38	1.40	155.40	92	94	97	48	47	95	95	4	159.789
12	48	.40	1.48	156.90	92	94	97	48	49	95	95	4	159.8
1	52	.36	1.33	159.977	93	94	96	50	55	95	95	4	~~1440~~
2	56	.36	1.33	162.7	93	94	96	47	53	95	95	4	1440
3	60	.44	1.63	—	93	96	97	47	52	95	95	4	
4	64	.48	1.77	167.3	93	100	97	47	51	95	95	4	
5	68	.44	1.63	169.70	93	99	97	47	48	95	95	4	
6	72	.44	1.63	172.3	93	100	97	47	49	94	94	4	
7	76	.32	1.18	178.7	93	100	98	48	53	94	94	4	
8	80	0.24	0.88	181.4	93	102	100	49	53	95	95	3	
9	84	0.22	0.81	183.4	93	101	101	50	52	95	95	3	
10	88	0.19	0.70	185.4	93	101	101	52	57	95	95	3	
11	92	.20	.74	—	93	101	101	52	52	95	95	3	
12	96	.20	.74	187.2	93	101	100	52	50	95	95	3	
				189.059									

Impinger Data (vol) #	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm) #	Initial	Final
1		
2		

Moisture Gain	
	ml.
	gm
	Total

Filter Data #	Number	Tare
1		
2		
3		

Molecular Weight Data (% #	O_2	CO_2
1		
2		
3		
Avg		

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EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	R3	Pitot Number	P4-3
Location	Fayetteville, NC	Stack Diameter	41.5"	Pitot Coefficient	.84
Source	Outlet VES CB	Barometric Pres.	29.8	Stack TC I.D.	P4-3
Date	6-23-20	Static Pressure	-1.5	Oven Box I.D.	5
Operators	DLS, SM	Meter Box #	15	Impinger Out I.D.	1
Start Time	1610	Meter delta H	1.73	Nozzle Size	.243
End Time	1803	Meter Gamma	1.013	XAD Trap I.D.	N/A

Leak Check Rates	Sample Rate in.	Sample Rate cfm	Pitot +	Pitot -
Initial	10	0.000	✓	✓
Mid	10	0.008		
Mid	10	0.000		
Final	8	.00	✓	✓

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
1	4	.26	.96	189.166	93	94	97	66	63	93	93	4	
2	8	.26	.96	191.80	93	94	96	56	56	93	93	4	
3	12	.29	1.03	194.30	93	94	96	60	59	93	93	4	
4	16	.24	.88	196.80	93	94	96	62	60	93	93	4	
5	20	.26	.96	198.7	93	94	97	61	61	93	93	4	
6	24	.29	1.03	201.00	93	94	95	61	57	93	93	4	
7	28	.33	1.22	203.50	93	94	95	60	60	93	93	4	
8	32	.37	1.36	206.40	92	94	95	61	59	94	94	4	
9	36	.44	1.62	208.40	93	94	95	61	61	94	94	4	
10	40	.44	1.62	212.30	93	94	95	61	52	94	94	4	
11	44	.42	1.77	214.	93	94	95	60	52	94	94	5	1658
12	48	.44	1.62	215.60	92	94	95	60	64	94	94	5	218.326
1	52	.26	.77	ET 218.591	92	101	96	60	62	94	94	5	1715
2	56	.22	.77	—	92	100	96	60	62	94	94	3	
3	60	.24	.88	—	93	97	96	58	62	94	94	3	
4	64	.24	.88	225.8	93	95	96	54	62	94	94	3	
5	68	.24	.88	227.80	93	94	95	54	65	94	94	3	
6	72	.32	1.18	229.80	93	94	96	57	64	94	94	3	
7	76	.34	1.25	231.80	93	94	95	56	65	94	94	3	
8	80	.37	1.37	234.60	93	94	94	57	65	94	94	3	
9	84	.40	1.48	237—	92	94	94	58	63	93	93	4	
10	88	.44	1.62	239.70	92	95	95	59	55	93	93	4	
11	92	.44	1.62	242.90	92	95	95	62	62	93	93	4	
12	96	.44	1.62	245.50	92	94	96	64	63	93	93	5	1803
				247.665									

4.21 D

Impinger Data (vol) #	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm) #	Initial	Final
1		
2		

Moisture Gain	
	ml.
	gm
	Total

Filter Data #	Number	Tare
1		
2		
3		

Molecular Weight Data (% #	O_2	CO_2
1		
2		
3		
Avg		

RAMBOLL

Velocity Determination Data Sheet

Client: ~~BASF~~ The Chemours
Location: ~~Palmyra, Mo~~ Fayetteville NC
Source: ~~Unit D~~ Outlet VES
Date: 6/23/20
Operator: JS/SM

Stack Diameter: 42" 41.5"
Barometric Pressure: 29.86
Probe ID: P4-3
Velocity Guage ID: MB 15

Leak Check	pos.	neg
Initial		
Post		

Run No. _____ Angle

Traverse Point Number	~~Delta P (in. H20)~~	Stack Temp (°F)
1	5	
2	5	
3	0	
4	0	
5	3	
6	3	
7	2	
8	2	
9	0	
10	0	
11	0	
12	0	

Static Pressure	
Oxygen (%)	
Carbon Dioxide (%)	
Wet Bulb (°F)	
Dry Bulb (°F)	

Run No. _____

Traverse Point Number	Delta P (in. H20)	Stack Temp (°F)

Static Pressure	
Oxygen (%)	
Carbon Dioxide (%)	
Wet Bulb (°F)	
Dry Bulb (°F)	

Run No. _____

Traverse Point Number	Delta P (in. H20)	Stack Temp (°F)

Static Pressure	
Oxygen (%)	
Carbon Dioxide (%)	
Wet Bulb (°F)	
Dry Bulb (°F)	

OBG Part of Ramboll

Sample Train Recovery Data Sheet

Client Chambers Location Fayetteville NC Source YES 00725 Method M0010 Date 6/23/20

Run # 1

	Final ml or gm	Initial ml or gm	Net Gain
Impinger #1	509.2	508.8	0.4
Impinger #2	701.8	702.4	-0.6
Impinger #3	781.0	787.0	-6.0
Impinger #4	525.6	519.6	6.0
Impinger #5	868.2	855.4	12.8
Impinger #6			
Impinger #7			
Impinger #8			
		Total Gain	12.6 ml/gm

Filter #1 M0010
Filter #2
Filter #3
Nozzle B
Run Start Time
Run End Time 0845
Recovery Technician 1048

Run # 2

	Final ml or gm	Initial ml or gm	Net Gain
Impinger #1	513.6	512.0	1.6
Impinger #2	795.6	795.6	0
Impinger #3	752.4	753.6	-1.2
Impinger #4	531.4	529.6	1.8
Impinger #5	871.6	860.0	11.6
Impinger #6			
Impinger #7			
Impinger #8			
		Total Gain	13.8 ml/gm

Filter #1 M0010
Filter #2
Filter #3
Run Start Time 1315
Run End Time 1528
Recovery Technician PG

Run # 3

	Final ml or gm	Initial ml or gm	Net Gain
Impinger #1	511.6	508.8	2.8
Impinger #2	674.0	675.6	-1.6
Impinger #3	765.0	765.2	-0.2
Impinger #4	521.4	519.6	1.8
Impinger #5	881.2	868.4	12.8
Impinger #6			
Impinger #7			
Impinger #8			
		Total Gain	ml/gm

Filter #1 M0010
Filter #2
Filter #3
Run Start Time 1610
Run End Time 1803
Recovery Technician PG

Nozzle Calibration Form

Plant I.D. Chemours

Project No. 75812

Source I.D. Vinyl Ethers

Personnel P. Grady

Date 6/22/20

Nozzle ID:	SS B
Diameter 1	.243
Diameter 2	.243
Diameter 3	.244
Average	.243

< 0.004" between high & low diameters

EPA Isokinetic Field Sheet

Methods Performed: Modified 0010

Client	The Chemours Company	Run Number	Blank Train	Pitot Number	NA
Location	Fayetteville, NC	Stack Diameter	NA	Pitot Coefficient	NA
Source	VES	Barometric Pres.	29.92	Stack TC I.D.	NA
Date	6/23/20	Static Pressure	NA	Oven Box I.D.	OB 11
Operators	PG	Meter Box #	5	Impinger Out I.D.	I0-10
Start Time		Meter delta H	1.82	Nozzle Size	.244
End Time		Meter Gamma	.993	XAD Trap I.D.	NA

Leak Check Rates	Sample Rate in.	Sample Rate cfm	Pitot +	Pitot -
Initial	10	.02		
Mid				
Mid				
Final	10	.02		

Sample Point	Sample Time (min)	Velocity Head (in. H_2O)	Orifice Setting (in. H_2O)	Meter Volume (ft^3)	Temperature Readings in Degrees Farenheit: Stack	Probe	Oven Box	Impinger	Aux	Meter Inlet	Meter Outlet	Vacuum (in. hg)	Comments/Notes
	4	NA	NA	926.329	NA	106	105	69	66	74	74	NA	
	8	N/A	N/A	926.329	N/A	106	106	62	66	75	75	N/A	
	12	N/A	N/A	926.329	N/A	106	106	62	67	75	75	N/A	
	16	N/A	N/A	926.329	N/A	106	105	62	67	75	75	N/A	
	20	N/A	N/A	926.329	N/A	105	105	62	67	75	75	N/A	
	24	N/A	N/A	926.329	N/A	105	105	61	67	75	75	N/A	
	28	N/A	N/A	926.329	N/A	106	105	59	67	75	75	N/A	
	32	N/A	N/A	926.329	N/A	107	105	58	67	75	75	N/A	
	36	N/A	N/A	926.329	N/A	106	105	58	67	76	75	N/A	
	40	N/A	N/A	926.329	N/A	106	105	59	67	76	75	N/A	
	44	N/A	N/A	926.329	N/A	106	105	59	67	76	76	N/A	
	48	N/A	N/A	926.329	N/A	106	105	60	67	77	77	N/A	
	52	N/A	N/A	926.329	N/A	107	105	62	67	77	77	N/A	
	56	N/A	N/A	926.329	N/A	106	105	64	67	77	77	N/A	
	60	N/A	N/A	926.329	N/A	106	105	64	67	77	77	N/A	
	64	N/A	N/A	926.329	N/A	106	105	64	67	77	77	N/A	
	68	N/A	N/A	926.329	N/A	106	105	66	68	79	79	N/A	
	72	N/A	N/A	926.329	N/A	106	105	67	68	79	79	N/A	
	76	N/A	N/A	926.329	N/A	106	105	67	68	79	79	N/A	
	80	N/A	N/A	926.329	N/A	106	105	68	68	79	79	N/A	
	84	N/A	N/A	926.329	N/A	106	105	68	68	80	80	N/A	
	88	N/A	N/A	926.329	N/A	106	105	68	68	80	80	N/A	
	92	N/A	N/A	926.329	N/A	106	105	68	68	81	80	N/A	
	96	N/A	N/A	926.329	N/A	106	105	68	68	83	81	N/A	

Impinger Data (vol)		
#	Initial	Final
1	0	
2	100	
3	100	
4	0	
5	SiGel	
6		

Silica Gel Data (gm)		
#	Initial	Final
1		
2		

Moisture Gain

_____ ml.

_____ gm

_____ Total

Filter Data		
#	Number	Tare
1		
2		
3		

Molecular Weight Data (%		
#	O_2	CO_2
1		
2		
3		
Avg		

RAMBOLL

APPENDIX D
LABORATORY DATA

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

Laboratory Job ID: 140-19456-1
Client Project/Site: VES Carbon Bed Inlet - HFPO-DA

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

Attn: Michael Aucoin

Authorized for release by:
7/10/2020 11:45:43 AM

Courtney Adkins, Project Manager II
(865)291-3000
courtney.adkins@testamericainc.com

Table of Contents

Definitions/Glossary

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
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)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
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)
TNTC	Too Numerous To Count

Job ID: 140-19456-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Job Narrative
140-19456-1

Sample Receipt

The samples were received on June 24, 2020 at 1:35 PM in good condition and properly preserved. The temperature of the cooler at receipt was 0.7º C.

