IXM
MANUFACTURING PROCESS
POLYMERS STACK
E1 EMISSIONS TEST REPORT
TEST DATE: 17 MAY 2018

THE CHEMOURS COMPANY
FAYETTEVILLE, NORTH CAROLINA

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1. INTRODUCTION

1.1 FACILITY AND BACKGROUND INFORMATION

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

Chemours contracted Weston Solutions, Inc. (WESTON) to perform E1 (CAS No. 3330-15-2) emission testing on a single source at the facility IXM Resins Polymers stack (Polymers). Testing was performed on 17 May 2018 and generally followed the procedures provided to the North Carolina Department of Environmental Quality (NCDEQ). This report provides the results from the emission test program.

1.2 TEST OBJECTIVES

The specific objectives for this test program were as follows:

- Measure the emissions concentrations and mass emissions rates of EI from the Polymers Stack which is located in the IXM process.
- Monitor and record process and emissions control data in conjunction with the test program.
- Provide representative emissions data.

1.3 TEST PROGRAM OVERVIEW

During the emissions test program, the concentrations and mass emissions rates of E1 were measured at the Polymers Stack.

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

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

Process operating data, raw and reduced test data, laboratory analytical reports, sample calculations, equipment calibration records, and a list of WESTON project participants are provided in Appendices A through F, respectively.

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

Table 1-1
Sampling Plan for Polymers Stack

Sampling Point & Location	**Polymers Stack**				
Number of Tests:	3				
Parameters To Be Tested:	E1	Volumetric Flow Rate and Gas Velocity	Carbon Dioxide	Oxygen	Water Content
Sampling or Monitoring Method	EPA Modified Method 18 (M-18)	EPA M1, M2, M3A, and M4 in conjunction with M-18 tests	EPA M3A		Wet bulb dry bulb in conjunction with M-18 tests
Sample Extraction/ Analysis Method(s):	GC/MS	NA[6]	NA		NA
Sample Size	> 0.4 ft^3	NA	NA	NA	NA
Total Number of Samples Collected[1]	3	3	3	3	3
Reagent Blanks (Solvents, Resins)[1]	1 set	0	0	0	0
Field Blank Trains[1]	1	0	0	0	0
Proof Blanks[1]	1 set	0	0	0	0
Trip Blanks[1,2]	1 set	0	0	0	
Lab Blanks	2 per fraction[3]	0	0	0	0
Laboratory or Batch Control Spike Samples (LCS)	2 per fraction[3]	0	0	0	0
Laboratory or Batch Control Spike Sample Duplicate (LCSD)	2 per fraction[3]	0	0	0	0
Media Blanks	2 sets[4]	0	0	0	0
Isotope Dilution Internal Standard Spikes	Each sample	0	0	0	0
Total No. of Samples	7[5]	3	3	3	3

Key:

[1] Sample collected in field.

[2] Trip blanks include one methanol sample per sample shipment.

[3] Lab blank and LCS/LCSD includes one set per analytical fraction.

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

[5] Actual number of samples collected in field.

[6] Not applicable.

2. SUMMARY OF TEST RESULTS

During the E1 test program on 17 May 2018, a total of three test runs were performed on the Polymers Stack. Table 2-1 provides a summary of the E1 emission test results. Detailed test results summaries are provided in Section 6.

Table 2-1

Summary of E1 Test Results

Source	Run No.	Emission Rates	
		lb/hr	g/sec
Polymers Stack (5/17/18)	1	≤ 3.69E-5	≤ 4.65E-6
	2	6.80E-5	8.56E-6
	3	7.96E-5	1.00E-5
	Average	≤ 6.15E-5	≤ 7.75E-6

3. PROCESS DESCRIPTIONS

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

3.1 POLYMERS

The polymers area consists of a polymerization process, Finishing and Recycle. There are two types of polymer produced, using products made in the Fluoromonomers and IXM Precursors areas: SR polymer and CR polymer. Both SR and CR polymerization processes take place in a solvent. The reaction is initiated and sustained by continuous addition of Dimer Peroxide initiator. There is a Recycle Still that takes solution and removes any impurities, allowing the solution to be used again. The finishing area takes the polymer produced during polymerization and transforms it into pellets.

3.2 PROCESS OPERATIONS AND PARAMETERS

Testing during the following operations provided "normal" conditions while running products and operations that were expected to result in the most conservative (i.e., highest) emissions for the target compound.

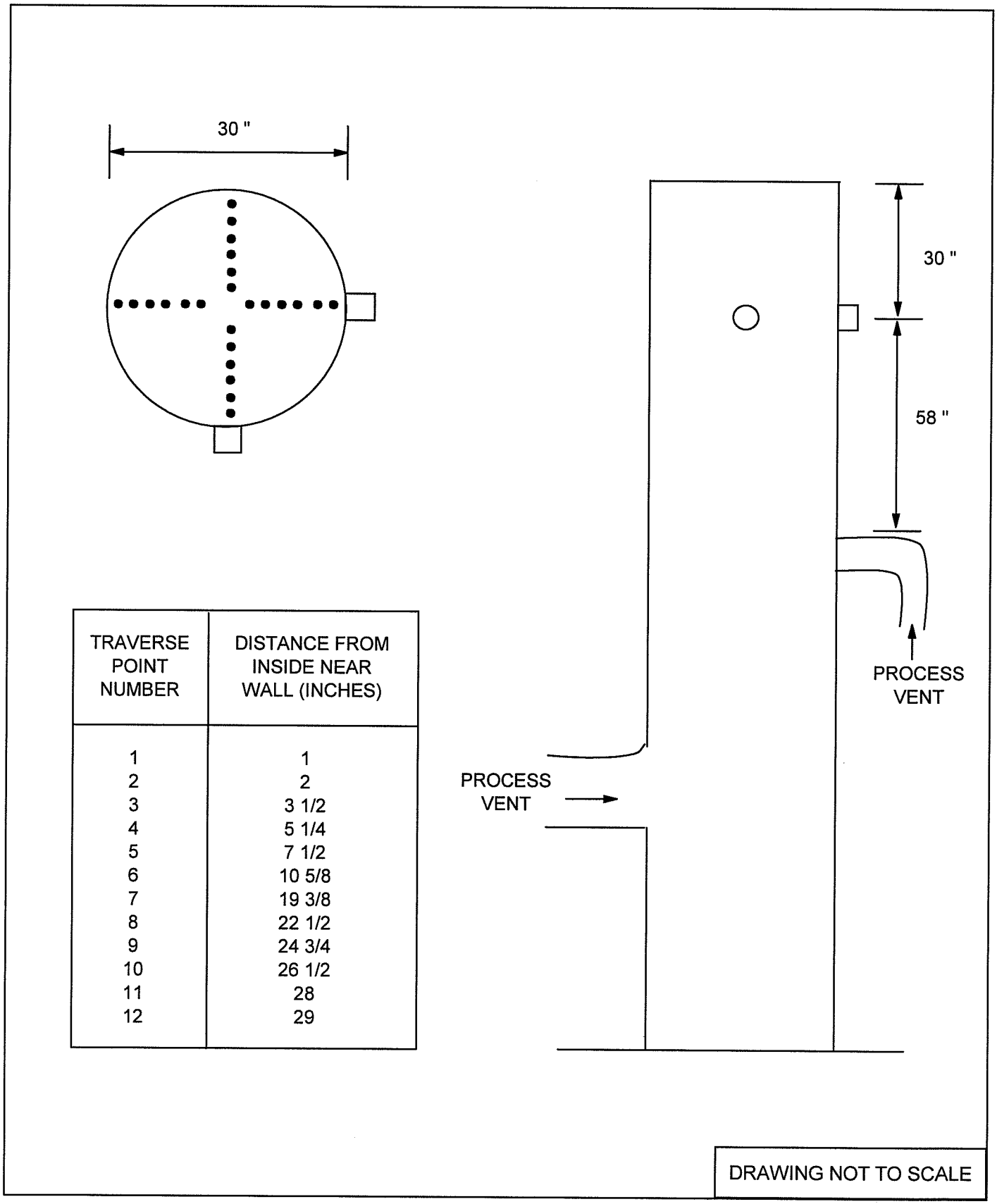
Source	Operation/Product	Batch or Continuous
Polymer Stack	SR Polymer	Continuous – Polymerization Batch – Recycle Still Batch – Line Four extrusion

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

4. DESCRIPTION OF TEST LOCATIONS

4.1 POLYMERS STACK

The Polymers stack is a 30 inch ID fiberglass stack located near the roof edge. Vent lines enter the stack at various points and a significant straight run of vertical stack without flow disturbances is not available. Two sample ports are installed in the stack 30 inches down from the stack exit and 58 inches up from the last vent line entry point. Per EPA Method 1, twenty-four traverse points, 12 per port, were used for volumetric flow rate measurements. Figure 4-2 provides a schematic of the test port and traverse point locations. All dimensions were verified on site prior to sampling.



TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE NEAR WALL (INCHES)
1	1
2	2
3	3 1/2
4	5 1/4
5	7 1/2
6	10 5/8
7	19 3/8
8	22 1/2
9	24 3/4
10	26 1/2
11	28
12	29

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

5. SAMPLING AND ANALYTICAL METHODS

5.1 STACK GAS SAMPLING PROCEDURES

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

5.1.1 Pre-Test Determinations

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

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

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

5.2 STACK PARAMETERS

5.2.1 E1

For all E1 tests, the sample train was a modified EPA Method 18 train using midget impingers. During the tests on 17 May 2018 the sample run included six impingers. The first impinger was of a modified short stem design. Impingers 1 through 6 each contained 20 milliliters of methanol.

The midget impingers were maintained in an ice bath. Each test was 60 minutes in duration collecting at a rate of approximately 0.5 liters per minute.

Each impinger was recovered and included a methanol rinse of each impinger and connector. The impinger contents and rinses were collected separately.

Each sample was analyzed by EPA SW-846 Method 8260B procedures by Gas Chromatography (GC) Mass Spectrometry (MS). All results were non detect (ND) for all samples. TestAmerica reran the samples in the Selective Ion Monitoring (SIM) mode which provides a significantly lower detection limit. These results are provided in Appendix C.

5.2.2 Flue Gas Velocity Measurements

The stack gas velocity was measured at the stack locations according to the procedures outlined in EPA Methods 1 and 2. A S-type pitot and inclined manometer, or electronic pressure transducer, were used to measure the velocity pressure at each traverse point. The traverse points are selected in accordance to EPA Reference Method 1 on the basis of stack dimensions, geometry and upstream and downstream disturbances. The traverse points for the stack locations are presented on Figure 4-1.

One velocity traverse was conducted prior to and one conducted following each 60-minute test run. The average of each velocity traverse was used to calculate the volumetric flow rate for calculating mass rates for that rest run.

Stack gas moisture content was calculated by wet bulb/dry bulb measurement in conjunction with each velocity traverse.

5.2.3 Gas Composition

The WESTON mobile laboratory equipped with instrumental analyzers was used to measure carbon dioxide (CO_2) and oxygen (O_2) concentrations. A diagram of the WESTON sampling system is presented in Figure 5-1.

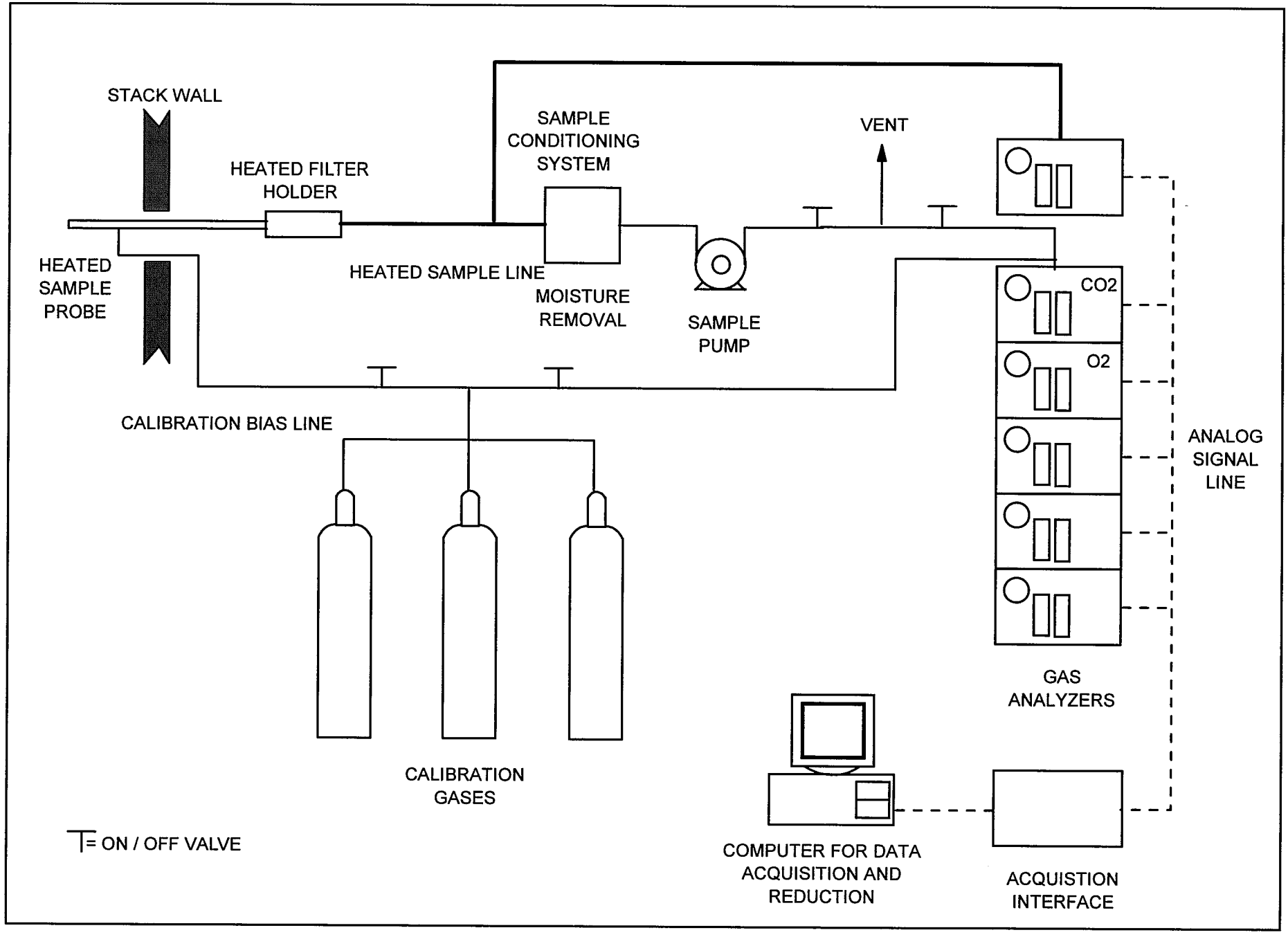


FIGURE 5-1
WESTON SAMPLING SYSTEM

I:\ASDATA\CHEMOURS\15418.002.004\FIGURE 5-1 WESTON SAMPLING SYSTEM

The sample was collected through the probe and a sample conditioner. At the end of the line, a tee permitted the introduction of calibration gas. The output from the sampling system was recorded electronically, and one-minute averages were recorded and displayed on a data logger.

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

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

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

6. DETAILED TEST RESULTS AND DISCUSSION

Table 6-1 provides detailed test data and test results for the Polymers Stack.

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

As discussed in Section 5.2.1, the samples were originally analyzed by standard GC/MS procedures and all of the results were ND. TestAmerica reran the samples using the SIM mode. As footnoted on Table 6-1, the first five impinger samples for run 1 were still ND and ½ the DL was used in the calculation. All of the other sample fractions for all runs were detected above the DL. Note that the SIM analysis was performed beyond the 14 day holding time; however, all samples were maintained under chain of custody and were kept cool (≤ 4°C).

Table 6-1
Chemours - Fayetteville, NC
Summary of E1 Test Data and Test Results
Polymer Stack (May 17th, 2018)

TEST DATA				
Test run number		1	2	3
Location		Polymers	Polymers	Polymers
Test date		5/17/2018	5/17/18	5/17/18
Test time period		1043-1143	1204-1304	1352-1452
SAMPLING DATA				
Duration, minutes		60	60	60
Average dry gas meter press. in. H2O		0.98	1.00	0.98
Average dry gas meter temp. deg. F		74.7	77.8	77.9
Average absolute meter temp. deg. R		534.7	537.8	537.9
Sample vol. at meter cond., dcl		30.000	30.005	30.000
Meter box calibration, Y		1.0150	1.0150	1.0150
Barometric pressure, in. Hg		29.88	29.88	29.89
Sample volume, dscl [1]		30.090	29.924	29.918
Sample volume, dscf [1]		1.063	1.057	1.056
STACK GAS COMPOSITION				
Temperature, deg F		71.6	74.4	0.4
Moisture, %		2.54	2.82	2.77
CO_2 Concentration, %		0.0	0.0	0.0
O_2 Concentration, %		20.9	20.9	20.9
Molecular Weight, lb/lb-mole		28.8	28.8	28.8
VOLUMETRIC FLOW RATE				
Stack/duct cross sectional area, sq.ft.		4.910	4.910	4.910
Avg. gas stream volumetric flow, wacf/min.		10,919	10,937	10,964
Avg. gas stream volumetric flow, dscf/min. [1]		10,546	10,477	10,479
E1 LABORATORY REPORT DATA				
Impinger-1, ug.	≤	0.00530	0.00864	0.01100
Impinger-2, ug.	≤	0.00476	0.01000	0.01260
Impinger-3, ug.	≤	0.00382	0.01000	0.00915
Impinger-4, ug.	≤	0.00354	0.00708	0.00824
Impinger-5, ug.	≤	0.00327	0.00812	0.00714
Impinger-6, ug.		0.00744	0.00798	0.00988
Total catch, ug.	≤	0.02813	0.05182	0.05801
E1 EMISSIONS RESULTS[2]				
E1, ug/sample	≤	0.02813	0.05182	0.05801
Concentration, lb/dscf	≤	5.84E-11	1.08E-10	1.21E-10
Emission Rate, lb/hr	≤	3.69E-05	6.80E-05	7.96E-05
Emission Rate, g/sec	≤	4.65E-06	8.56E-06	1.00E-05

(1) Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 inches Hg (760mm Hg).
(2) The reported laboratory values were non-detect for run1 impingers 1 through 5. The values entered for impingers 1 through 5 represent 1/2 of the detection limit value and are noted as less than or equal to (≤).