Quality Control and Data Interpretation

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

LCMS

Method 537 (modified): Results for samples Q-2912,2913 M0010 VES CB INLET R1 FH (140-19456-1), Q-2919,2920 M0010 VES CB INLET R2 FH (140-19456-5) and Q-2926,2927 M0010 VES CB INLET R3 FH (140-19456-9) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method 537 (modified): The method blank for preparation batch 140-40556 and 140-40588 contained HFPO-DA above the reporting limit (RL). The entire sample was consumed during analysis or extraction, therefore, the data have been reported.

Method 537 (modified): Results for samples Q-2921,2922,2924 M0010 VES CB INLET R2 BH (140-19456-6) and Q-2928,2929,2931 M0010 VES CB INLET R3 BH (140-19456-10) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method 537 (modified): Results for samples Q-2914,2915,2417 M0010 VES CB INLET R1 BH (140-19456-2) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

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

Organic Prep

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

Client Sample ID: Q-2912,2913 M0010 VES CB INLET R1 FH
Lab Sample ID: 140-19456-1

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.91	B	0.0496	0.0248	ug/Sample		06/25/20 07:00	07/01/20 15:23	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*78*		*25 - 150*	*06/25/20 07:00*	*07/01/20 15:23*	*50*

Client Sample ID: Q-2914,2915,2417 M0010 VES CB INLET R1 BH
Lab Sample ID: 140-19456-2

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.632		0.00800	0.00800	ug/Sample		06/25/20 09:12	07/06/20 14:44	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*82*		*25 - 150*	*06/25/20 09:12*	*07/06/20 14:44*	*5*

Client Sample ID: Q-2916 M0010 VES CB INLET R1 IMPINGERS 1,2&3 COND
Lab Sample ID: 140-19456-3

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0717	0.0717	ug/Sample		06/25/20 13:57	06/27/20 15:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*90*		*25 - 150*	*06/25/20 13:57*	*06/27/20 15:13*	*1*

Client Sample ID: Q-2918 M0010 VES CB INLET R1 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-19456-4

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.176		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/06/20 14:00	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*66*		*25 - 150*	*06/25/20 09:12*	*07/06/20 14:00*	*1*

Client Sample ID: Q-2919,2920 M0010 VES CB INLET R2 FH
Lab Sample ID: 140-19456-5

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.47	B	0.0495	0.0248	ug/Sample		06/25/20 07:00	07/01/20 15:40	50

Client Sample ID: Q-2919,2920 M0010 VES CB INLET R2 FH
Lab Sample ID: 140-19456-5

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	101		25 - 150	06/25/20 07:00	07/01/20 15:40	50

Client Sample ID: Q-2921,2922,2924 M0010 VES CB INLET R2 BH
Lab Sample ID: 140-19456-6

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	4.35		0.0800	0.0800	ug/Sample		06/25/20 09:12	07/05/20 15:14	50

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	102		25 - 150	06/25/20 09:12	07/05/20 15:14	50

Client Sample ID: Q-2923 M0010 VES CB INLET R2 IMPINGERS 1,2&3 COND
Lab Sample ID: 140-19456-7

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.396		0.0672	0.0672	ug/Sample		06/25/20 13:57	06/27/20 15:21	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	90		25 - 150	06/25/20 13:57	06/27/20 15:21	1

Client Sample ID: Q-2925 M0010 VES CB INLET R2 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-19456-8

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0664		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/06/20 14:09	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	64		25 - 150	06/25/20 09:12	07/06/20 14:09	1

Client Sample ID: Q-2926,2927 M0010 VES CB INLET R3 FH
Lab Sample ID: 140-19456-9

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	5.30	B	0.0496	0.0248	ug/Sample		06/25/20 07:00	07/01/20 15:58	50

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	108		25 - 150	06/25/20 07:00	07/01/20 15:58	50

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Client Sample ID: Q-2928,2929,2931 M0010 VES CB INLET R3 BH

Lab Sample ID: 140-19456-10

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.10		0.0800	0.0800	ug/Sample		06/25/20 09:12	07/05/20 15:31	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*84*		*25 - 150*	*06/25/20 09:12*	*07/05/20 15:31*	*50*

Client Sample ID: Q-2930 M0010 VES CB INLET R3 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19456-11

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0697	0.0697	ug/Sample		06/25/20 13:57	06/27/20 15:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*84*		*25 - 150*	*06/25/20 13:57*	*06/27/20 15:30*	*1*

Client Sample ID: Q-2932 M0010 VES CB INLET R3 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19456-12

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35
Sample Container: Air Train

Matrix: Air

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.00695		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/06/20 14:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*61*		*25 - 150*	*06/25/20 09:12*	*07/06/20 14:17*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Job ID: 140-19456-1
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.00100	0.000500	ug/Sample
HFPO-DA	0.00160	0.00160	ug/Sample
HFPO-DA	0.000700	0.000700	ug/Sample

Isotope Dilution Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Air

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**HFPODA (25-150)**
140-19456-1	Q-2912,2913 M0010 VES CB IN	78
140-19456-2	Q-2914,2915,2417 M0010 VES CB INLET R1 BH	82
140-19456-3	Q-2916 M0010 VES CB INLET R1 IMPINGERS 1,2&3 COND	90
140-19456-4	Q-2918 M0010 VES CB INLET R1 BREAKTHROUGH XAD-2 RESIN TUBE	66
140-19456-5	Q-2919,2920 M0010 VES CB INLET R2 FH	101
140-19456-6	Q-2921,2922,2924 M0010 VES CB INLET R2 BH	102
140-19456-7	Q-2923 M0010 VES CB INLET R2 IMPINGERS 1,2&3 COND	90
140-19456-8	Q-2925 M0010 VES CB INLET R2 BREAKTHROUGH XAD-2 RESIN TUBE	64
140-19456-9	Q-2926,2927 M0010 VES CB INLET R3 FH	108
140-19456-10	Q-2928,2929,2931 M0010 VES CB INLET R3 BH	84
140-19456-11	Q-2930 M0010 VES CB INLET R3 IMPINGERS 1,2&3 COND	84
140-19456-12	Q-2932 M0010 VES CB INLET R3 BREAKTHROUGH XAD-2 RESIN TUBE	61
LCS 140-40556/2-B	Lab Control Sample	75
LCS 140-40562/2-B	Lab Control Sample	71
LCS 140-40579/2-B	Lab Control Sample	89
LCSD 140-40556/3-B	Lab Control Sample Dup	80
LCSD 140-40562/3-B	Lab Control Sample Dup	61
LCSD 140-40579/3-B	Lab Control Sample Dup	91
MB 140-40556/1-B	Method Blank	77
MB 140-40562/1-B	Method Blank	70
MB 140-40579/1-B	Method Blank	88

Surrogate Legend

HFPODA = 13C3 HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 140-40556/1-B
Matrix: Air
Analysis Batch: 40723

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40556

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.001691		0.00100	0.000500	ug/Sample		06/25/20 07:00	07/01/20 13:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*77*		*25 - 150*	*06/25/20 07:00*	*07/01/20 13:46*	*1*

Lab Sample ID: LCS 140-40556/2-B
Matrix: Air
Analysis Batch: 40723

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40556

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HFPO-DA	0.0200	0.02120		ug/Sample		106	60 - 140

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*75*		*25 - 150*

Lab Sample ID: LCSD 140-40556/3-B
Matrix: Air
Analysis Batch: 40723

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 40556

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA	0.0200	0.02057		ug/Sample		103	60 - 140	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*80*		*25 - 150*

Lab Sample ID: MB 140-40562/1-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40562

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/05/20 13:19	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*70*		*25 - 150*	*06/25/20 09:12*	*07/05/20 13:19*	*1*

Lab Sample ID: LCS 140-40562/2-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40562

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HFPO-DA	0.0200	0.02122		ug/Sample		106	60 - 140

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*71*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 140-40562/3-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 40562

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA			0.0200	0.02155		ug/Sample		108	60 - 140	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*61*		*25 - 150*

Lab Sample ID: MB 140-40579/1-B
Matrix: Air
Analysis Batch: 40624

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40579

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.000700	0.000700	ug/Sample		06/25/20 13:57	06/27/20 14:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*88*		*25 - 150*	*06/25/20 13:57*	*06/27/20 14:46*	*1*

Lab Sample ID: LCS 140-40579/2-B
Matrix: Air
Analysis Batch: 40624

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40579

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HFPO-DA			0.0100	0.009373		ug/Sample		94	60 - 140

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*89*		*25 - 150*

Lab Sample ID: LCSD 140-40579/3-B
Matrix: Air
Analysis Batch: 40624

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 40579

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA			0.0100	0.009318		ug/Sample		93	60 - 140	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*91*		*25 - 150*

LCMS

Prep Batch: 40556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-1	Q-2912,2913 M0010 VES CB INLET R1 FH	Total/NA	Air	None	
140-19456-5	Q-2919,2920 M0010 VES CB INLET R2 FH	Total/NA	Air	None	
140-19456-9	Q-2926,2927 M0010 VES CB INLET R3 FH	Total/NA	Air	None	
MB 140-40556/1-B	Method Blank	Total/NA	Air	None	
LCS 140-40556/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-40556/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 40562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-2	Q-2914,2915,2417 M0010 VES CB INLET R1 BH	Total/NA	Air	None	
140-19456-4	Q-2918 M0010 VES CB INLET R1 BREAKTHRO	Total/NA	Air	None	
140-19456-6	Q-2921,2922,2924 M0010 VES CB INLET R2 BH	Total/NA	Air	None	
140-19456-8	Q-2925 M0010 VES CB INLET R2 BREAKTHRO	Total/NA	Air	None	
140-19456-10	Q-2928,2929,2931 M0010 VES CB INLET R3 BH	Total/NA	Air	None	
140-19456-12	Q-2932 M0010 VES CB INLET R3 BREAKTHRO	Total/NA	Air	None	
MB 140-40562/1-B	Method Blank	Total/NA	Air	None	
LCS 140-40562/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-40562/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 40579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-3	Q-2916 M0010 VES CB INLET R1 IMPINGERS 1	Total/NA	Air	None	
140-19456-7	Q-2923 M0010 VES CB INLET R2 IMPINGERS 1	Total/NA	Air	None	
140-19456-11	Q-2930 M0010 VES CB INLET R3 IMPINGERS 1	Total/NA	Air	None	
MB 140-40579/1-B	Method Blank	Total/NA	Air	None	
LCS 140-40579/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-40579/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 40581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-3	Q-2916 M0010 VES CB INLET R1 IMPINGERS 1	Total/NA	Air	Split	40579
140-19456-7	Q-2923 M0010 VES CB INLET R2 IMPINGERS 1	Total/NA	Air	Split	40579
140-19456-11	Q-2930 M0010 VES CB INLET R3 IMPINGERS 1	Total/NA	Air	Split	40579
MB 140-40579/1-B	Method Blank	Total/NA	Air	Split	40579
LCS 140-40579/2-B	Lab Control Sample	Total/NA	Air	Split	40579
LCSD 140-40579/3-B	Lab Control Sample Dup	Total/NA	Air	Split	40579

Cleanup Batch: 40588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-1	Q-2912,2913 M0010 VES CB INLET R1 FH	Total/NA	Air	Split	40556
140-19456-5	Q-2919,2920 M0010 VES CB INLET R2 FH	Total/NA	Air	Split	40556
140-19456-9	Q-2926,2927 M0010 VES CB INLET R3 FH	Total/NA	Air	Split	40556
MB 140-40556/1-B	Method Blank	Total/NA	Air	Split	40556
LCS 140-40556/2-B	Lab Control Sample	Total/NA	Air	Split	40556
LCSD 140-40556/3-B	Lab Control Sample Dup	Total/NA	Air	Split	40556

Analysis Batch: 40624

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-3	Q-2916 M0010 VES CB INLET R1 IMPINGERS 1	Total/NA	Air	537 (modified)	40581
140-19456-7	Q-2923 M0010 VES CB INLET R2 IMPINGERS 1	Total/NA	Air	537 (modified)	40581
140-19456-11	Q-2930 M0010 VES CB INLET R3 IMPINGERS 1	Total/NA	Air	537 (modified)	40581

LCMS (Continued)