APPENDIX A
PROCESS OPERATIONS DATA

IXM Polymers

Date 5/17/2018

Time	900				1000			1100				1200			
Stack Testing								1043 - 1143				1204 - 1304			
Recycle Still															
Polymerization	Standard SR Polymer Production														
Line 4 Extrusion															

1300				1400				1500			
			1352-1452								

IXM Polymers takes the following raw materials to produce the Sulfonic Resin (polymer) – that then goes to the IXM Products area to make film and membrane:

PSEPVE
TFE/CO2
E2
Dimer Peroxide

APPENDIX B
RAW AND REDUCED TEST DATA

FIELD DATA SHEET

Modified Method 18 - E1
Polymer Stack

Client	CHEMOURS	Run No.	1	Meter Box ID	VOS78	Leak Checks	
W.O.#	15418.002.003.0001	Test Method	M18	Meter Box Y	1.045		
Project ID	CHEMOURS	Date	5/17/18	Probe ID/Length		Initial	0.001 @ 10
Source	POLYMER	Baro. Press (in Hg)	29.80	Probe Material	GLASS/ 7'	TRAIN	0.001 liters/min @ 10 in Hg Vac
Samp. Type.	Stack	Ambient Temp (°F)	77				
Samp. Location	RUN 2	Operator	MW / JM				
		Sample Time	60			Final	0.001 @ 10
Comments:						TRAIN	0.001 liters/min @ 10 in Hg Vac
						Post Test Purge	YES/NO

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	ROTOMETER SETTING ON CONSOLE	ORIFICE PRESSURE Delta H (in H_2O)	DRY GAS METER READING (liters)	DGM INLET TEMP (°C / °F)	DGM OUTLET TEMP (°C / °F)	PROBE TEMPERATURE (°C / °F)	SAMPLE TRAIN VAC in Hg	ICE BATH TEMPERATURE (°C / °F)			
	0	1043			0.000								
	5		0.5	0.80	3.5	NA	74	100	7	32			
	10		0.5	1.0	4.9		75	100	8	32			
	15		0.5	1.0	7.5		75	101	8	32			
	20		0.5	1.0	10.1		75	100	8	32			
	25		0.5	0.8	12.1		75	100	1.0	34			
	30		0.5	1.0	14.5		75	100	1.0	36			
	35		0.5	1.0	17.5		75	100	1.0	36			
	40		0.5	1.1	20.5		75	100	1.0	36			
	45		0.5	1.0	22.5		75	100	1.5	35			
	50		0.5	1.0	25.0		75	100	1.5	35			
	55		0.5	1.0	27.5		75	100	1.5	35			
	60	1143	0.5	1.0	30.000		75	100	1.5	35			
WESTON SOLUTIONS			0.5	Avg Delta H .975	Total Volume 30.000	Avg Tm 74.7		Max Temp 101	Max Vac 1.5	Max Temp 36			

FIELD DATA SHEET

Modified Method 18 - E1
Polymer Stack

Client	CHEMOURS	Run No.	1 2	Meter Box ID	VOST 8	Leak Checks	
W.O.#	15418.002.003.0001	Test Method	M18	Meter Box Y	1.0150		
Project ID	CHEMOURS	Date	5/17/18	Probe ID/Length	7'	Initial	0.001 @ 12
Source	POLYMER	Baro. Press (in Hg)	29.80	Probe Material	GLASS	TRAIN	0.001 liters/min @ 12 in Hg Vac
Samp. Type.	Stack	Ambient Temp (°F)	78				
Samp. Location	RUN 3	Operator	MW / JM				
		Sample Time	12 60			Final	.001 @ 10
Comments:						TRAIN	.001 liters/min @ 0 in Hg Vac
						Post Test Purge	YES/NO

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	ROTOMETER SETTING ON CONSOLE	ORIFICE PRESSURE Delta H (in H_2O)	DRY GAS METER READING (liters)	DGM INLET TEMP (°C / °F)	DGM OUTLET TEMP (°C / °F)	PROBE TEMPERATURE (°C / °F)	SAMPLE TRAIN VAC in Hg	ICE BATH TEMPERATURE (°C / °F)			
	0	1204		MW 2.5 1.0	0.000								
	5		0.5	1.0	2.5	NA	77	100	1.0	36			
	10		0.5	1.0	5.0		77	100	1.0	36			
	15		0.5	1.0	7.5		77	100	1.0	36			
	20		0.5	1.0	10.0		78	100	1.0	36			
	25		0.5	1.0	12.5		78	100	1.0	36			
	30		0.5	1.0	15.0		78	100	1.0	36			
	35		0.5	1.0	17.5		78	100	1.0	36			
	40		0.5	1.0	20.0		78	100	1.0	34			
	45		0.5	1.0	22.5		78	100	1.0	33			
	50		0.5	1.0	25.0		78	100	1.0	33			
	55		0.5	1.0	27.5		78	100	1.0	33			
	60	1304	0.5	1.0	30.005		78	100	1.0	33			
WESTON SOLUTIONS			0.5	Avg Delta H 1.0	Total Volume 30.005		Avg Tm 77 75	Max Temp 100	Max Vac 1.0	Max Temp 36			

5/21/18

FIELD DATA SHEET

Modified Method 18 - E1
Polymer Stack

Client	CHEMOURS	Run No.	x 3	Meter Box ID	UOST 8	Leak Checks	
W.O.#	15418.002.003.0001	Test Method	M18	Meter Box Y	1.015		
Project ID	CHEMOURS	Date	5/17/17	Probe ID/Length	7'	Initial	0.001 @ 10
Source	POLYMER	Baro. Press (in Hg)	29.89	Probe Material	GLASS	TRAIN	0.001 liters/min @ 10 in Hg Vac
Samp. Type.	Stack	Ambient Temp (°F)	77				
Samp. Location	RUN 1	Operator	MW / JM				
		Sample Time	60			Final	0.001 @ 10
Comments:						TRAIN	0.001 liters/min @ 10 in Hg Vac
						Post Test Purge	YES/NO

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	ROTOMETER SETTING ON CONSOLE	ORIFICE PRESSURE Delta H (in H_2O)	DRY GAS METER READING (liters)	DGM INLET TEMP (°C / °F)	DGM OUTLET TEMP (°C / °F)	PROBE TEMPERATURE (°C / °F)	SAMPLE TRAIN VAC in Hg	ICE BATH TEMPERATURE (°C / °F)			
	0	1325	MB1352		0.000								
	5		0.5	0.8	2.52	NA	77	100	2.0	33			
	10		0.5	0.8	5.01		77	100	2.0	33			
	15		0.5	1.0	7.5		77	100	2.0	33			
	20		0.5	1.0	10.0		77	100	2.0	33			
	25		0.5	1.0	12.5		77	100	2.0	33			
	30		0.5	1.0	15.0		79	100	2.0	35			
	35		0.5	1.0	17.5		78	100	2.0	37			
	40		0.5	1.0	20.0		78	100	1.0	38			
	45		0.5	1.0	22.5		79	100	2.0	37			
	50		0.5	1.0	25.0		79	100	2.0	37			
	55		0.5	1.1	27.6		79	100	2.0	38			
	60	1452	0.5	1.0	30.000		79	100	2.0	40			
WESTON SOLUTIONS			Avg 0.5	Avg Delta H .975	Total Volume 30.000	Avg Tm 77.9		Max Temp 100	Max Vac 2.0	Max Temp 40			

Determination of Stack Gas Velocity - Method 2

Client: Chemours | Operator: MW / KS | Pitot Coeff (Cp): .84
Location/Plant: Fayetteville, NC | Date: 5/17/18 | Stack Area, ft² (As): 4.91
Source: Polymer Stack | W.O. Number: 15418.002.004 | Pitot Tube/Thermo ID: P558/P698

Run Number	1 Pre	1 Post / 2 Pre	2 Post / 3 Pre
Time	1018 - 1028	1151 - 1201	1313 - 1326
Barometric Press, In Hg (Pb)	29.88	29.88	29.88
Static Press, In H_2O (Pstatic)	-0.22	-0.22	-0.2
Source Moisture, % (BWS)			
O_2, %			
CO_2, %			

Cyclonic Flow Determination		Traverse Location		Leak Check good? (Y) / N		Leak Check good? (Y) / N		Leak Check good? (Y) / N	
Delta P at 0°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
		A	1	0.33	69	0.27	74	0.28	75
			2	0.34	69	0.35	74	0.33	75
			3	0.46	70	0.46	74	0.41	75
			4	0.50	70	0.44	74	0.47	75
			5	0.48	70	0.45	74	0.50	75
			6	0.48	70	0.47	74	0.48	75
			7	0.44	70	0.47	74	0.47	75
			8	0.48	70	0.49	74	0.48	75
			9	0.50	70	0.49	74	0.52	75
			10	0.48	70	0.50	74	0.50	75
			11	0.44	70	0.44	74	0.44	75
			12	0.39	70	0.37	74	0.40	75
		B	1	0.34	69	0.34	74	0.32	76
			2	0.33	69	0.34	73	0.38	75
			3	0.39	70	0.39	74	0.42	75
			4	0.43	70	0.43	74	0.40	75
			5	0.40	69	0.40	74	0.42	75
			6	0.46	70	0.46	74	0.42	75
			7	0.45	69	0.46	74	0.47	75
			8	0.48	68	0.50	73	0.51	75
			9	0.49	68	0.50	73	0.49	75
			10	0.48	69	0.47	73	0.46	75
			11	0.41	69	0.42	73	0.39	75
			12	0.39	68	0.34	73	0.36	75
Avg Angle		Avg Delta P & Temp		0.43208 ✓	69.4 ✓	0.42708 ✓	73.8 ✓	0.43008 ✓	75.0 ✓
		avg $\sqrt{\text{DeltaP}}$		0.65592 ✓		0.65166 ✓		0.65398 ✓	
Average gas stream velocity, ft/sec.									
Vol. flow rate @ actual conditions, wacf/min									
Vol. flow rate at standard conditions, dscf/min									

Wet Bulb
R1 - 69
R2 - 73
R3 - 75

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

$MWs = (MWd * (1 - (BWS/100))) + (18 * (BWS/100))$

$Tsa = Ts + 460$

$Ps = Pb + (Pstatic/13.6)$

$Vs = 85.49 * Cp * avg\sqrt{DeltaP} * \sqrt{Tsa/(Ps * MWs)}$

$Qs(act) = 60 * Vs * As$

$Qs(std) = 17.64 * (1 - (BWS/100)) * (Ps/Tsa) * Qs(act)$

where:
MWd = Dry molecular weight source gas, lb/lb-mole.
MWs = Wet molecular weight source gas, lb/lb-mole.
Tsa = Source Temperature, absolute(oR)
Ps = Absolute stack static pressure, Inches Hg.
Vs = Average gas stream velocity, ft/sec.
Qs(act) = Volumetric flow rate of wet stack gas at actual, wacf/min
Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min

Comments _____

method2.xls

Determination of Stack Gas Velocity - Method 2

Client: Chemours | Operator: MW / KS | Pitot Coeff (Cp): .84
Location/Plant: Fayetteville NC | Date: 5/17/16 | Stack Area, ft² (As): 4.91
Source: Polymer | W.O. Number: 15418.02.005 Fume | Pitot Tube/Thermo ID: _____

Run Number	3 Post		
Time	1500 - 1515		
Barometric Press, in Hg (Pb)	29.89		
Static Press, in H_20 (Pstatic)	-0.22		
Source Moisture, % (BWS)			
O_2, %			
CO_2, %			

Cyclonic Flow Determination		Traverse Location		Leak Check good? Y / N		Leak Check good? Y / N		Leak Check good? Y / N	
Delta P at 0°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
		A	1	0.34	72				
			2	0.34	72				
			3	0.43	72				
			4	0.45	72				
			5	0.52	72				
			6	0.46	72				
			7	0.52	72				
			8	0.45	72				
			9	0.50	72				
			10	0.49	72				
			11	0.46	72				
			12	0.41	72				
		B	1	0.33	72				
			2	0.34	74				
			3	0.40	74				
			4	0.43	74				
			5	0.41	74				
			6	0.44	74				
			7	0.51	74				
			8	0.51	74				
			9	0.49	74				
			10	0.46	74				
			11	0.41	74				
			12	0.39	74				
Avg Angle		Avg Delta P & Temp		0.43708	72.9				
		avg $\sqrt{DeltaP}$		0.65966					
		Average gas stream velocity, ft/sec.							
		Vol. flow rate @ actual conditions, wacf/min							
		Vol. flow rate at standard conditions, dscf/min							

Wet Bob
R4 - 72

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

$$MWs = (MWd * (1 - (BWS/100))) + (18 * (BWS/100))$$

$$Tsa = Ts + 460$$

$$Ps = Pb + (Pstatic/13.6)$$

$$Vs = 85.49 * Cp * avg\sqrt{DeltaP} * \sqrt{Tsa/(Ps * MWs)}$$

$$Qs(act) = 60 * Vs * As$$

$$Qs(std) = 17.64 * (1 - (BWS/100)) * (Ps/Tsa) * Qs(act)$$

where:
MWd = Dry molecular weight source gas, lb/lb-mole.
MWs = Wet molecular weight source gas, lb/lb-mole.
Tsa = Source Temperature, absolute(oR)
Ps = Absolute stack static pressure, inches Hg.
Vs = Average gas stream velocity, ft/sec.
Qs(act) = Volumetric flow rate of wet stack gas at actual,
Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min

Comments _____

WESTON MANAGERS DESIGNERS/CONSULTANTS

Method2

SK

Determination of Stack Gas Velocity - Method 2

Client	Chemours	**Operator**	MW	**Pitot Coeff (Cp)**	0.84
Location/Plant	Fayetteville NC	**Date**	17-May-18	**Stack Area, ft² (As)**	4.910
Source	Polymer	**W.O. Number**		**Pitot Tube/Thermo ID**	

Run Number	**Pre 1**	**Post 1**	
Time	**1018-1028**	**1151-1201**	
Barometric Press, in Hg (Pb)	**29.88**	**29.88**	
Static Press, in H_20 (Pstatic)	**-0.22**	**-0.22**	
Source Moisture, % (BWS)	**2.38**	**2.71**	
O_2, %	**20.9**	**20.9**	
CO_2, %	**0.0**	**0.0**	

Cyclonic Flow Determination		**Traverse Location**		Zero Check good ? **Y / N**		Zero Check good ? **Y / N**		Zero Check good ? **Y / N**	
Delta P at O°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
		A	1	0.33	69	0.27	74		
			2	0.34	69	0.35	74		
			3	0.46	70	0.46	74		
			4	0.50	70	0.44	74		
			5	0.48	70	0.45	74		
			6	0.48	70	0.47	74		
			7	0.44	70	0.47	74		
			8	0.48	70	0.49	74		
			9	0.50	70	0.49	74		
			10	0.48	70	0.50	74		
			11	0.44	70	0.44	74		
			12	0.39	70	0.37	74		
		B	1	0.34	69	0.34	74		
			2	0.33	69	0.34	73		
			3	0.39	70	0.39	74		
			4	0.43	70	0.43	74		
			5	0.40	69	0.40	74		
			6	0.46	70	0.46	74		
			7	0.45	69	0.46	74		
			8	0.48	68	0.50	73		
			9	0.49	68	0.50	73		
			10	0.48	69	0.47	73		
			11	0.41	69	0.42	73		
			12	0.39	68	0.34	73		
		Avg Delta P & Temp		**0.432083**	**69.42**	**0.42708**	**73.75**		
		Avg SQRT Delta P		**0.65592**		**0.65166**			
		Average gas stream velocity, ft/sec.		**37.10**		**37.03**			
		Vol. flow rate @ actual conditions, wacf/min		**10929**		**10909**			
		Vol. flow rate at standard conditions, dscf/min		**10617**		**10475**			
		Average Vol. flow rate at standard conditions, dscf/min				**10546**			

Comments _____

Determination of Stack Gas Velocity - Method 2

Client	Chemours	**Operator**	JM	**Pitot Coeff (Cp)**	0.84
Location/Plant	Fayetteville NC	**Date**	17-May-18	**Stack Area, ft² (As)**	4.910
Source	Polymer	**W.O. Number**		**Pitot Tube/Thermo ID**	

Run Number	Pre 2	Post 2	
Time	1151-1201	1313-1326	
Barometric Press, in Hg (Pb)	29.88	29.88	
Static Press, in H_20 (Pstatic)	-0.22	-0.20	
Source Moisture, % (BWS)	2.71	2.93	
O_2, %	20.9	20.9	
CO_2, %	0.0	0.0	

Cyclonic Flow Determination		Traverse Location		Zero Check good ? Y / N		Zero Check good ? Y / N		Zero Check good ? Y / N	
Delta P at O°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
		A	1	0.27	74	0.28	75		
			2	0.35	74	0.33	75		
			3	0.46	74	0.41	75		
			4	0.44	74	0.47	75		
			5	0.45	74	0.50	75		
			6	0.47	74	0.48	75		
			7	0.47	74	0.47	75		
			8	0.49	74	0.48	75		
			9	0.49	74	0.52	75		
			10	0.50	74	0.50	75		
			11	0.44	74	0.44	75		
			12	0.37	74	0.40	75		
		B	1	0.34	74	0.32	76		
			2	0.34	73	0.38	75		
			3	0.39	74	0.42	75		
			4	0.43	74	0.40	75		
			5	0.40	74	0.42	75		
			6	0.46	74	0.42	75		
			7	0.46	74	0.47	75		
			8	0.50	73	0.51	75		
			9	0.50	73	0.49	75		
			10	0.47	73	0.46	75		
			11	0.42	73	0.39	75		
			12	0.34	73	0.36	75		
		Avg Delta P & Temp		0.42708	73.75	0.43000	75.04		
		Avg SQRT Delta P		0.65166		0.65388			
		Average gas stream velocity, ft/sec.		37.03		37.22			
		Vol. flow rate @ actual conditions, wacf/min		10909		10964			
		Vol. flow rate at standard conditions, dscf/min		10475		10479			
		Average Vol. flow rate at standard conditions, dscf/min		10477					

Comments _____

Determination of Stack Gas Velocity - Method 2

Client	Chemours	**Operator**	JM	**Pitot Coeff (Cp)**	0.84
Location/Plant	Fayetteville NC	**Date**	17-May-18	**Stack Area, ft² (As)**	4.910
Source	Polymer	**W.O. Number**		**Pitot Tube/Thermo ID**	

Run Number	Pre 3	Post 3	
Time	14313-1326	1500-1515	
Barometric Press, in Hg (Pb)	29.88	29.89	
Static Press, in H_20 (Pstatic)	-0.20	-0.22	
Source Moisture, % (BWS)	2.93	2.62	
O_2, %	20.9	20.9	
CO_2, %	0.0	0.0	

Cyclonic Flow Determination		Traverse Location		Zero Check good ? Y / N		Zero Check good ? Y / N		Zero Check good ? Y / N	
Delta P at O°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
		A	1	0.28	75.0	0.34	72		
			2	0.33	75.0	0.34	72		
			3	0.41	75.0	0.43	72		
			4	0.47	75.0	0.45	72		
			5	0.50	75.0	0.52	72		
			6	0.48	75.0	0.46	72		
			7	0.47	75.0	0.52	72		
			8	0.48	75.0	0.45	72		
			9	0.52	75.0	0.50	72		
			10	0.50	75.0	0.49	72		
			11	0.44	75.0	0.46	72		
			12	0.40	75.0	0.41	72		
		B	1	0.32	76.0	0.33	72		
			2	0.38	75.0	0.34	74		
			3	0.42	75.0	0.40	74		
			4	0.40	75.0	0.43	74		
			5	0.42	75.0	0.41	74		
			6	0.42	75.0	0.44	74		
			7	0.47	75.0	0.51	74		
			8	0.51	75.0	0.51	74		
			9	0.49	75.0	0.49	74		
			10	0.46	75.0	0.46	74		
			11	0.39	75.0	0.41	74		
			12	0.36	75.0	0.39	74		
		Avg Delta P & Temp		0.43000	75.0	0.43708	72.92		
		Avg SQRT Delta P		0.65388		0.65960			
		Average gas stream velocity, ft/sec.		37.22		37.44			
		Vol. flow rate @ actual conditions, wacf/min		10964		11030			
		Vol. flow rate at standard conditions, dscf/min		10479		10621			
		Average Vol. flow rate at standard conditions, dscf/min		10550					

Comments _____

Determination of Moisture Content in Stack Gases - Method 4
Wet Bulb / Dry Bulb

Client	Chemours	**Source**	Polymer	**Operator**	MW		
Location/Plant	Fayetteville, NC	**W.O.**		**Date**	5/17/2018		