Analysis Batch: 40624 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 140-40579/1-B	Method Blank	Total/NA	Air	537 (modified)	40581
LCS 140-40579/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	40581
LCSD 140-40579/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	40581

Cleanup Batch: 40640

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-2	Q-2914,2915,2417 M0010 VES CB INLET R1 BH	Total/NA	Air	Split	40562
140-19456-4	Q-2918 M0010 VES CB INLET R1 BREAKTHRO	Total/NA	Air	Split	40562
140-19456-6	Q-2921,2922,2924 M0010 VES CB INLET R2 BH	Total/NA	Air	Split	40562
140-19456-8	Q-2925 M0010 VES CB INLET R2 BREAKTHRO	Total/NA	Air	Split	40562
140-19456-10	Q-2928,2929,2931 M0010 VES CB INLET R3 BH	Total/NA	Air	Split	40562
140-19456-12	Q-2932 M0010 VES CB INLET R3 BREAKTHRO	Total/NA	Air	Split	40562
MB 140-40562/1-B	Method Blank	Total/NA	Air	Split	40562
LCS 140-40562/2-B	Lab Control Sample	Total/NA	Air	Split	40562
LCSD 140-40562/3-B	Lab Control Sample Dup	Total/NA	Air	Split	40562

Analysis Batch: 40723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-1	Q-2912,2913 M0010 VES CB INLET R1 FH	Total/NA	Air	537 (modified)	40588
140-19456-5	Q-2919,2920 M0010 VES CB INLET R2 FH	Total/NA	Air	537 (modified)	40588
140-19456-9	Q-2926,2927 M0010 VES CB INLET R3 FH	Total/NA	Air	537 (modified)	40588
MB 140-40556/1-B	Method Blank	Total/NA	Air	537 (modified)	40588
LCS 140-40556/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	40588
LCSD 140-40556/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	40588

Analysis Batch: 40787

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-6	Q-2921,2922,2924 M0010 VES CB INLET R2 BH	Total/NA	Air	537 (modified)	40640
140-19456-10	Q-2928,2929,2931 M0010 VES CB INLET R3 BH	Total/NA	Air	537 (modified)	40640
MB 140-40562/1-B	Method Blank	Total/NA	Air	537 (modified)	40640
LCS 140-40562/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	40640
LCSD 140-40562/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	40640

Analysis Batch: 40811

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19456-2	Q-2914,2915,2417 M0010 VES CB INLET R1 BH	Total/NA	Air	537 (modified)	40640
140-19456-4	Q-2918 M0010 VES CB INLET R1 BREAKTHRO	Total/NA	Air	537 (modified)	40640
140-19456-8	Q-2925 M0010 VES CB INLET R2 BREAKTHRO	Total/NA	Air	537 (modified)	40640
140-19456-12	Q-2932 M0010 VES CB INLET R3 BREAKTHRO	Total/NA	Air	537 (modified)	40640

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Client Sample ID: Q-2912,2913 M0010 VES CB INLET R1 FH

Lab Sample ID: 140-19456-1

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	115 mL	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			58 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40723	07/01/20 15:23	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2914,2915,2417 M0010 VES CB INLET R1 BH

Lab Sample ID: 140-19456-2

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		5			40811	07/06/20 14:44	CLJ	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2916 M0010 VES CB INLET R1 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19456-3

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.00976 Sample	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:13	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2918 M0010 VES CB INLET R1 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19456-4

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40811	07/06/20 14:00	CLJ	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Client Sample ID: Q-2919,2920 M0010 VES CB INLET R2 FH

Lab Sample ID: 140-19456-5

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	103 mL	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			52 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40723	07/01/20 15:40	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2921,2922,2924 M0010 VES CB INLET R2 BH

Lab Sample ID: 140-19456-6

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40787	07/05/20 15:14	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2923 M0010 VES CB INLET R2 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19456-7

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.01042 Sample	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:21	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2925 M0010 VES CB INLET R2 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19456-8

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40811	07/06/20 14:09	CLJ	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Client Sample ID: Q-2926,2927 M0010 VES CB INLET R3 FH

Lab Sample ID: 140-19456-9

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	113 mL	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			57 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40723	07/01/20 15:58	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2928,2929,2931 M0010 VES CB INLET R3 BH

Lab Sample ID: 140-19456-10

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40787	07/05/20 15:31	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2930 M0010 VES CB INLET R3 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19456-11

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.01005 Sample	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:30	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Q-2932 M0010 VES CB INLET R3 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19456-12

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40811	07/06/20 14:17	CLJ	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40556/1-B
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	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			25 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40723	07/01/20 13:46	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40562/1-B
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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:19	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40579/1-B
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	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 14:46	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-40556/2-B
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	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			25 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40723	07/01/20 13:55	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-40562/2-B
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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:37	JRC	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Client Sample ID: Lab Control Sample
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCS 140-40579/2-B
Matrix: Air

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	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 14:55	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample Dup
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCSD 140-40556/3-B
Matrix: Air

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	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			25 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40723	07/01/20 14:04	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample Dup
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCSD 140-40562/3-B
Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:46	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample Dup
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCSD 140-40579/3-B
Matrix: Air

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	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:04	JRC	TAL KNX
	Instrument ID: LCA									

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

Accreditation/Certification Summary

Client: The Chemours Company FC, LLC
Job ID: 140-19456-1
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-17-21
California	State	2423	06-30-21
Colorado	State	TN00009	02-28-21
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	07-01-21
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	01-01-21
Louisiana	NELAP	LA110001	12-31-12 *
Louisiana	NELAP	83979	06-30-21
Louisiana (DW)	State	LA019	12-31-20
Maryland	State	277	03-31-21
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-20
New Hampshire	NELAP	299919	01-17-21
New Jersey	NELAP	TN001	07-01-21
New York	NELAP	10781	03-31-21
North Carolina (DW)	State	21705	07-31-20
North Carolina (WW/SW)	State	64	12-31-20
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	09-01-20
Oregon	NELAP	TNI0189	01-02-21
Pennsylvania	NELAP	68-00576	12-31-20
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-20
Virginia	NELAP	460176	09-15-20
Washington	State	C593	01-19-21
West Virginia (DW)	State	9955C	01-01-21
West Virginia DEP	State	345	05-01-21
Wisconsin	State	998044300	08-31-20

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

Method Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Inlet - HFPO-DA

Job ID: 140-19456-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-19456-1	Q-2912,2913 M0010 VES CB INLET R1 FH	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-2	Q-2914,2915,2417 M0010 VES CB INLET R1 BH	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-3	Q-2916 M0010 VES CB INLET R1 IMPINGERS 1,2&3 COND	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-4	Q-2918 M0010 VES CB INLET R1 BREAKTHROUGH XAD-2 RESIN TUBE	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-5	Q-2919,2920 M0010 VES CB INLET R2 FH	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-6	Q-2921,2922,2924 M0010 VES CB INLET R2 BH	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-7	Q-2923 M0010 VES CB INLET R2 IMPINGERS 1,2&3 COND	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-8	Q-2925 M0010 VES CB INLET R2 BREAKTHROUGH XAD-2 RESIN TUBE	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-9	Q-2926,2927 M0010 VES CB INLET R3 FH	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-10	Q-2928,2929,2931 M0010 VES CB INLET R3 BH	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-11	Q-2930 M0010 VES CB INLET R3 IMPINGERS 1,2&3 COND	Air	06/23/20 00:00	06/24/20 13:35	
140-19456-12	Q-2932 M0010 VES CB INLET R3 BREAKTHROUGH XAD-2 RESIN TUBE	Air	06/23/20 00:00	06/24/20 13:35	

Request for Analysis/Chain-of-Custody – RFA/COC #001
The Chemours Company – Fayetteville NC Facility
HFPO-DA Testing on VES Carbon Bed Inlet

eurofins | Environment Testing TestAmerica

Project Identification:	Chemours Emissions Test
Client Name:	The Chemours Company FC, LLC
Client Contact:	Ms. Christel Compton Office: (910) 678-1213 Cell: (910) 975-3386
TestAmerica Contact:	Ms. Courtney Adkins Office: (865) 291-3019
TestAmerica Project Manager:	Mr. Billy Anderson Office: (865) 291-3080 Cell: (865) 206-9004

Laboratory Deliverable Turnaround Requirements:	
Analytical Due Date: (Review-Released Data)	21 Days from Lab Receipt
Data Package Due Date:	28 Days from Lab Receipt

Analytical Testing QC Requirements:
The Legend for Project-Specific Quality Control Testing is designated in the "QC" column as follows: "BT" = Blank Train, "RB" = Reagent Blank, "MS" = Matrix Spike, "MSD" = Matrix Spike Duplicate, "DUP" = Duplicate, "PB" = Proof Blank, "TB" = Trip Blank

Laboratory Destination:	Eurofins TestAmerica 5815 Middlebrook Pike Knoxville, TN 37921
Lab Phone Number:	865-291-3000
Courier:	Hand Deliver

Project Deliverables:
Report analytical results on TALS Reports and in data packages. Include "Field Sample Number", "Sample Type", and "Run Number" on all TALS Reports.

Analytical Parameter:	Holding Time Requirements:
HFPO-DA (CAS No. 13252-13-6)	14 Days to Extraction; 40 Days to Analysis

140-19456 Chain of Custody

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Q-2912 VES CB Inlet R1 M0010 Filter (Combine with *Q-2913*)	1	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Particulate Filter (90 mm Whatman Glass Microfiber)** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Front-Half Probe Rinse to assist the solvent extraction of the Particulate Filter sample. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2913 VES CB Inlet R1 M0010 FH of Filter Holder & Probe Methanol Rinse (Combine with *Q-2912*)	1	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Front Half of Filter Holder & Probe Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the Particulate Filter extraction.
Q-2914 VES CB Inlet R1 M0010 XAD-2 Resin Tube	1	6/23/20		XAD-2 Resin Tube	**XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Back-Half Glassware Rinse and the Impinger Glassware Methanol Rinse to assist the solvent extraction of the XAD-2 resin sample. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require -ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Q-2915 VES CB Inlet R1 M0010 BH of Filter Holder & Coil Condenser Methanol Rinse (Combine with *Q-2914*)	1	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Back Half of Filter Holder & Coil Condenser Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample and the Impinger Glassware Methanol Rinse in the XAD-2 Resin extraction. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2916 VES CB Inlet R1 M0010 Impingers 1,2 & 3 Condensate	1	6/23/20		500 mL HDPE Wide-Mouth Bottle	**Impinger #1, #2 & #3 Condensate** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Measure the volume of the Impinger Composite and forward a 250 mL portion to Denver for analysis. **Denver**: Analyze a 250 mL portion of the sample for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2917 VES CB Inlet R1 M0010 Impinger Glassware MeOH Rinse (Combine with *Q-2914*)	1	6/23/20		250 mL HDPE Wide-Mouth Bottle	**Impinger Glassware Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the XAD-2 Resin Extraction.
Q-2918 VES CB Inlet R1 M0010 Breakthrough XAD-2 Resin Tube	1	6/23/20		XAD-2 Resin Tube	**Breakthrough XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level and perform the regular XAD-2 Resin Extraction. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2919 VES CB Inlet R2 M0010 Filter (Combine with *Q-2920*)	2	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Particulate Filter (90 mm Whatman Glass Microfiber)** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Front-Half Probe Rinse to assist the solvent extraction of the Particulate Filter sample. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2920 VES CB Inlet R2 M0010 Front Half of Filter Holder & Probe Methanol Rinse (Combine with *Q-2919*)	2	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Front Half of Filter Holder & Probe Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the Particulate Filter extraction.