Run Number	1	2	3	4
Location	Polymer	Polymer	Polymer	Polymer
Barometric Press, in. Hg (Pb)	29.88	29.88	29.88	29.88
Static Press, in. H_20 (Pstatic)	-0.22	-0.22	-0.22	-0.20
Dry Bulb Temperture,°F (Td)	69.4	73.8	75.0	72.9
Wet Bulb Temperture,°F (Tw)	69.0	73.0	75.0	72.0
Delta T = Td-Tw, (ΔT)	0.4	0.8	0	0.9
Vapor Press H_20 at Tw (Vp), from table	0.7144	0.8183	0.875	0.7912
Absolute stack static pressure, inches Hg (Ps)	29.864	29.864	29.864	29.865
Partial Press of H_2O (PP)	0.7101	0.8097	0.8750	0.7815
Moisture, % (BWS)	2.38%	2.71%	2.93%	2.62%

Vapor Pressure of Water

°F	"Hg	°F	"Hg	°F	"Hg	F	"Hg	F	"Hg	°F	"Hg
2	0.0417	47	0.324	80	1.032		2.829		6.85	179	14.96
4	0.0463	48	0.3364	81	1.066		2.911		7.024	180	15.29
6	0.0517	49	0.3493	82	1.102		2.995		7.202	181	15.63
8	0.0571	50	0.3626	83	1.138		3.081		7.384	182	15.98
10	0.0631	51	0.3764	84	1.175		3.169		7.569	183	16.34
12	0.0696	52	0.3906	85	1.213		3.259		7.759	184	16.7
14	0.0768	53	0.4052	86	1.253		3.351		7.952	185	17.07
16	0.0846	54	0.4203	87	1.293		3.446		8.15	186	17.44
18	0.0932	55	0.4359	88	1.335		3.543		8.351	187	17.82
20	0.1205	56	0.452	89	1.378		3.642		8.557	188	18.21
22	0.1127	57	0.4686	90	1.422		3.744		8.767	189	18.61
24	0.1248	58	0.4858	91	1.467		3.848		8.981	190	19.01
26	0.137	59	0.5035	92	1.513		3.954		9.2	191	19.42
27	0.1429	60	0.5218	93	1.561		4.063		9.424	192	19.84
28	0.1502	61	0.5407	94	1.61		4.174		9.652	193	20.27
29	0.1567	62	0.5601	95	1.66		4.289		9.885	194	20.7
30	0.1647	63	0.5802	96	1.712		4.406		10.12	195	21.14
31	0.1716	64	0.6009	97	1.765		4.525		10.36	196	21.59
32	0.1803	65	0.6222	98	1.819		4.647		10.61	197	22.05
33	0.1878	66	0.6442	99	1.875		4.772		10.86	198	22.52
34	0.1955	67	0.6669	100	1.932		4.9		11.12	199	22.99
35	0.2035	68	0.6903	101	1.992		5.031		11.38	200	23.47
36	0.2188	69	0.7144	102	2.052		5.165		11.65	201	23.96
37	0.2203	70	0.7392	103	2.114		5.302		11.92	202	24.46
38	0.2292	71	0.7648	104	2.178		5.442		12.2	203	24.97
39	0.2383	72	0.7912	105	2.243		5.585		12.48	204	25.48
40	0.2478	73	0.8183	106	2.31		5.732		12.77	205	26
41	0.2576	74	0.8462	107	2.379		5.881		13.07	206	26.53
42	0.2677	75	0.875	108	2.449		6.034		13.37	207	27.07
43	0.2782	76	0.9046	109	2.521		6.19		13.67	208	27.62
44	0.2891	77	0.9352	110	2.596		6.35		13.98	209	28.18
45	0.3004	78	0.9666	111	2.672		6.513		14.3	210	28.75
46	0.312	79	0.9989	112	2.749		6.68		14.62	211	29.33
										212	29.92

Ps = Pb + (Pstatic / 13.6)

Comments:

$$PP = Vp - \frac{(Ps - Vp) * T}{2800 - (1.3 * Tw)}$$

BWS = (PP / Ps) * 100

METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

File: C:\Users\Administrator.WSWCEQUIP2\Desktop\DATA\Chemours\051718 polymers.cem
Program Version: 2.0, built 21 Feb 2015 **File Version:** 2.02
Computer: WSWCEQUIP2 **Trailer:** 26
Analog Input Device: MCC USB-1608G

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 1440**
Full-Scale Output, mv	**1000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.0**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 1440**
Full-Scale Output, mv	**1000**
Analyzer Range, %	**20.0**
Span Concentration, %	**16.6**

CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

Start Time: 08:47

O_2

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

Calibration Standards

%	**Cylinder ID**
12.0	SG9164618
21.0	SG9169108

Calibration Results

Zero	-2 mv
Span, 21.0 %	841 mv

Curve Coefficients

Slope	**Intercept**
40.14	-2

CO_2

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

Calibration Standards

%	**Cylinder ID**
8.9	SG9164618
16.6	SG9169108

Calibration Results

Zero	0 mv
Span, 16.6 %	833 mv

Curve Coefficients

Slope	**Intercept**
50.24	0

CALIBRATION ERROR DATA

Number 1

Client: **Chemours** Project Number:
Location: **Fayetteville, nc** Operator: **SDR**
Source: **Polymer** Calibration **1** Date: **17 May 2018**

Start Time: 08:47

O_2
Method: EPA 3A
Span Conc. 21.0 %
Slope 40.14 **Intercept** -2.0

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

CO_2
Method: EPA 3A
Span Conc. 16.6 %
Slope 50.24 **Intercept** 0.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.9	9.0	0.1	0.6	Pass
16.6	16.6	0.0	0.0	Pass

BIAS

Number 1

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

Start Time: 08:53

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

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

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

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

RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Calibration **1**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

Time	O_2 %	CO_2 %
10:44	21.1	0.2
10:45	21.1	0.2
10:46	21.1	0.2
10:47	21.0	0.2
10:48	21.0	0.2
10:49	21.0	0.2
10:50	21.0	0.2
10:51	21.0	0.2
10:52	21.0	0.2
10:53	21.0	0.1
10:54	21.0	0.1
10:55	21.0	0.1
10:56	21.0	0.1
10:57	21.0	0.1
10:58	21.0	0.1
10:59	21.0	0.1
11:00	21.0	0.1
11:01	21.0	0.1
11:02	21.0	0.1
11:03	21.0	0.1
11:04	21.0	0.1
11:05	21.0	0.2
11:06	21.0	0.1
11:07	21.0	0.2
11:08	21.0	0.2
11:09	21.0	0.2
11:10	21.0	0.2
11:11	21.0	0.1
11:12	21.0	0.2
11:13	21.0	0.1
11:14	21.0	0.1
11:15	21.0	0.1
11:16	21.0	0.1
11:17	21.0	0.1
11:18	21.0	0.1
11:19	21.0	0.1
11:20	21.0	0.1
11:21	21.0	0.1
11:22	21.0	0.1
11:23	21.0	0.1
11:24	21.0	0.1
11:25	21.0	0.1

RUN DATA

Number 1

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

Time	O_2 %	CO_2 %
11:26	21.0	0.1
11:27	21.0	0.1
11:28	21.0	0.1
11:29	21.0	0.1
11:30	20.9	0.2
11:31	21.0	0.2
11:32	21.0	0.2
11:33	21.0	0.2
11:34	21.0	0.2
11:35	21.0	0.1
11:36	21.0	0.1
11:37	21.0	0.1
11:38	21.0	0.1
11:39	21.0	0.1
11:40	21.0	0.1
11:41	21.0	0.1
11:42	21.0	0.1
11:43	21.0	0.1
Avgs	**21.0**	**0.1**

RUN SUMMARY

Number 1

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Calibration **1**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

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

Time: 10:43 to 11:43

Run Averages

	21.0	0.1

Pre-run Bias at 08:53

Zero Bias	-0.1	0.1
Span Bias	12.0	9.0
Span Gas	12.0	8.9

Post-run Bias at 11:46

Zero Bias	0.0	0.2
Span Bias	12.0	8.7
Span Gas	12.0	8.9

Averages corrected for the average of the pre-run and post-run bias

	20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

Start Time: 11:46

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

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

Calibration Drift

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

*Bias No. 1

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	1.2	Pass
Span	9.0	8.7	-0.3	-1.8	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.2	0.1	0.6	Pass
Span	9.0	8.7	-0.3	-1.8	Pass

*Bias No. 1

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Calibration **1**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

Time	O_2 %	CO_2 %
12:05	20.9	0.1
12:06	21.0	0.1
12:07	21.0	0.1
12:08	21.0	0.1
12:09	21.0	0.1
12:10	21.0	0.1
12:11	21.0	0.1
12:12	21.0	0.1
12:13	21.0	0.1
12:14	21.0	0.1
12:15	21.0	0.1
12:16	21.0	0.1
12:17	21.0	0.1
12:18	21.0	0.1
12:19	21.0	0.1
12:20	21.1	0.1
12:21	21.1	0.1
12:22	21.1	0.1
12:23	21.1	0.1
12:24	21.1	0.1
12:25	21.1	0.1
12:26	21.1	0.1
12:27	21.1	0.1
12:28	21.1	0.1
12:29	21.1	0.1
12:30	21.1	0.1
12:31	21.1	0.1
12:32	21.1	0.1
12:33	21.1	0.1
12:34	21.1	0.1
12:35	21.1	0.1
12:36	21.1	0.1
12:37	21.1	0.1
12:38	21.0	0.1
12:39	21.0	0.1
12:40	21.0	0.1
12:41	21.1	0.1
12:42	21.0	0.1
12:43	21.0	0.1
12:44	21.1	0.1
12:45	21.1	0.1
12:46	21.1	0.1

RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Calibration **1**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

Time	O_2 %	CO_2 %
12:47	21.1	0.1
12:48	21.1	0.1
12:49	21.1	0.1
12:50	21.1	0.1
12:51	21.1	0.1
12:52	21.1	0.1
12:53	21.1	0.1
12:54	21.1	0.1
12:55	21.1	0.1
12:56	21.0	0.1
12:57	21.0	0.1
12:58	21.0	0.1
12:59	21.0	0.1
13:00	21.0	0.1
13:01	21.0	0.1
13:02	21.0	0.1
13:03	21.0	0.1
13:04	21.0	0.1
Avgs	**21.1**	**0.1**