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require -ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Q-2921 VES CB Inlet R2 M0010 XAD-2 Resin Tube	2	6/23/20		XAD-2 Resin Tube	**XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Back-Half Glassware Rinse and the Impinger Glassware Methanol Rinse to assist the solvent extraction of the XAD-2 resin sample. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2922 VES CB Inlet R2 M0010 BH of Filter Holder & Coil Condenser Methanol Rinse (Combine with *Q-2921*)	2	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Back Half of Filter Holder & Coil Condenser Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample and the Impinger Glassware Methanol Rinse in the XAD-2 Resin extraction. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2923 VES CB Inlet R2 M0010 Impingers 1,2 & 3 Condensate	2	6/23/20		500 mL HDPE Wide-Mouth Bottle	**Impinger #1, #2 & #3 Condensate** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Measure the volume of the Impinger Composite and forward a 250 mL portion to Denver for analysis. **Denver**: Analyze a 250 mL portion of the sample for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2924 VES CB Inlet R2 M0010 Impinger Glassware MeOH Rinse (Combine with *Q-2921*)	2	6/23/20		250 mL HDPE Wide-Mouth Bottle	**Impinger Glassware Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the XAD-2 Resin Extraction.
Q-2925 VES CB Inlet R2 M0010 Breakthrough XAD-2 Resin Tube	2	6/23/20		XAD-2 Resin Tube	**Breakthrough XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level and perform the regular XAD-2 Resin Extraction. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Q-2926 VES CB Inlet R3 M0010 Filter (Combine with *Q-2927*)	3	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Particulate Filter (90 mm Whatman Glass Microfiber)** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Front-Half Probe Rinse to assist the solvent extraction of the Particulate Filter sample. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2927 VES CB Inlet R3 M0010 Front Half of Filter Holder & Probe Methanol Rinse (Combine with *Q-2926*)	3	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Front Half of Filter Holder & Probe Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the Particulate Filter extraction.
Q-2928 VES CB Inlet R3 M0010 XAD-2 Resin Tube	3	6/23/20		XAD-2 Resin Tube	**XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Back-Half Glassware Rinse and the Impinger Glassware Methanol Rinse to assist the solvent extraction of the XAD-2 resin sample. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2929 VES CB Inlet R3 M0010 BH of Filter Holder & Coil Condenser Methanol Rinse (Combine with *Q-2928*)	3	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Back Half of Filter Holder & Coil Condenser Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample and the Impinger Glassware Methanol Rinse in the XAD-2 Resin extraction. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).
Q-2930 VES CB Inlet R3 M0010 Impingers 1,2 & 3 Condensate	3	6/23/20		500 mL HDPE Wide-Mouth Bottle	**Impinger #1, #2 & #3 Condensate** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Measure the volume of the Impinger Composite and forward a 250 mL portion to Denver for analysis. **Denver**: Analyze a 250 mL portion of the sample for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Q-2931 VES CB Inlet R3 M0010 Impinger Glassware MeOH Rinse (Combine with *Q-2928*)	3	6/23/20		250 mL HDPE Wide-Mouth Bottle	**Impinger Glassware Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the XAD-2 Resin Extraction.
Q-2932 VES CB Inlet R3 M0010 Breakthrough XAD-2 Resin Tube	3	6/23/20		XAD-2 Resin Tube	**Breakthrough XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level and perform the regular XAD-2 Resin Extraction. **Denver**: Analyze for HFPO-DA using TestAmerica Denver's SOPs (Method 8321A-HFPO).

Sample Receipt Log and Condition of the Samples Upon Receipt:

Please fill in the following information:	Comments (Please write "NONE" if no comment applicable)
(1) Record the identities of any samples that were listed on the RFA but were not found in the sample shipment.	NONE
(2) Record the sample shipping cooler temperature of all coolers transporting samples listed on this RFA:	RT 0.7 / CT 0.7°C
(3) Record any apparent sample loss/breakage.	NONE
(4) Record any unidentified samples transported with this shipment of samples:	NONE
(5) Indicate if all samples were received according to the project's required specifications (i.e. no nonconformances):	HAND DELIVERED, NO CUSTODY SEALS

Custody Transfer:

	Name	Company	Date/Time
Relinquished By:	Patti Bales	Ramboll	6/23/20 19:15
Accepted By:	Wm. C. Anderson	Eurofins TA	6/23/20 19:15
Relinquished By:	Wm. C. Anderson	Eurofins TA	6/23/20 20:20
Accepted By:	Doug Child	ETA KNOX	6/23/20 20:20
Relinquished By:	Doug Child	ETA KNOX	6/24/20 1335
Accepted By:	[illegible]	ETA Ky	6/24/20 13:35
Relinquished By:			
Accepted By:			

Loc: 140
19456

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST **Log In Number:**

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	✓		✓	☐ **Containers, Broken**
2. Were ambient air containers received intact?			✓	☐ Checked in lab
3. The coolers/containers custody seal if present, is it intact?			✓	☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : S668 Correction factor: 0.0	✓			☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	✓			☐ **Containers, Broken**
6. Were samples received in appropriate containers?	✓			☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	✓			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	✓			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?			✓	☐ **Sampler Not Listed on COC**
11. Is the client and project name/# identified?	✓			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	✓			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	✓			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	✓			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			✓	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:			✓	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			✓	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			✓	☐ Project missing info

Comments/Actions Taken

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: _____ PM Instructions: _____

Sample Receiving Associate: _____ Date: 6.24.20

QA026R32.doc, 062719

7/10/2020

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ANALYTICAL REPORT

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Tel: (865)291-3000

Laboratory Job ID: 140-19457-1
Client Project/Site: VES Carbon Bed Outlet - HFPO-DA

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

Attn: Michael Aucoin

Authorized for release by:
7/10/2020 11:46:59 AM

Courtney Adkins, Project Manager II
(865)291-3000
courtney.adkins@testamericainc.com

Table of Contents

Definitions/Glossary

Client: The Chemours Company FC, LLC
Job ID: 140-19457-1
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
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)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
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)
TNTC	Too Numerous To Count

Job ID: 140-19457-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Job Narrative
140-19457-1

Sample Receipt

The samples were received on June 24, 2020 at 1:35 PM in good condition and properly preserved. The temperature of the cooler at receipt was 0.7º C.

Quality Control and Data Interpretation

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

LCMS

Method 537 (modified): Results for samples Z-2112,2113 M0010 VES CB OUTLET R1 FH (140-19457-1), Z-2119,2120 M0010 VES CB OUTLET R2 FH (140-19457-5) and Z-2126,2127 M0010 VES CB OUTLET R3 FH (140-19457-9) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method 537 (modified): The method blank for preparation batch 140-40556 and 140-40588 contained HFPO-DA above the reporting limit (RL). The entire sample was consumed during analysis or extraction, therefore, the data have been reported.

Method 537 (modified): Results for samples Z-2118 M0010 VES CB OUTLET R1 BREAKTHROUGH XAD-2 RESIN TUBE (140-19457-4) and Z-2121,2122,2124 M0010 VES CB OUTLET R2 BH (140-19457-6) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method 537 (modified): Results for samples Z-2114,2115,2117 M0010 VES CB OUTLET R1 BH (140-19457-2) and Z-2128,2129,2131 M0010 VES CB OUTLET R3 BH (140-19457-10) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

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

Organic Prep

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

Client Sample ID: Z-2112,2113 M0010 VES CB OUTLET R1 FH
Lab Sample ID: 140-19457-1

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	2.48	B	0.0500	0.0250	ug/Sample		06/25/20 07:00	07/01/20 14:30	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*96*		*25 - 150*	*06/25/20 07:00*	*07/01/20 14:30*	*50*

Client Sample ID: Z-2114,2115,2117 M0010 VES CB OUTLET R1 BH
Lab Sample ID: 140-19457-2

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.969		0.00800	0.00800	ug/Sample		06/25/20 09:12	07/06/20 14:53	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*83*		*25 - 150*	*06/25/20 09:12*	*07/06/20 14:53*	*5*

Client Sample ID: Z-2116 M0010 VES CB OUTLET R1 IMPINGERS 1,2&3 COND
Lab Sample ID: 140-19457-3

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.162		0.0784	0.0784	ug/Sample		06/25/20 13:57	06/27/20 15:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*86*		*25 - 150*	*06/25/20 13:57*	*06/27/20 15:39*	*1*

Client Sample ID: Z-2118 M0010 VES CB OUTLET R1 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-19457-4

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.27		0.0800	0.0800	ug/Sample		06/25/20 09:12	07/05/20 15:58	50

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*90*		*25 - 150*	*06/25/20 09:12*	*07/05/20 15:58*	*50*

Client Sample ID: Z-2119,2120 M0010 VES CB OUTLET R2 FH
Lab Sample ID: 140-19457-5

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	2.55	B	0.0496	0.0248	ug/Sample		06/25/20 07:00	07/01/20 14:39	50

Client Sample ID: Z-2119,2120 M0010 VES CB OUTLET R2 FH
Lab Sample ID: 140-19457-5

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	95		25 - 150	06/25/20 07:00	07/01/20 14:39	50

Client Sample ID: Z-2121,2122,2124 M0010 VES CB OUTLET R2 BH
Lab Sample ID: 140-19457-6

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	1.60		0.0800	0.0800	ug/Sample		06/25/20 09:12	07/05/20 16:07	50

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	100		25 - 150	06/25/20 09:12	07/05/20 16:07	50

Client Sample ID: Z-2123 M0010 VES CB OUTLET R2 IMPINGERS 1,2&3 COND
Lab Sample ID: 140-19457-7

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.112		0.0711	0.0711	ug/Sample		06/25/20 13:57	06/27/20 15:48	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	89		25 - 150	06/25/20 13:57	06/27/20 15:48	1

Client Sample ID: Z-2125 M0010 VES CB OUTLET R2 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-19457-8

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.0173		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/06/20 14:26	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	65		25 - 150	06/25/20 09:12	07/06/20 14:26	1

Client Sample ID: Z-2126,2127 M0010 VES CB OUTLET R3 FH
Lab Sample ID: 140-19457-9

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	3.14	B	0.0500	0.0250	ug/Sample		06/25/20 07:00	07/01/20 14:48	50

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 HFPO-DA	88		25 - 150	06/25/20 07:00	07/01/20 14:48	50

Client Sample ID: Z-2128,2129,2131 M0010 VES CB OUTLET R3 BH

Lab Sample ID: 140-19457-10

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.333		0.00800	0.00800	ug/Sample		06/25/20 09:12	07/06/20 15:01	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*92*		*25 - 150*	*06/25/20 09:12*	*07/06/20 15:01*	*5*

Client Sample ID: Z-2130 M0010 VES CB OUTLET R3 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19457-11

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.0767	0.0767	ug/Sample		06/25/20 13:57	06/27/20 15:57	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*93*		*25 - 150*	*06/25/20 13:57*	*06/27/20 15:57*	*1*

Client Sample ID: Z-2132 M0010 VES CB OUTLET R3 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19457-12

Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35
Sample Container: Air Train

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.00703		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/06/20 14:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*68*		*25 - 150*	*06/25/20 09:12*	*07/06/20 14:35*	*1*

Default Detection Limits

Client: The Chemours Company FC, LLC
Job ID: 140-19457-1
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units
HFPO-DA	0.00100	0.000500	ug/Sample
HFPO-DA	0.00160	0.00160	ug/Sample
HFPO-DA	0.000700	0.000700	ug/Sample

Isotope Dilution Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Job ID: 140-19457-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Air

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	HFPODA (25-150)
140-19457-1	Z-2112,2113 M0010 VES CB OU	96
140-19457-2	Z-2114,2115,2117 M0010 VES CB OUTLET R1 BH	83
140-19457-3	Z-2116 M0010 VES CB OUTLET R1 IMPINGERS 1,2&3 COND	86
140-19457-4	Z-2118 M0010 VES CB OUTLET R1 BREAKTHROUGH XAD-2 RESIN TUBE	90
140-19457-5	Z-2119,2120 M0010 VES CB OUTLET R2 FH	95
140-19457-6	Z-2121,2122,2124 M0010 VES CB OUTLET R2 BH	100
140-19457-7	Z-2123 M0010 VES CB OUTLET R2 IMPINGERS 1,2&3 COND	89
140-19457-8	Z-2125 M0010 VES CB OUTLET R2 BREAKTHROUGH XAD-2 RESIN TUBE	65
140-19457-9	Z-2126,2127 M0010 VES CB OUTLET R3 FH	88
140-19457-10	Z-2128,2129,2131 M0010 VES CB OUTLET R3 BH	92
140-19457-11	Z-2130 M0010 VES CB OUTLET R3 IMPINGERS 1,2&3 COND	93
140-19457-12	Z-2132 M0010 VES CB OUTLET R3 BREAKTHROUGH XAD-2 RESIN TUBE	68
LCS 140-40556/2-B	Lab Control Sample	75
LCS 140-40562/2-B	Lab Control Sample	71
LCS 140-40579/2-B	Lab Control Sample	89
LCSD 140-40556/3-B	Lab Control Sample Dup	80
LCSD 140-40562/3-B	Lab Control Sample Dup	61
LCSD 140-40579/3-B	Lab Control Sample Dup	91
MB 140-40556/1-B	Method Blank	77
MB 140-40562/14-B	Method Blank	74
MB 140-40562/1-B	Method Blank	70
MB 140-40579/1-B	Method Blank	88

Surrogate Legend

HFPODA = 13C3 HFPO-DA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 140-40556/1-B
Matrix: Air
Analysis Batch: 40723

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40556

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	0.001691		0.00100	0.000500	ug/Sample		06/25/20 07:00	07/01/20 13:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*77*		*25 - 150*	*06/25/20 07:00*	*07/01/20 13:46*	*1*

Lab Sample ID: LCS 140-40556/2-B
Matrix: Air
Analysis Batch: 40723

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40556

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
HFPO-DA			0.0200	0.02120		ug/Sample		106	60 - 140		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*75*		*25 - 150*

Lab Sample ID: LCSD 140-40556/3-B
Matrix: Air
Analysis Batch: 40723

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 40556

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA			0.0200	0.02057		ug/Sample		103	60 - 140	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*80*		*25 - 150*

Lab Sample ID: MB 140-40562/14-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40562

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/05/20 13:28	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*74*		*25 - 150*	*06/25/20 09:12*	*07/05/20 13:28*	*1*

Lab Sample ID: MB 140-40562/1-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40562

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.00160	0.00160	ug/Sample		06/25/20 09:12	07/05/20 13:19	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*70*		*25 - 150*	*06/25/20 09:12*	*07/05/20 13:19*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 140-40562/2-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40562

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
HFPO-DA			0.0200	0.02122		ug/Sample		106	60 - 140		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*71*		*25 - 150*

Lab Sample ID: LCSD 140-40562/3-B
Matrix: Air
Analysis Batch: 40787

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 40562

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA			0.0200	0.02155		ug/Sample		108	60 - 140	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*61*		*25 - 150*

Lab Sample ID: MB 140-40579/1-B
Matrix: Air
Analysis Batch: 40624

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40579

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HFPO-DA	ND		0.000700	0.000700	ug/Sample		06/25/20 13:57	06/27/20 14:46	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*88*		*25 - 150*	*06/25/20 13:57*	*06/27/20 14:46*	*1*

Lab Sample ID: LCS 140-40579/2-B
Matrix: Air
Analysis Batch: 40624

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40579

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
HFPO-DA			0.0100	0.009373		ug/Sample		94	60 - 140		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*89*		*25 - 150*

Lab Sample ID: LCSD 140-40579/3-B
Matrix: Air
Analysis Batch: 40624

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 40579

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HFPO-DA			0.0100	0.009318		ug/Sample		93	60 - 140	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*91*		*25 - 150*

LCMS

Prep Batch: 40556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-1	Z-2112,2113 M0010 VES CB OUTLET R1 FH	Total/NA	Air	None	
140-19457-5	Z-2119,2120 M0010 VES CB OUTLET R2 FH	Total/NA	Air	None	
140-19457-9	Z-2126,2127 M0010 VES CB OUTLET R3 FH	Total/NA	Air	None	
MB 140-40556/1-B	Method Blank	Total/NA	Air	None	
LCS 140-40556/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-40556/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 40562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-2	Z-2114,2115,2117 M0010 VES CB OUTLET R1 E	Total/NA	Air	None	
140-19457-4	Z-2118 M0010 VES CB OUTLET R1 BREAKTHR	Total/NA	Air	None	
140-19457-6	Z-2121,2122,2124 M0010 VES CB OUTLET R2 E	Total/NA	Air	None	
140-19457-8	Z-2125 M0010 VES CB OUTLET R2 BREAKTHR	Total/NA	Air	None	
140-19457-10	Z-2128,2129,2131 M0010 VES CB OUTLET R3 E	Total/NA	Air	None	
140-19457-12	Z-2132 M0010 VES CB OUTLET R3 BREAKTHR	Total/NA	Air	None	
MB 140-40562/14-B	Method Blank	Total/NA	Air	None	
MB 140-40562/1-B	Method Blank	Total/NA	Air	None	
LCS 140-40562/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-40562/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Prep Batch: 40579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-3	Z-2116 M0010 VES CB OUTLET R1 IMPINGERS	Total/NA	Air	None	
140-19457-7	Z-2123 M0010 VES CB OUTLET R2 IMPINGERS	Total/NA	Air	None	
140-19457-11	Z-2130 M0010 VES CB OUTLET R3 IMPINGERS	Total/NA	Air	None	
MB 140-40579/1-B	Method Blank	Total/NA	Air	None	
LCS 140-40579/2-B	Lab Control Sample	Total/NA	Air	None	
LCSD 140-40579/3-B	Lab Control Sample Dup	Total/NA	Air	None	

Cleanup Batch: 40581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-3	Z-2116 M0010 VES CB OUTLET R1 IMPINGERS	Total/NA	Air	Split	40579
140-19457-7	Z-2123 M0010 VES CB OUTLET R2 IMPINGERS	Total/NA	Air	Split	40579
140-19457-11	Z-2130 M0010 VES CB OUTLET R3 IMPINGERS	Total/NA	Air	Split	40579
MB 140-40579/1-B	Method Blank	Total/NA	Air	Split	40579
LCS 140-40579/2-B	Lab Control Sample	Total/NA	Air	Split	40579
LCSD 140-40579/3-B	Lab Control Sample Dup	Total/NA	Air	Split	40579

Cleanup Batch: 40588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-1	Z-2112,2113 M0010 VES CB OUTLET R1 FH	Total/NA	Air	Split	40556
140-19457-5	Z-2119,2120 M0010 VES CB OUTLET R2 FH	Total/NA	Air	Split	40556
140-19457-9	Z-2126,2127 M0010 VES CB OUTLET R3 FH	Total/NA	Air	Split	40556
MB 140-40556/1-B	Method Blank	Total/NA	Air	Split	40556
LCS 140-40556/2-B	Lab Control Sample	Total/NA	Air	Split	40556
LCSD 140-40556/3-B	Lab Control Sample Dup	Total/NA	Air	Split	40556

Analysis Batch: 40624

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-3	Z-2116 M0010 VES CB OUTLET R1 IMPINGERS	Total/NA	Air	537 (modified)	40581
140-19457-7	Z-2123 M0010 VES CB OUTLET R2 IMPINGERS	Total/NA	Air	537 (modified)	40581

LCMS (Continued)

Analysis Batch: 40624 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-11	Z-2130 M0010 VES CB OUTLET R3 IMPINGERS	Total/NA	Air	537 (modified)	40581
MB 140-40579/1-B	Method Blank	Total/NA	Air	537 (modified)	40581
LCS 140-40579/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	40581
LCSD 140-40579/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	40581

Cleanup Batch: 40640

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-2	Z-2114,2115,2117 M0010 VES CB OUTLET R1 E	Total/NA	Air	Split	40562
140-19457-4	Z-2118 M0010 VES CB OUTLET R1 BREAKTHR	Total/NA	Air	Split	40562
140-19457-6	Z-2121,2122,2124 M0010 VES CB OUTLET R2 E	Total/NA	Air	Split	40562
140-19457-8	Z-2125 M0010 VES CB OUTLET R2 BREAKTHR	Total/NA	Air	Split	40562
140-19457-10	Z-2128,2129,2131 M0010 VES CB OUTLET R3 E	Total/NA	Air	Split	40562
140-19457-12	Z-2132 M0010 VES CB OUTLET R3 BREAKTHR	Total/NA	Air	Split	40562
MB 140-40562/14-B	Method Blank	Total/NA	Air	Split	40562
MB 140-40562/1-B	Method Blank	Total/NA	Air	Split	40562
LCS 140-40562/2-B	Lab Control Sample	Total/NA	Air	Split	40562
LCSD 140-40562/3-B	Lab Control Sample Dup	Total/NA	Air	Split	40562

Analysis Batch: 40723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-1	Z-2112,2113 M0010 VES CB OUTLET R1 FH	Total/NA	Air	537 (modified)	40588
140-19457-5	Z-2119,2120 M0010 VES CB OUTLET R2 FH	Total/NA	Air	537 (modified)	40588
140-19457-9	Z-2126,2127 M0010 VES CB OUTLET R3 FH	Total/NA	Air	537 (modified)	40588
MB 140-40556/1-B	Method Blank	Total/NA	Air	537 (modified)	40588
LCS 140-40556/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	40588
LCSD 140-40556/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	40588

Analysis Batch: 40787

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-4	Z-2118 M0010 VES CB OUTLET R1 BREAKTHR	Total/NA	Air	537 (modified)	40640
140-19457-6	Z-2121,2122,2124 M0010 VES CB OUTLET R2 E	Total/NA	Air	537 (modified)	40640
MB 140-40562/14-B	Method Blank	Total/NA	Air	537 (modified)	40640
MB 140-40562/1-B	Method Blank	Total/NA	Air	537 (modified)	40640
LCS 140-40562/2-B	Lab Control Sample	Total/NA	Air	537 (modified)	40640
LCSD 140-40562/3-B	Lab Control Sample Dup	Total/NA	Air	537 (modified)	40640

Analysis Batch: 40811

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19457-2	Z-2114,2115,2117 M0010 VES CB OUTLET R1 E	Total/NA	Air	537 (modified)	40640
140-19457-8	Z-2125 M0010 VES CB OUTLET R2 BREAKTHR	Total/NA	Air	537 (modified)	40640
140-19457-10	Z-2128,2129,2131 M0010 VES CB OUTLET R3 E	Total/NA	Air	537 (modified)	40640
140-19457-12	Z-2132 M0010 VES CB OUTLET R3 BREAKTHR	Total/NA	Air	537 (modified)	40640

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Job ID: 140-19457-1

Client Sample ID: Z-2112,2113 M0010 VES CB OUTLET R1 FH

Lab Sample ID: 140-19457-1

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	142 mL	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			71 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40723	07/01/20 14:30	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2114,2115,2117 M0010 VES CB OUTLET R1 BH

Lab Sample ID: 140-19457-2

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		5			40811	07/06/20 14:53	CLJ	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2116 M0010 VES CB OUTLET R1 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19457-3

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.00893 Sample	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:39	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2118 M0010 VES CB OUTLET R1 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19457-4

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40787	07/05/20 15:58	JRC	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Job ID: 140-19457-1
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Client Sample ID: Z-2119,2120 M0010 VES CB OUTLET R2 FH
Lab Sample ID: 140-19457-5
Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35

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	131 mL	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			66 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40723	07/01/20 14:39	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2121,2122,2124 M0010 VES CB OUTLET R2 BH
Lab Sample ID: 140-19457-6
Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40787	07/05/20 16:07	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2123 M0010 VES CB OUTLET R2 IMPINGERS 1,2&3 COND
Lab Sample ID: 140-19457-7
Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.00985 Sample	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:48	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2125 M0010 VES CB OUTLET R2 BREAKTHROUGH XAD-2 RESIN TUBE
Lab Sample ID: 140-19457-8
Date Collected: 06/23/20 00:00
Matrix: Air
Date Received: 06/24/20 13:35

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40811	07/06/20 14:26	CLJ	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Job ID: 140-19457-1

Client Sample ID: Z-2126,2127 M0010 VES CB OUTLET R3 FH

Lab Sample ID: 140-19457-9

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	136 mL	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			68 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		50			40723	07/01/20 14:48	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2128,2129,2131 M0010 VES CB OUTLET R3 BH

Lab Sample ID: 140-19457-10

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		5			40811	07/06/20 15:01	CLJ	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2130 M0010 VES CB OUTLET R3 IMPINGERS 1,2&3 COND

Lab Sample ID: 140-19457-11

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			0.00913 Sample	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:57	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Z-2132 M0010 VES CB OUTLET R3 BREAKTHROUGH XAD-2 RESIN TUBE