RUN SUMMARY

Number 2

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

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

Time: 12:04 to 13:04

Run Averages

21.1	0.1

Pre-run Bias at 11:46

Zero Bias	0.0	0.2
Span Bias	12.0	8.7
Span Gas	12.0	8.9

Post-run Bias at 13:24

Zero Bias	-0.1	0.2
Span Bias	12.1	8.6
Span Gas	12.0	8.9

Averages corrected for the average of the pre-run and post-run bias

20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

Start Time: 13:24

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

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

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	-0.1	-0.1	-0.5	Pass
Span	12.0	12.1	0.1	0.5	Pass

*Bias No. 2

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	1.2	Pass
Span	9.0	8.6	-0.4	-2.4	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.2	0.2	0.0	0.0	Pass
Span	8.7	8.6	-0.1	-0.6	Pass

*Bias No. 2

RUN DATA

Number 3

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Calibration **1**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

Time	O_2 %	CO_2 %
13:53	21.0	0.0
13:54	21.0	0.0
13:55	21.0	0.0
13:56	21.0	0.0
13:57	21.0	0.0
13:58	21.0	0.0
13:59	21.0	0.0
14:00	21.0	0.0
14:01	21.0	0.0
14:02	21.0	0.0
14:03	21.0	0.0
14:04	21.0	0.0
14:05	21.0	0.0
14:06	21.0	0.0
14:07	21.0	0.0
14:08	21.0	0.0
14:09	21.0	0.0
14:10	21.0	0.0
14:11	21.0	0.0
14:12	21.0	0.0
14:13	21.0	0.0
14:14	21.0	0.0
14:15	21.0	0.0
14:16	21.0	0.0
14:17	21.0	0.0
14:18	21.0	0.0
14:19	21.0	0.0
14:20	21.0	0.0
14:21	21.0	0.0
14:22	21.0	0.0
14:23	21.0	0.0
14:24	21.0	0.0
14:25	21.0	0.0
14:26	21.0	0.0
14:27	21.0	0.0
14:28	21.0	0.0
14:29	21.0	0.0
14:30	21.0	0.0
14:31	21.0	0.0
14:32	21.0	0.0
14:33	21.0	0.0
14:34	21.0	0.0

RUN DATA

Number 3

Client: **Chemours**
Location: **Fayetteville, nc**
Source: **Polymer**

Calibration **1**

Project Number:
Operator: **SDR**
Date: **17 May 2018**

Time	O_2 %	CO_2 %
14:35	21.0	0.0
14:36	21.0	0.0
14:37	21.0	0.0
14:38	21.0	0.0
14:39	21.0	0.0
14:40	21.0	0.0
14:41	21.0	0.0
14:42	21.0	0.0
14:43	21.0	0.0
14:44	21.0	0.0
14:45	21.0	0.0
14:46	21.0	0.0
14:47	21.0	0.0
14:48	21.0	0.0
14:49	21.0	0.0
14:50	21.0	0.0
14:51	21.0	0.0
14:52	21.0	0.0
Avgs	**21.0**	**0.0**

RUN SUMMARY

Number 3

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

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

Time: 13:52 to 14:52

Run Averages

	21.0	0.0

Pre-run Bias at 13:24

Zero Bias	-0.1	0.2
Span Bias	12.1	8.6
Span Gas	12.0	8.9

Post-run Bias at 14:55

Zero Bias	0.1	-0.2
Span Bias	12.0	8.5
Span Gas	12.0	8.9

Averages corrected for the average of the pre-run and post-run bias

	20.9	0.0

BIAS AND CALIBRATION DRIFT

Number 4

Client: **Chemours** | Project Number:
Location: **Fayetteville, nc** | Operator: **SDR**
Source: **Polymer** | Calibration **1** | Date: **17 May 2018**

Start Time: 14:55

O_2
Method: EPA 3A
Span Conc. 21.0 %

Bias Results

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

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	-0.1	0.1	0.2	1.0	Pass
Span	12.1	12.0	-0.1	-0.5	Pass

*Bias No. 3

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	-0.2	-0.2	-1.2	Pass
Span	9.0	8.5	-0.5	-3.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.2	-0.2	-0.4	-2.4	Pass
Span	8.6	8.5	-0.1	-0.6	Pass

*Bias No. 3

APPENDIX C
LABORATORY ANALYTICAL DESCRIPTION AND ANALYTICAL REPORTS

Note: The full analytical reports are included on the attached CD.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 140-11587-2

Job Description: E-1 Field Test Low Level Re-analysis

Contract Number: LBIO-67048

For:

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

Attention: Michael Aucoin

Approved for release.
Courtney M Adkins
Project Manager I
8/14/2018 3:05 PM

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

08/14/2018
Revision: 1

Table of Contents

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Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

Glossary

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

Method Summary

Client: Chemours Company FC, LLC The
Project/Site: E-1 Field Test Low Level Re-analysis

TestAmerica Job ID: 140-11587-2

Method	Method Description	Protocol	Laboratory
8260B SIM	Volatile Organic Compounds (GC/MS)	SW846	TAL KNX
MeOH Prep	Methanol Impinger Preparation	None	TAL KNX

Protocol References:

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

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

Sample Summary

Client: Chemours Company FC, LLC The
Project/Site: E-1 Field Test Low Level Re-analysis

TestAmerica Job ID: 140-11587-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-11587-1	O-2460 R1 IMPINGER #1 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-2	O-2461 R1 IMPINGER #2 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-3	O-2462 R1 IMPINGER #3 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-4	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-5	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-6	O-2465 R1 IMPINGER #6 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-7	O-2466 R2 IMPINGER #1 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-8	O-2467 R2 IMPINGER #2 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-9	O-2468 R2 IMPINGER #3 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-10	O-2469 R2 IMPINGER #4 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-11	O-2470 R2 IMPINGER #5 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-12	O-2471 R2 IMPINGER #6 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-13	O-2472 R3 IMPINGER #1 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-14	O-2473 R3 IMPINGER #2 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-15	O-2474 R3 IMPINGER #3 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-16	O-2475 R3 IMPINGER #4 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-17	O-2476 R3 IMPINGER #5 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-18	O-2477 R3 IMPINGER #6 WITH MEOH RINSE	Air	05/17/18 00:00	05/18/18 09:53
140-11587-19	O-2478 QC IMPINGER #1 WITH MEOH RINSE BT	Air	05/17/18 00:00	05/18/18 09:53
140-11587-20	O-2479 QC IMPINGER #2 WITH MEOH RINSE BT	Air	05/17/18 00:00	05/18/18 09:53
140-11587-21	O-2480 QC IMPINGER #3 WITH MEOH RINSE BT	Air	05/17/18 00:00	05/18/18 09:53
140-11587-22	O-2481 QC IMPINGER #4 WITH MEOH RINSE BT	Air	05/17/18 00:00	05/18/18 09:53
140-11587-23	O-2482 QC IMPINGER #5 WITH MEOH RINSE BT	Air	05/17/18 00:00	05/18/18 09:53
140-11587-24	O-2483 QC IMPINGER #6 WITH MEOH RINSE BT	Air	05/17/18 00:00	05/18/18 09:53
140-11587-25	O-2484 QC MEOH RB	Air	05/17/18 00:00	05/18/18 09:53
140-11587-26	O-2485 QC MEOH TB	Air	05/17/18 00:00	05/18/18 09:53
140-11587-27	O-2486 QC MEOH PB	Air	05/17/18 00:00	05/18/18 09:53

Job Narrative
140-11587-2

Sample Receipt

The samples were received on May 18, 2018 at 9:53 AM in good condition and properly preserved. The temperature of the cooler at receipt was 0.1° 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.

GC/MS VOA

Impinger Sample Preparation and Analysis: Impinger samples were originally analyzed for the volatile organic target analytes by purge and trap GCMS using TestAmerica Knoxville standard operating procedure KNOX-MS-0015, based on the following method:

- SW-846 8260B, "Volatile Organic Compounds by Gas Chromatography/ Mass Spectrometry (GC/MS)"

To enhance the detectability of the EPA 8260 Method the lab employed a selective ion monitoring analysis mode to use for the E-1 samples. The methanol impinger samples were reprocessed using the more aggressive analytical technique. Samples processed by this method were run outside of the standard fourteen (14) day holding time, but were stored refrigerated in their original method solvent and containers.

Each sample is prepared by adding a known amount of sample to the purge water in a purge and trap vessel and spiking with internal standards, surrogates, and matrix spike analytes (as needed). Volatile compounds are introduced into the gas chromatograph by the purge and trap method. The components are separated using a gas chromatograph and detected using a mass spectrometer, which provides both qualitative and quantitative information.

Impinger sample results were calculated using the following equation:

Concentration, µg/sample = (C × DF × W × Vt) / (Va)
Where:
C = On-column concentration, µg/L
DF = Dilution factor
W = Volume of water purged, L
Vt = Methanol extract final volume, µL
Va = Volume of extract analyzed, µL

The volumes of each sample are initially measured for the calculation of the total mass of Fluoroether E-1 in the sample. Results are reported in total micrograms (ug).