Lab Sample ID: 140-19457-12

Date Collected: 06/23/20 00:00
Date Received: 06/24/20 13:35

Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40811	07/06/20 14:35	CLJ	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Job ID: 140-19457-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40556/1-B
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	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			25 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40723	07/01/20 13:46	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40562/14-B
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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:28	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40562/1-B
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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:19	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-40579/1-B
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	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 14:46	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-40556/2-B
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	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			25 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40723	07/01/20 13:55	JRC	TAL KNX
	Instrument ID: LCA									

Lab Chronicle

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Job ID: 140-19457-1

Client Sample ID: Lab Control Sample
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCS 140-40562/2-B
Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:37	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCS 140-40579/2-B
Matrix: Air

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	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 14:55	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample Dup
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCSD 140-40556/3-B
Matrix: Air

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	40556	06/25/20 07:00	DWS	TAL KNX
Total/NA	Cleanup	Split			25 mL	10 mL	40588	06/26/20 08:05	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40723	07/01/20 14:04	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample Dup
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCSD 140-40562/3-B
Matrix: Air

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	360 mL	40562	06/25/20 09:12	DWS	TAL KNX
Total/NA	Cleanup	Split			180 mL	10 mL	40640	06/29/20 10:35	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40787	07/05/20 13:46	JRC	TAL KNX
	Instrument ID: LCA									

Client Sample ID: Lab Control Sample Dup
Date Collected: N/A
Date Received: N/A

Lab Sample ID: LCSD 140-40579/3-B
Matrix: Air

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	10 mL	40579	06/25/20 13:57	DWS	TAL KNX
Total/NA	Cleanup	Split			10 mL	10 mL	40581	06/25/20 16:25	DWS	TAL KNX
Total/NA	Analysis	537 (modified)		1			40624	06/27/20 15:04	JRC	TAL KNX
	Instrument ID: LCA									

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

Accreditation/Certification Summary

Client: The Chemours Company FC, LLC
Job ID: 140-19457-1
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-17-21
California	State	2423	06-30-21
Colorado	State	TN00009	02-28-21
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	07-01-21
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	01-01-21
Louisiana	NELAP	LA110001	12-31-12 *
Louisiana	NELAP	83979	06-30-21
Louisiana (DW)	State	LA019	12-31-20
Maryland	State	277	03-31-21
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-20
New Hampshire	NELAP	299919	01-17-21
New Jersey	NELAP	TN001	07-01-21
New York	NELAP	10781	03-31-21
North Carolina (DW)	State	21705	07-31-20
North Carolina (WW/SW)	State	64	12-31-20
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	09-01-20
Oregon	NELAP	TNI0189	01-02-21
Pennsylvania	NELAP	68-00576	12-31-20
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-20
Virginia	NELAP	460176	09-15-20
Washington	State	C593	01-19-21
West Virginia (DW)	State	9955C	01-01-21
West Virginia DEP	State	345	05-01-21
Wisconsin	State	998044300	08-31-20

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

Method Summary

Client: The Chemours Company FC, LLC
Job ID: 140-19457-1
Project/Site: VES Carbon Bed Outlet - HFPO-DA

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

Sample Summary

Client: The Chemours Company FC, LLC
Project/Site: VES Carbon Bed Outlet - HFPO-DA

Job ID: 140-19457-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-19457-1	Z-2112,2113 M0010 VES CB OUTLET R1 FH	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-2	Z-2114,2115,2117 M0010 VES CB OUTLET R1 BH	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-3	Z-2116 M0010 VES CB OUTLET R1 IMPINGERS 1,2&3 COND	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-4	Z-2118 M0010 VES CB OUTLET R1 BREAKTHROUGH XAD-2 RESIN TUBE	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-5	Z-2119,2120 M0010 VES CB OUTLET R2 FH	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-6	Z-2121,2122,2124 M0010 VES CB OUTLET R2 BH	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-7	Z-2123 M0010 VES CB OUTLET R2 IMPINGERS 1,2&3 COND	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-8	Z-2125 M0010 VES CB OUTLET R2 BREAKTHROUGH XAD-2 RESIN TUBE	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-9	Z-2126,2127 M0010 VES CB OUTLET R3 FH	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-10	Z-2128,2129,2131 M0010 VES CB OUTLET R3 BH	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-11	Z-2130 M0010 VES CB OUTLET R3 IMPINGERS 1,2&3 COND	Air	06/23/20 00:00	06/24/20 13:35	
140-19457-12	Z-2132 M0010 VES CB OUTLET R3 BREAKTHROUGH XAD-2 RESIN TUBE	Air	06/23/20 00:00	06/24/20 13:35	

Request for Analysis/Chain-of-Custody – RFA/COC #002
The Chemours Company – Fayetteville NC Facility
HFPO-DA Testing on VES Carbon Bed Outlet

Project Identification:	Chemours Emissions Test
Client Name:	The Chemours Company FC, LLC
Client Contact:	Ms. Christel Compton Office: (910) 678-1213 Cell: (910) 975-3386
TestAmerica Contact:	Ms. Courtney Adkins Office: (865) 291-3019
TestAmerica Project Manager:	Mr. Billy Anderson Office: (865) 291-3080 Cell: (865) 206-9004

Laboratory Deliverable Turnaround Requirements:	
Analytical Due Date: (Review-Released Data)	21 Days from Lab Receipt
Data Package Due Date:	28 Days from Lab Receipt

Analytical Testing QC Requirements:
The Legend for Project-Specific Quality Control Testing is designated in the "QC" column as follows: "BT" = Blank Train, "RB" = Reagent Blank, "MS" = Matrix Spike, "MSD" = Matrix Spike Duplicate, "DUP" = Duplicate, "PB" = Proof Blank, "TB" = Trip Blank

Laboratory Destination:	Eurofins TestAmerica 5815 Middlebrook Pike Knoxville, TN 37921
Lab Phone Number:	865-291-3000
Courier:	Hand Deliver

Project Deliverables:
Report analytical results on TALS Reports and in data packages. Include "Field Sample Number", "Sample Type", and "Run Number" on all TALS Reports.

Analytical Parameter:	Holding Time Requirements:	Preservation Requirements:
HFPO-DA (CAS No. 13252-13-6)	14 Days to Extraction; 40 Days to Analysis	Cool, 4°C

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require -ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Z-2112 VES CB Outlet R1 M0010 Filter (Combine with *Z-2113*)	1	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Particulate Filter (90 mm Whatman Glass Microfiber)** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Front-Half Probe Rinse to assist the solvent extraction of the Particulate Filter sample. **Knoxville**: Analyze for HFPO-DA.
Z-2113 VES CB Outlet R1 M0010 FH of Filter Holder & Probe Methanol Rinse (Combine with *Z-2112*)	1	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Front Half of Filter Holder & Probe Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the Particulate Filter extraction. 140-19457 Chain of Custody
Z-2114 VES CB Outlet R1 M0010 XAD-2 Resin Tube	1	6/23/20		XAD-2 Resin Tube	**XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Back-Half Glassware Rinse and the Impinger Glassware Methanol Rinse to assist the solvent extraction of the XAD-2 resin sample. **Knoxville**: Analyze for HFPO-DA.

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Z-2115 VES CB Outlet R1 M0010 BH of Filter Holder & Coil Condenser Methanol Rinse (Combine with *Z-2114*)	1	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Back Half of Filter Holder & Coil Condenser Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample and the Impinger Glassware Methanol Rinse in the XAD-2 Resin extraction. **Knoxville**: Analyze for HFPO-DA.
Z-2116 VES CB Outlet R1 M0010 Impingers 1,2 & 3 Condensate	1	6/23/20		500 mL HDPE Wide-Mouth Bottle	**Impinger #1, #2 & #3 Condensate** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Measure the volume of the Impinger Composite and forward a 250 mL portion to Knoxville for analysis. **Knoxville**: Analyze for HFPO-DA.
Z-2117 VES CB Outlet R1 M0010 Impinger Glassware MeOH Rinse (Combine with *Z-2114*)	1	6/23/20		250 mL HDPE Wide-Mouth Bottle	**Impinger Glassware Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the XAD-2 Resin Extraction.
Z-2118 VES CB Outlet R1 M0010 Breakthrough XAD-2 Resin Tube	1	6/23/20		XAD-2 Resin Tube	**Breakthrough XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level and perform the regular XAD-2 Resin Extraction. **Knoxville**: Analyze for HFPO-DA.
Z-2119 VES CB Outlet R2 M0010 Filter (Combine with *Z-2120*)	2	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Particulate Filter (90 mm Whatman Glass Microfiber)** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Front-Half Probe Rinse to assist the solvent extraction of the Particulate Filter sample. **Knoxville**: Analyze for HFPO-DA.
Z-2120 VES CB Outlet R2 M0010 Front Half of Filter Holder & Probe Methanol Rinse (Combine with *Z-2119*)	2	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Front Half of Filter Holder & Probe Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the Particulate Filter extraction.

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require -ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Z-2121 VES CB Outlet R2 M0010 XAD-2 Resin Tube	2	6/23/20		XAD-2 Resin Tube	**XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Back-Half Glassware Rinse and the Impinger Glassware Methanol Rinse to assist the solvent extraction of the XAD-2 resin sample. **Knoxville**: Analyze for HFPO-DA.
Z-2122 VES CB Outlet R2 M0010 BH of Filter Holder & Coil Condenser Methanol Rinse (Combine with *Z-2121*)	2	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Back Half of Filter Holder & Coil Condenser Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample and the Impinger Glassware Methanol Rinse in the XAD-2 Resin extraction. **Knoxville**: Analyze for HFPO-DA.
Z-2123 VES CB Outlet R2 M0010 Impingers 1,2 & 3 Condensate	2	6/23/20		500 mL HDPE Wide-Mouth Bottle	**Impinger #1, #2 & #3 Condensate** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Measure the volume of the Impinger Composite and forward a 250 mL portion to Knoxville for analysis. **Knoxville**: Analyze for HFPO-DA.
Z-2124 VES CB Outlet R2 M0010 Impinger Glassware MeOH Rinse (Combine with *Z-2121*)	2	6/23/20		250 mL HDPE Wide-Mouth Bottle	**Impinger Glassware Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the XAD-2 Resin Extraction.
Z-2125 VES CB Outlet R2 M0010 Breakthrough XAD-2 Resin Tube	2	6/23/20		XAD-2 Resin Tube	**Breakthrough XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level and perform the regular XAD-2 Resin Extraction. **Knoxville**: Analyze for HFPO-DA.
Z-2126 VES CB Outlet R3 M0010 Filter (Combine with *Z-2127*)	3	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Particulate Filter (90 mm Whatman Glass Microfiber)** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Front-Half Probe Rinse to assist the solvent extraction of the Particulate Filter sample. **Knoxville**: Analyze for HFPO-DA.

Field Sample No./Sample Coding ID	Run No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
Z-2127 VES CB Outlet R3 M0010 Front Half of Filter Holder & Probe Methanol Rinse (Combine with *Z-2126*)	3	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Front Half of Filter Holder & Probe Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the Particulate Filter extraction.
Z-2128 VES CB Outlet R3 M0010 XAD-2 Resin Tube	3	6/23/20		XAD-2 Resin Tube	**XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level. Use the Back-Half Glassware Rinse and the Impinger Glassware Methanol Rinse to assist the solvent extraction of the XAD-2 resin sample. **Knoxville**: Analyze for HFPO-DA.
Z-2129 VES CB Outlet R3 M0010 BH of Filter Holder & Coil Condenser Methanol Rinse (Combine with *Z-2128*)	3	6/23/20		125 mL HDPE Wide-Mouth Bottle	**Back Half of Filter Holder & Coil Condenser Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample and the Impinger Glassware Methanol Rinse in the XAD-2 Resin extraction. **Knoxville**: Analyze for HFPO-DA.
Z-2130 VES CB Outlet R3 M0010 Impingers 1,2 & 3 Condensate	3	6/23/20		500 mL HDPE Wide-Mouth Bottle	**Impinger #1, #2 & #3 Condensate** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Measure the volume of the Impinger Composite and forward a 250 mL portion to Knoxville for analysis. **Knoxville**: Analyze for HFPO-DA.
Z-2131 VES CB Outlet R3 M0010 Impinger Glassware MeOH Rinse (Combine with *Z-2128*)	3	6/23/20		250 mL HDPE Wide-Mouth Bottle	**Impinger Glassware Methanol/5% Ammonium Hydroxide Rinse** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Use this solvent sample in the XAD-2 Resin Extraction.
Z-2132 VES CB Outlet R3 M0010 Breakthrough XAD-2 Resin Tube	3	6/23/20		XAD-2 Resin Tube	**Breakthrough XAD-2 Resin Tube** Method 0010 Train HFPO-DA Analysis	**Knoxville**: Spike sample with the Isotope Dilution Internal Standard (IDIS) at the regular level and perform the regular XAD-2 Resin Extraction. **Knoxville**: Analyze for HFPO-DA.

Sample Receipt Log and Condition of the Samples Upon Receipt:

Please fill in the following information:	Comments (Please write "NONE" if no comment applicable)
(1) Record the identities of any samples that were listed on the RFA but were not found in the sample shipment.	NONE
(2) Record the sample shipping cooler temperature of all coolers transporting samples listed on this RFA:	RT 0.4/CT 0.4°C
(3) Record any apparent sample loss/breakage.	NONE
(4) Record any unidentified samples transported with this shipment of samples:	NONE
(5) Indicate if all samples were received according to the project's required specifications (i.e. no nonconformances):	HAND DELIVERED, NO CUSTODY SEALS

Custody Transfer:

	Name	Company	Date/Time
Relinquished By:	Patricia Grady	Ramboll	6/23/20 19:15
Accepted By:	Wm. C. Anderson	Eurofins T.A	6/23/20 19:15
Relinquished By:	Wm. C. Anderson	Eurofins T.A	6/23/20 20:20
Accepted By:	Doug Cahill	ETA KNOX	6/23/20 20:20
Relinquished By:	Doug Cahill	ETA KNOX	6/24/20 1235
Accepted By:	[signature]	ETA KNOX	6/24/20 13:35
Relinquished By:			
Accepted By:			

Loc: 140
19457

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST **Log In Number:**

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	/		/	☐ **Containers, Broken**
2. Were ambient air containers received intact?			/	☐ Checked in lab
3. The coolers/containers custody seal if present, is it intact?			/	☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : 6668 Correction factor: 0.0	/			☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	/			☐ **Containers, Broken**
6. Were samples received in appropriate containers?	/			☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	/			☐ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	/			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	/			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?			/	☐ **Sampler Not Listed on COC**
11. Is the client and project name/# identified?	/			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	/			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	/			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)	/			☐ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	/			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			/	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			/	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:			/	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			/	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			/	☐ Project missing info

Comments/Actions Taken

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: _____ PM Instructions: _____

Sample Receiving Associate: Nancy Norman Date: 6-24-20

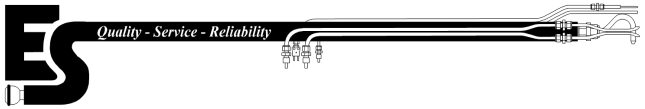
QA026R32.doc, 062719

7/10/2020

APPENDIX E
EQUIPMENT CALIBRATION DATA

Pretest Equipment Calibration Data

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

					INITIAL	FINAL	AVG (P_{bar})
DATE:	1/13/2020	METER SERIAL #:	MB 2	BAROMETRIC PRESSURE (in Hg):	30.3	30.29	30.295
METER PART #:		CRITICAL ORIFICE SET SERIAL #:	1393				

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) q	DGM DH ($in\ H_2O$)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y % Diff to Average Y	Y % Diff with other orifices	$DH_@$
11	1	0.306	23	341.926	347.963	6.037	69.1	69	70	69	70	69.5	15.00	0.44	6.1030	6.0470	0.991			1.54
	2	0.306																		
	3	0.306																		
																AVG =	0.991	-0.12	0.56	
16	1	0.4268	22	335.279	340.931	5.652	69.8	73	73	68	70	71	10.00	0.83	5.7030	5.6191	0.985			1.49
	2	0.4268																		
	3	0.4268																		
																AVG =	0.985	-0.68	-0.56	
18	1	0.4961	21.5	347.963	354.445	6.482	69.3	70	72	70	70	70.5	10.00	1.2	6.5525	6.5346	0.997			1.60
	2	0.4961																		
	3	0.4961																		
																AVG =	0.997	0.53	1.21	
26	1	0.7131	19	315.203	324.428	9.225	70.3	64	69	63	66	65.5	10.00	2.5	9.4438	9.3840	0.994			1.63
	2	0.7131																		
	3	0.7131																		
																AVG =	0.994	0.16	0.05	
31	1	0.8358	17.5	324.428	335.279	10.851	70	67	73	65	68	68.25	10.00	3.5	11.0772	11.0018	0.993			1.66
	2	0.8358																		
	3	0.8358																		
																AVG =	0.993	0.12	-0.05	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.992

AVERAGE $DH_@$ = 1.58

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

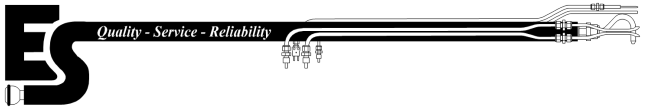
(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$DH_@ = \left(\frac{0.75\ q}{V_{cr(std)}}\right)^2 DH \left(\frac{V_{m(std)}}{V_m}\right)$$

RAMBOLL

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

DATE:	1/14/2020	METER SERIAL #:	MB 15	BAROMETRIC PRESSURE (in Hg):	INITIAL 30.27 / FINAL 30.27 / AVG (P_{bar}) 30.27
METER PART #:		CRITICAL ORIFICE SET SERIAL #:	1393		

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) q	DGM DH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y % Diff to Average Y	Y % Diff with other orifices	$DH_@$
11	1	0.306	23.5	240.408	246.224	5.816	70.4	65	67	65	67	66	15.00	0.5	5.9147	6.0346	1.020			1.77
	2	0.306																		
	3	0.306																		
																AVG =	1.020	0.68	1.04	
16	1	0.4268	22.5	246.224	251.697	5.473	70.4	67	68	67	68	67.5	10.00	1	5.5568	5.6113	1.010			1.81
	2	0.4268																		
	3	0.4268																		
																AVG =	1.010	-0.35	-1.03	
18	1	0.4961	20.5	251.697	257.984	6.287	70.5	68	70	68	70	69	10.00	1.2	6.3682	6.5218	1.024			1.61
	2	0.4961																		
	3	0.4961																		
																AVG =	1.024	1.06	1.87	
26	1	0.7131	17.5	257.984	267.179	9.195	70.9	70	71	70	71	70.5	10.00	2.7	9.3212	9.3709	1.005			1.75
	2	0.7131																		
	3	0.7131																		
																AVG =	1.005	-0.79	-0.21	
31	1	0.8358	17.5	267.179	277.971	10.792	71.1	71	73	71	73	72	10.03	3.6	10.9329	11.0142	1.007			1.70
	2	0.8358																		
	3	0.8358																		
																AVG =	1.007	-0.59	0.21	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.013

AVERAGE $DH_@$ = 1.73

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions
K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions
T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$DH_@ = \left(\frac{0.75\ q}{V_{cr(std)}}\right)^2 DH \left(\frac{V_{m(std)}}{V_m}\right)$$

RAMBOLL

Initial Oven Box Thermocouple Calibration

ID Number	Ice Bath			Ambient			Hot Water Bath			Technician	Date Performed
	Reference Temperature (^{o}R)	Thermocouple Temperature (^{o}R)	Deviation*	Reference Temperature (^{o}R)	Thermocouple Temperature (^{o}R)	Deviation*	Reference Temperature (^{o}R)	Thermocouple Temperature (^{o}R)	Deviation*		
OB-1	491.67	492.67	0.2%	524.67	523.67	-0.2%	671.67	673.67	0.3%	JLS	01/17/20
OB-2	491.67	492.67	0.2%	524.67	524.67	0.0%	671.67	669.67	-0.3%	JLS	01/17/20
OB-3	491.67	492.67	0.2%	524.67	524.67	0.0%	671.67	669.67	-0.3%	JLS	01/17/20
OB-4	491.67	493.67	0.4%	524.67	524.67	0.0%	671.67	670.67	-0.1%	JLS	01/17/20
OB-A	491.67	492.67	0.2%	524.67	526.67	0.4%	671.67	673.67	0.3%	JLS	01/17/20
OB-B	491.67	492.67	0.2%	524.67	526.67	0.4%	671.67	672.67	0.1%	JLS	01/17/20
OB-5	491.67	494.67	0.6%	524.67	523.67	-0.2%	671.67	669.67	-0.3%	JLS	01/17/20
OB-C	491.67	492.67	0.2%	524.67	525	0.0%	671.67	673.67	0.3%	JLS	01/17/20
OB-6	491.67	493.67	0.4%	524.67	525	0.0%	671.67	669.67	-0.3%	JLS	01/17/20
OB-7	491.67	494.67	0.6%	524.67	525	0.0%	671.67	671.67	0.0%	JLS	01/17/20
OB-E	491.67	494	0.4%	524.67	528	0.6%	671.67	668.67	-0.4%	JLS	01/17/20
OB-10	491.67	493.67	0.4%	524.67	525.67	0.2%	671.67	671.67	0.0%	JLS	01/17/20
OB-11	491.67	493.67	0.4%	524.67	525.67	0.2%	671.67	671.67	0.0%	JLS	01/17/20

Reference Thermocouple: Fluke S/N: 83450033 or S/N 90460057 traceable to the Untied States National Institute of Standards and Technology

*Acceptable Deviation: 1.5%

Initial Impinger Outlet Thermocouple Calibration

ID Number	Ice Bath			Ambient			Hot Water Bath			Technician	Date Performed
	Reference Temperature (^{o}Rk)	Thermocouple Temperature (^{o}Rk)	Deviation*	Reference Temperature (^{o}Rk)	Thermocouple Temperature (^{o}Rk)	Deviation*	Reference Temperature (^{o}Rk)	Thermocouple Temperature (^{o}Rk)	Deviation*		
IO-1	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	670.67	-0.1%	JLS	01/30/20
IO-2	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	671.67	0.0%	JLS	01/30/20
IO-3	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	670.67	-0.1%	JLS	01/30/20
IO-4	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	669.67	-0.3%	JLS	01/30/20
IO-5	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	671.67	0.0%	JLS	01/30/20
IO-6	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	672.67	0.1%	JLS	01/30/20
IO-7	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	670.67	-0.1%	JLS	01/30/20
IO-8	491.67	493.67	0.4%	527.67	527.67	0.0%	671.67	669.67	-0.3%	JLS	01/30/20
IO-9	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	672.67	0.1%	JLS	01/30/20
IO-10	491.67	492.67	0.2%	527.67	526.67	-0.2%	671.67	672.67	0.1%	JLS	01/30/20
IO-11	491.67	493.67	0.4%	527.67	527.67	0.0%	671.67	672.67	0.1%	JLS	01/30/20
IO-12	491.67	492.67	0.2%	527.67	526.67	-0.2%	671.67	672.67	0.1%	JLS	01/30/20
IO-13	NA			NA			NA			JLS	01/30/20
IO-14	491.67	494.67	0.6%	527.67	526.67	-0.2%	671.67	670.67	-0.1%	JLS	01/30/20
IO-15	491.67	493.67	0.4%	527.67	527.67	0.0%	671.67	670.67	-0.1%	JLS	01/30/20
IO-16	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	671.67	0.0%	JLS	01/30/20
IO-17	NA			NA			NA			JLS	01/30/20
IO-18	491.67	493.67	0.4%	527.67	527.67	0.0%	671.67	669.67	-0.3%	JLS	01/30/20
IO-19	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	671.67	0.0%	JLS	01/30/20
IO-19	491.67	493.67	0.4%	527.67	526.67	-0.2%	671.67	671.67	0.0%	JLS	01/30/20

Reference Thermocouple: Fluke S/N: 83450033 or S/N 90460057 traceable to the Untied States National Institute of Standards and Technology
*Acceptable Deviation: 1.5%