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

GC/MS VOA

Analysis Batch: 22317

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-11587-1	O-2460 R1 IMPINGER #1 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-2	O-2461 R1 IMPINGER #2 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-4	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-5	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-6	O-2465 R1 IMPINGER #6 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-7	O-2466 R2 IMPINGER #1 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-8	O-2467 R2 IMPINGER #2 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-9	O-2468 R2 IMPINGER #3 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-10	O-2469 R2 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-11	O-2470 R2 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-12	O-2471 R2 IMPINGER #6 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-13	O-2472 R3 IMPINGER #1 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-14	O-2473 R3 IMPINGER #2 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-15	O-2474 R3 IMPINGER #3 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-16	O-2475 R3 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-17	O-2476 R3 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-18	O-2477 R3 IMPINGER #6 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-19	O-2478 QC IMPINGER #1 WITH MEOH RINSE E	Total/NA	Air	8260B SIM	22604
140-11587-20	O-2479 QC IMPINGER #2 WITH MEOH RINSE E	Total/NA	Air	8260B SIM	22604
MB 140-22604/2-A	Method Blank	Total/NA	Air	8260B SIM	22604
LCS 140-22604/1-A	Lab Control Sample	Total/NA	Air	8260B SIM	22604
140-11587-4 MS	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-4 MSD	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-5 MS	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604

Analysis Batch: 22361

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-11587-3	O-2462 R1 IMPINGER #3 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-21	O-2480 QC IMPINGER #3 WITH MEOH RINSE E	Total/NA	Air	8260B SIM	22607
140-11587-22	O-2481 QC IMPINGER #4 WITH MEOH RINSE E	Total/NA	Air	8260B SIM	22607
140-11587-23	O-2482 QC IMPINGER #5 WITH MEOH RINSE E	Total/NA	Air	8260B SIM	22607
140-11587-24	O-2483 QC IMPINGER #6 WITH MEOH RINSE E	Total/NA	Air	8260B SIM	22607
140-11587-25	O-2484 QC MEOH RB	Total/NA	Air	8260B SIM	22607
140-11587-26	O-2485 QC MEOH TB	Total/NA	Air	8260B SIM	22607
140-11587-27	O-2486 QC MEOH PB	Total/NA	Air	8260B SIM	22607
MB 140-22607/2-A	Method Blank	Total/NA	Air	8260B SIM	22607
LCS 140-22607/1-A	Lab Control Sample	Total/NA	Air	8260B SIM	22607
140-11587-5 MSD	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	8260B SIM	22604
140-11587-27 MS	O-2486 QC MEOH PB	Total/NA	Air	8260B SIM	22607
140-11587-27 MSD	O-2486 QC MEOH PB	Total/NA	Air	8260B SIM	22607

Prep Batch: 22604

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-11587-1	O-2460 R1 IMPINGER #1 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-2	O-2461 R1 IMPINGER #2 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-3	O-2462 R1 IMPINGER #3 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-4	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-5	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-6	O-2465 R1 IMPINGER #6 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-7	O-2466 R2 IMPINGER #1 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-8	O-2467 R2 IMPINGER #2 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	

GC/MS VOA (Continued)

Prep Batch: 22604 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-11587-9	O-2468 R2 IMPINGER #3 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-10	O-2469 R2 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-11	O-2470 R2 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-12	O-2471 R2 IMPINGER #6 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-13	O-2472 R3 IMPINGER #1 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-14	O-2473 R3 IMPINGER #2 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-15	O-2474 R3 IMPINGER #3 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-16	O-2475 R3 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-17	O-2476 R3 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-18	O-2477 R3 IMPINGER #6 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-19	O-2478 QC IMPINGER #1 WITH MEOH RINSE E	Total/NA	Air	MeOH Prep	
140-11587-20	O-2479 QC IMPINGER #2 WITH MEOH RINSE E	Total/NA	Air	MeOH Prep	
MB 140-22604/2-A	Method Blank	Total/NA	Air	MeOH Prep	
LCS 140-22604/1-A	Lab Control Sample	Total/NA	Air	MeOH Prep	
140-11587-4 MS	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-4 MSD	O-2463 R1 IMPINGER #4 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-5 MS	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	
140-11587-5 MSD	O-2464 R1 IMPINGER #5 WITH MEOH RINSE	Total/NA	Air	MeOH Prep	

Prep Batch: 22607

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-11587-21	O-2480 QC IMPINGER #3 WITH MEOH RINSE E	Total/NA	Air	MeOH Prep	
140-11587-22	O-2481 QC IMPINGER #4 WITH MEOH RINSE E	Total/NA	Air	MeOH Prep	
140-11587-23	O-2482 QC IMPINGER #5 WITH MEOH RINSE E	Total/NA	Air	MeOH Prep	
140-11587-24	O-2483 QC IMPINGER #6 WITH MEOH RINSE E	Total/NA	Air	MeOH Prep	
140-11587-25	O-2484 QC MEOH RB	Total/NA	Air	MeOH Prep	
140-11587-26	O-2485 QC MEOH TB	Total/NA	Air	MeOH Prep	
140-11587-27	O-2486 QC MEOH PB	Total/NA	Air	MeOH Prep	
MB 140-22607/2-A	Method Blank	Total/NA	Air	MeOH Prep	
LCS 140-22607/1-A	Lab Control Sample	Total/NA	Air	MeOH Prep	
140-11587-27 MS	O-2486 QC MEOH PB	Total/NA	Air	MeOH Prep	
140-11587-27 MSD	O-2486 QC MEOH PB	Total/NA	Air	MeOH Prep	

Client Sample ID: O-2460 R1 IMPINGER #1 WITH MEOH RINSE

Lab Sample ID: 140-11587-1

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.0106	0.0106	ug/Sample		05/18/18 12:08	07/27/18 13:59	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*84*		*50 - 150*	*05/18/18 12:08*	*07/27/18 13:59*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*50 - 150*	*05/18/18 12:08*	*07/27/18 13:59*	*1*

Client Sample ID: O-2461 R1 IMPINGER #2 WITH MEOH RINSE

Lab Sample ID: 140-11587-2

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00952	0.00952	ug/Sample		05/18/18 12:08	07/27/18 14:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*83*		*50 - 150*	*05/18/18 12:08*	*07/27/18 14:24*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*50 - 150*	*05/18/18 12:08*	*07/27/18 14:24*	*1*

Client Sample ID: O-2462 R1 IMPINGER #3 WITH MEOH RINSE

Lab Sample ID: 140-11587-3

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00764	0.00764	ug/Sample		05/18/18 12:08	07/30/18 15:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*93*		*50 - 150*	*05/18/18 12:08*	*07/30/18 15:34*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*50 - 150*	*05/18/18 12:08*	*07/30/18 15:34*	*1*

Client Sample ID: O-2463 R1 IMPINGER #4 WITH MEOH RINSE

Lab Sample ID: 140-11587-4

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00708	0.00708	ug/Sample		05/18/18 12:08	07/27/18 15:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*77*		*50 - 150*	*05/18/18 12:08*	*07/27/18 15:13*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*50 - 150*	*05/18/18 12:08*	*07/27/18 15:13*	*1*

Client Sample ID: O-2464 R1 IMPINGER #5 WITH MEOH RINSE

Lab Sample ID: 140-11587-5

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00654	0.00654	ug/Sample		05/18/18 12:08	07/27/18 15:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*87*		*50 - 150*	*05/18/18 12:08*	*07/27/18 15:37*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*50 - 150*	*05/18/18 12:08*	*07/27/18 15:37*	*1*

Client Sample ID: O-2465 R1 IMPINGER #6 WITH MEOH RINSE

Lab Sample ID: 140-11587-6

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	**0.00744**	H	0.00672	0.00672	ug/Sample		05/18/18 12:08	07/27/18 16:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*91*		*50 - 150*	*05/18/18 12:08*	*07/27/18 16:02*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*50 - 150*	*05/18/18 12:08*	*07/27/18 16:02*	*1*

Client Sample ID: O-2466 R2 IMPINGER #1 WITH MEOH RINSE

Lab Sample ID: 140-11587-7

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	**0.00864**	H	0.00760	0.00760	ug/Sample		05/18/18 12:08	07/27/18 16:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*93*		*50 - 150*	*05/18/18 12:08*	*07/27/18 16:26*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:08*	*07/27/18 16:26*	*1*

Client Sample ID: O-2467 R2 IMPINGER #2 WITH MEOH RINSE

Lab Sample ID: 140-11587-8

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	**0.0100**	H	0.00682	0.00682	ug/Sample		05/18/18 12:08	07/27/18 16:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*92*		*50 - 150*	*05/18/18 12:08*	*07/27/18 16:50*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:08*	*07/27/18 16:50*	*1*

Client Sample ID: O-2468 R2 IMPINGER #3 WITH MEOH RINSE

Lab Sample ID: 140-11587-9

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.0100	H	0.00750	0.00750	ug/Sample		05/18/18 12:08	07/27/18 17:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*94*		*50 - 150*	*05/18/18 12:08*	*07/27/18 17:15*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*50 - 150*	*05/18/18 12:08*	*07/27/18 17:15*	*1*

Client Sample ID: O-2469 R2 IMPINGER #4 WITH MEOH RINSE

Lab Sample ID: 140-11587-10

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00708	H	0.00680	0.00680	ug/Sample		05/18/18 12:08	07/27/18 17:39	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*94*		*50 - 150*	*05/18/18 12:08*	*07/27/18 17:39*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*50 - 150*	*05/18/18 12:08*	*07/27/18 17:39*	*1*

Client Sample ID: O-2470 R2 IMPINGER #5 WITH MEOH RINSE

Lab Sample ID: 140-11587-11

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00812	H	0.00663	0.00663	ug/Sample		05/18/18 12:08	07/27/18 18:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*92*		*50 - 150*	*05/18/18 12:08*	*07/27/18 18:04*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:08*	*07/27/18 18:04*	*1*

Client Sample ID: O-2471 R2 IMPINGER #6 WITH MEOH RINSE

Lab Sample ID: 140-11587-12

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00798	H	0.00749	0.00749	ug/Sample		05/18/18 12:08	07/27/18 18:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*93*		*50 - 150*	*05/18/18 12:08*	*07/27/18 18:28*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*50 - 150*	*05/18/18 12:08*	*07/27/18 18:28*	*1*

Client Sample ID: O-2472 R3 IMPINGER #1 WITH MEOH RINSE

Lab Sample ID: 140-11587-13

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.0110	H	0.0109	0.0109	ug/Sample		05/18/18 12:08	07/27/18 18:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*93*		*50 - 150*	*05/18/18 12:08*	*07/27/18 18:52*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*50 - 150*	*05/18/18 12:08*	*07/27/18 18:52*	*1*