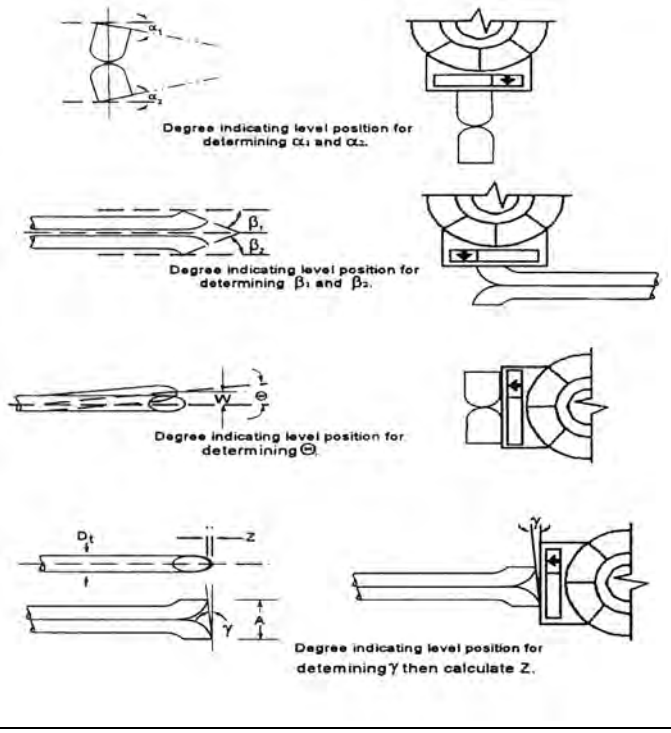
Initial Sample Probe Calibration Form

Probe ID: P4-2/TC-5D | Date: 06/16/20 | Technician: P. Grady

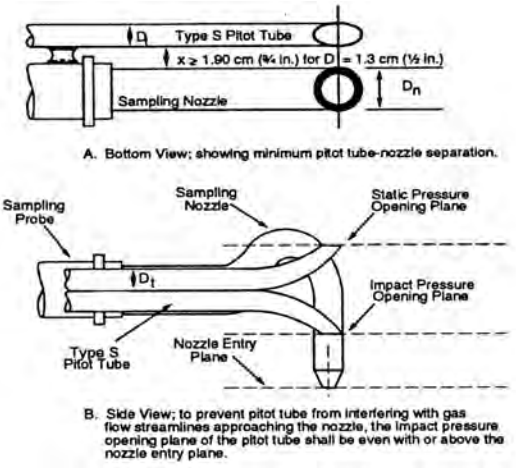
"S" Type Pitot Calibration

Is the Pitot Level and Perpindicular?	Yes
Is There any Obstruction?	No
Is the Pitot Damaged	No
α_1 ($-10^o = \alpha_1 = +10^o$)	2
α_2 ($-10^o = \alpha_2 = +10^o$)	1
$ß_1$ ($-5^o = ß_1 = +5^o$)	1
$ß_2$ ($-5^o = ß_2 = +5^o$)	1
γ	1
Θ	0
z = A Tan γ (< 0.125")	0.011
W = A Tan Θ (< 0.03125")	0.0000
D_t (3/16 = D_t = 3/8")	0.251
A	0.650
A/2D_t (1.05 = P_A/D_t = 1.5)	1.295

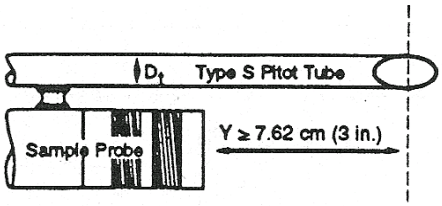
Source: Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods. EPA/600/R-94/038c, September 30, 1994



Verification of "S" Type Pitot, Thermocouple and Nozzle Placement



Does X Exceed 0.75 inches?	Yes
Does Y Exceed 3 inches?	NA



Thermocouple Calibration

	Ice Bath ^oR			Ambient ^oR			Boiling Water ^oR		
	1	2	3	1	2	3	1	2	3
Reference Temp	492.3	492.3	492.3	533.4	533.4	533.4	671.5	671.5	671.5
Thermocouple Temp	492.9	492.8	492.8	532.7	532.6	532.7	673.1	673	673
Difference (%)	0.1	0.1	0.1	-0.1	-0.1	-0.1	0.2	0.2	0.2

Temperature values must be within 1.5% of reference temperature

I certify that the probe ID P4-2/TC-5D meets or exceeds all specifications, criteria and/or applicable design features and is herby assigned a pitot tube calibration factor C_p of 0.84.

Certified By: P. Grady Date: 06/16/20

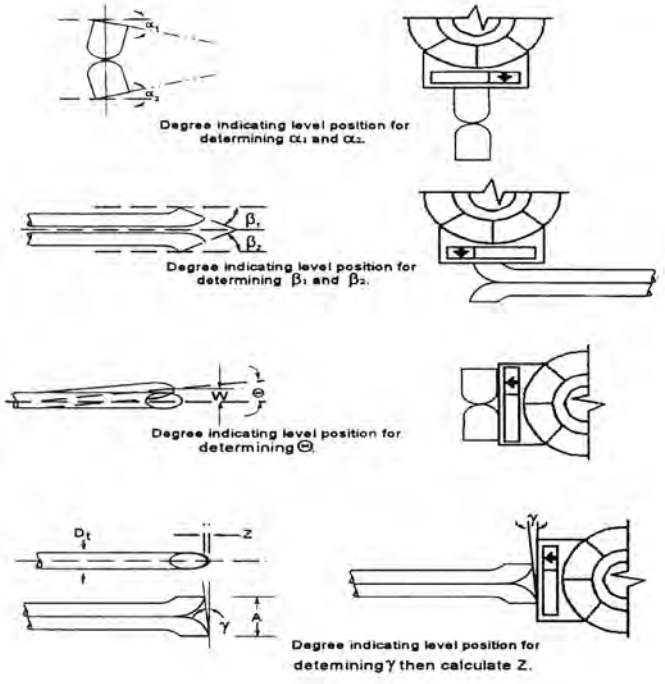
Initial Sample Probe Calibration Form

Probe ID: P4-3/TC-7D | Date: 06/16/20 | Technician: P. Grady

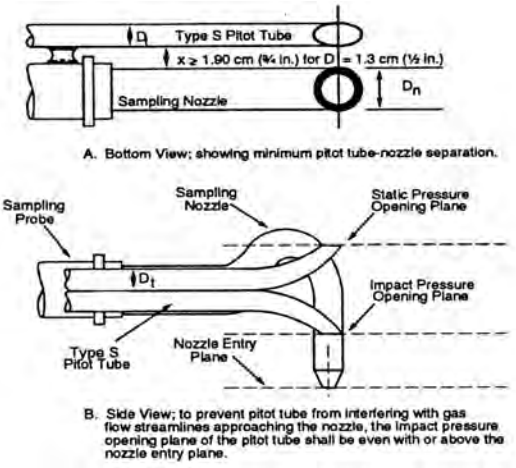
"S" Type Pitot Calibration

Is the Pitot Level and Perpindicular?	Yes
Is There any Obstruction?	No
Is the Pitot Damaged	No
α_1 ($-10^o = \alpha_1 = +10^o$)	1
α_2 ($-10^o = \alpha_2 = +10^o$)	0
$ß_1$ ($-5^o = ß_1 = +5^o$)	1
$ß_2$ ($-5^o = ß_2 = +5^o$)	1
γ	1
Θ	1
z = A Tan γ (< 0.125")	0.011
W = A Tan Θ (< 0.03125")	0.0110
D_t (3/16 = D_t = 3/8")	0.251
A	0.628
A/2D_t (1.05 = P_A/D_t = 1.5)	1.251

Source: Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods. EPA/600/R-94/038c, September 30, 1994

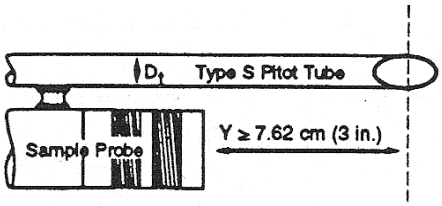


Verification of "S" Type Pitot, Thermocouple and Nozzle Placement



Does X Exceed 0.75 inches? Yes

Does Y Exceed 3 inches? NA



Thermocouple Calibration

	Ice Bath °R			Ambient °R			Boiling Water °R		
	1	2	3	1	2	3	1	2	3
Reference Temp	492.3	492.3	492.3	533.4	533.4	533.4	671.5	671.5	671.5
Thermocouple Temp	492.7	492.6	492.6	533.1	533.2	533.2	671.8	671.8	671.8
Difference (%)	0.1	0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.0

Temperature values must be within 1.5% of reference temperature

I certify that the probe ID P4-3/TC-7D meets or exceeds all specifications, criteria and/or applicable design features and is herby assigned a pitot tube calibration factor C_p of 0.84.

Certified By: P. Grady Date: 06/16/20

Post Test Equipment Calibration Data

POST TEST DRY GAS METER CALIBRATION

DATE:	06/30/20	METER BOX #:	2	BAROMETRIC PRESSURE (in Hg):	INITIAL 29.97	FINAL 29.97	AVG (P_{bar}) 29.97
TECHNICIAN:	A.Anderson	CRITICAL ORIFICE SET SERIAL #:	1393				

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) q	DGM DH ($in H_2O$)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y % Diff to Average Y	$DH_@$
	1																		
	2																		
	3																		
																AVG =			
18	1	0.4961	21	877.265	883.745	6.480	74	69	71	69	70	69.75	10.00	1.2	6.4896	6.4359	0.992	1.93	1.63
	2	0.4961	21	883.745	890.430	6.685	74	71	72	70	70	70.75	10.00	1.2	6.6823	6.4359	0.963	-1.01	1.63
	3	0.4961	21	890.430	897.115	6.685	74	72	72	70	71	71.25	10.00	1.2	6.6760	6.4359	0.964	-0.92	1.63
																AVG =	0.973		
	1																		
	2																		
	3																		
																AVG =			

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.973

PRE-DETERMINED DRY GAS METER CALIBRATION FACTOR, Y = 0.992

PERCENT DIFFERENCE = -1.9

POST TEST DRY GAS METER CALIBRATION

DATE:	06/30/20	METER BOX #:	15	BAROMETRIC PRESSURE (in Hg):	INITIAL 29.96	FINAL 29.96	AVG (P_{bar}) 29.96
TECHNICIAN:	A. Anderson	CRITICAL ORIFICE SET SERIAL #:	1393				

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) q	DGM DH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y % Diff to Average Y	$DH_@$
	1																		
	2																		
	3																		
																AVG =			
18	1	0.4961	21.5	450.407	456.830	6.423	72	70	70	70	70	70	10.00	1.3	6.4289	6.4459	1.003	-0.13	1.76
	2	0.4961	21.5	456.830	462.883	6.053	72	70	71	70	71	70.5	10.00	1.3	6.0529	6.4459	1.065	6.07	1.76
	3	0.4961	21.5	462.883	469.715	6.832	72	71	71	71	71	71	10.00	1.3	6.8254	6.4459	0.944	-5.94	1.76
																AVG =	1.004		
	1																		
	2																		
	3																		
																AVG =			

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.004

PRE-DETERMINED DRY GAS METER CALIBRATION FACTOR, Y = 1.013

PERCENT DIFFERENCE = -0.9

Post-Test Sample Probe Calibration Form

Probe ID P4-2

Visual Inspection

Do pitot tips appear to be damaged?	NO
Do thermocouple wires appear broken or shorted?	NO
Do all components appear to be in good condition?	YES

Post-Test Thermocouple Calibration

Reference Temperature ^{O}F	Thermocouple Temperature ^{O}F	Difference ^{O}F
77	77	0

Reference Thermocouple: Fluke S/N: 83450033 traceable to the Untied States National Institute of Standards and Technology

Accepatable Deviation +/- 2 ^{O}F

x Acceptable

Unacceptable

Date 06/30/20

Technician AA

Post-Test Sample Probe Calibration Form

Probe ID P4-3/TC-7D

Visual Inspection

Do pitot tips appear to be damaged?	NO
Do thermocouple wires appear broken or shorted?	NO
Do all components appear to be in good condition?	YES

Post-Test Thermocouple Calibration

Reference Temperature ^{O}F	Thermocouple Temperature ^{O}F	Difference ^{O}F
77	78	1

Reference Thermocouple: Fluke S/N: 83450033 traceable to the Untied States National Institute of Standards and Technology

Accepatable Deviation +/- 2 ^{O}F

x	Acceptable
	Unacceptable

Date 06/30/20 Technician AA