Client Sample ID: O-2473 R3 IMPINGER #2 WITH MEOH RINSE

Lab Sample ID: 140-11587-14

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.0126	H	0.0104	0.0104	ug/Sample		05/18/18 12:08	07/27/18 19:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*93*		*50 - 150*	*05/18/18 12:08*	*07/27/18 19:17*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*50 - 150*	*05/18/18 12:08*	*07/27/18 19:17*	*1*

Client Sample ID: O-2474 R3 IMPINGER #3 WITH MEOH RINSE

Lab Sample ID: 140-11587-15

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00915	H	0.00705	0.00705	ug/Sample		05/18/18 12:08	07/27/18 19:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*91*		*50 - 150*	*05/18/18 12:08*	*07/27/18 19:41*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:08*	*07/27/18 19:41*	*1*

Client Sample ID: O-2475 R3 IMPINGER #4 WITH MEOH RINSE

Lab Sample ID: 140-11587-16

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00824	H	0.00744	0.00744	ug/Sample		05/18/18 12:08	07/27/18 20:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*91*		*50 - 150*	*05/18/18 12:08*	*07/27/18 20:06*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*50 - 150*	*05/18/18 12:08*	*07/27/18 20:06*	*1*

Client Sample ID: O-2476 R3 IMPINGER #5 WITH MEOH RINSE

Lab Sample ID: 140-11587-17

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00714	H	0.00708	0.00708	ug/Sample		05/18/18 12:08	07/27/18 20:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*90*		*50 - 150*	*05/18/18 12:08*	*07/27/18 20:30*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:08*	*07/27/18 20:30*	*1*

Client Sample ID: O-2477 R3 IMPINGER #6 WITH MEOH RINSE

Lab Sample ID: 140-11587-18

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00988	H	0.00711	0.00711	ug/Sample		05/18/18 12:08	07/27/18 20:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*94*		*50 - 150*	*05/18/18 12:08*	*07/27/18 20:55*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*50 - 150*	*05/18/18 12:08*	*07/27/18 20:55*	*1*

Client Sample ID: O-2478 QC IMPINGER #1 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-19

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00668	0.00668	ug/Sample		05/18/18 12:08	07/27/18 21:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*94*		*50 - 150*	*05/18/18 12:08*	*07/27/18 21:19*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*50 - 150*	*05/18/18 12:08*	*07/27/18 21:19*	*1*

Client Sample ID: O-2479 QC IMPINGER #2 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-20

Date Collected: 05/17/18 00:00
Matrix: Air
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00738	0.00738	ug/Sample		05/18/18 12:08	07/27/18 21:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*94*		*50 - 150*	*05/18/18 12:08*	*07/27/18 21:43*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:08*	*07/27/18 21:43*	*1*

Client Sample ID: O-2480 QC IMPINGER #3 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-21

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00785	0.00785	ug/Sample		05/18/18 12:11	07/30/18 12:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*79*		*50 - 150*	*05/18/18 12:11*	*07/30/18 12:40*	*1*
1,2-Dichloroethane-d4 (Surr)	*87*		*50 - 150*	*05/18/18 12:11*	*07/30/18 12:40*	*1*

Client Sample ID: O-2481 QC IMPINGER #4 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-22

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00776	0.00776	ug/Sample		05/18/18 12:11	07/30/18 13:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*82*		*50 - 150*	*05/18/18 12:11*	*07/30/18 13:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*50 - 150*	*05/18/18 12:11*	*07/30/18 13:05*	*1*

Client Sample ID: O-2482 QC IMPINGER #5 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-23

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00678	0.00678	ug/Sample		05/18/18 12:11	07/30/18 13:29	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*84*		*50 - 150*	*05/18/18 12:11*	*07/30/18 13:29*	*1*
1,2-Dichloroethane-d4 (Surr)	*90*		*50 - 150*	*05/18/18 12:11*	*07/30/18 13:29*	*1*

Client Sample ID: O-2483 QC IMPINGER #6 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-24

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.00687	0.00687	ug/Sample		05/18/18 12:11	07/30/18 13:56	1

Client Sample ID: O-2483 QC IMPINGER #6 WITH MEOH RINSE BT

Lab Sample ID: 140-11587-24

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*88*		*50 - 150*	*05/18/18 12:11*	*07/30/18 13:56*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*50 - 150*	*05/18/18 12:11*	*07/30/18 13:56*	*1*

Client Sample ID: O-2484 QC MEOH RB

Lab Sample ID: 140-11587-25

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.0145	0.0145	ug/Sample		05/18/18 12:11	07/30/18 14:20	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*91*		*50 - 150*	*05/18/18 12:11*	*07/30/18 14:20*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*50 - 150*	*05/18/18 12:11*	*07/30/18 14:20*	*1*

Client Sample ID: O-2485 QC MEOH TB

Lab Sample ID: 140-11587-26

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.0104	0.0104	ug/Sample		05/18/18 12:11	07/30/18 14:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*93*		*50 - 150*	*05/18/18 12:11*	*07/30/18 14:45*	*1*
1,2-Dichloroethane-d4 (Surr)	*97*		*50 - 150*	*05/18/18 12:11*	*07/30/18 14:45*	*1*

Client Sample ID: O-2486 QC MEOH PB

Lab Sample ID: 140-11587-27

Date Collected: 05/17/18 00:00
Date Received: 05/18/18 09:53
Sample Container: Plastic 125mL - unpreserved

Matrix: Air

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	ND	H	0.0141	0.0141	ug/Sample		05/18/18 12:11	07/30/18 15:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*94*		*50 - 150*	*05/18/18 12:11*	*07/30/18 15:09*	*1*
1,2-Dichloroethane-d4 (Surr)	*99*		*50 - 150*	*05/18/18 12:11*	*07/30/18 15:09*	*1*

Default Detection Limits

Client: Chemours Company FC, LLC The
Project/Site: E-1 Field Test Low Level Re-analysis

TestAmerica Job ID: 140-11587-2

Method: 8260B SIM - Volatile Organic Compounds (GC/MS)

Prep: MeOH Prep

Analyte	RL	MDL	Units	Method
Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether	0.00250	0.00250	ug/Sample	8260B SIM

APPENDIX D
SAMPLE CALCULATIONS

SAMPLE CALCULATIONS FOR VOLUMETRIC FLOW & MOISTURE

Client: Chemours
Test Number: Run 1 Pre Test
Test Location: Polymer Stack

Plant: Fayetteville, NC
Test Date: 5/17/2018
Test Period: 1043-1143

1. Moisture Content

BWS	=	(PP / Ps) * 100
BWS	=	0.710 / 29.864 = 2.38
Where:		
BWS	=	Moisture, %
PP	=	Partial Press of H2O
Ps	=	Absolute stack static pressure, inches Hg (Ps)

2. Mole fraction of dry gas.

Md	=	1 - Bws
Md	=	1 - 0.0238 = 0.976
Where:		
Md	=	Mole fraction of dry gas, dimensionless.

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

MWd	=	(0.440 x % CO_2) + (0.320 x % O_2) + (0.280 x (% N_2 + % CO))
MWd	=	(0.440 x 0.00) + (0.320 x 20.90) + (0.280 x (79.10 + 0.00))
	=	28.84
Where:		
MWd	=	Dry molecular weight , lb/lb-mole.
% CO_2	=	Percent carbon dioxide by volume, dry basis.
% O_2	=	Percent oxygen by volume, dry basis.
% N_2	=	Percent nitrogen by volume, dry basis.
% CO	=	Percent carbon monoxide by volume, dry basis.
0.440	=	Molecular weight of carbon dioxide, divided by 100.
0.320	=	Molecular weight of oxygen, divided by 100.
0.280	=	Molecular weight of nitrogen or carbon monoxide, divided by 100.

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

MWs	=	(MWd x Md) + (18 x (1 - Md))
MWs	=	(28.84 x 0.976) + (18 x (1 - 0.976)) = 28.58
Where:		
MWs	=	Molecular weight of wet gas, lb/lb-mole.
18	=	Molecular weight of water, lb/lb-mole.

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

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

$$Vs = 85.49 \times 0.84 \times 0.655924 \times \left(\frac{529}{29.86 \times 28.58} \right)^{1/2} = 37.1$$

Where:

Vs = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, ft/sec x $\frac{(lb/lb\text{-}mole)(in.\ Hg)^{1/2}}{(deg\ R)(in\ H2O)}$

Cp = Pitot tube coefficient, dimensionless.

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

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

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

6. Average gas stream volumetric flowrate at actual conditions, wacf/min.

Qs(act) = 60 x Vs x As

Qs(act) = 60 x 37.10 x 4.91 = 10929

Where:

Qs(act) = Volumetric flowrate of wet stack gas at actual conditions, wacf/min.

As = Cross-sectional area of stack, ft^2.

7. Average gas stream dry volumetric flowrate at standard conditions, dscf/min.

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

$$Qs(std) = 17.64 \times 0.976 \times \frac{29.864}{529} \times 10929$$

= 10617

Where:

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

SAMPLE CALCULATIONS FOR
E-1

Client: Chemours | **Plant: Fayetteville, NC**
Test Number: Run 1 | **Test Date: 5/17/2018**
Test Location: Polymers | **Test Period: 1043-1143**

1. E-1 concentration, lbs/dscf.

$$Conc_1 = \frac{W \times 2.2046 \times 10^{-9}}{Vm(std)}$$

$$Conc_1 = \frac{\leq 0.0281 \times 2.2046 \times 10e\text{-}9}{1.063}$$

$Conc_1 = \leq$ 5.84E-11

Where:

W = Weight of E-1 collected in sample in ug.

$Conc_1$ = E-1 concentration, lbs/dscf.

$2.2046x10^{-9}$ = Conversion factor from ug to lbs.

Vm(std) = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.

2. E-1 concentration, ug/dscm.

$Conc_2$ = W / (Vm(std) x 0.02832)

$Conc_2 = \leq$ 0.0281 / (1.063 x 0.02832)

$Conc_2 = \leq$ 66.8

Where:

$Conc_2$ = E-1 concentration, ug/dscm.

0.02832 = Conversion factor from cubic feet to cubic meters.

3. E-1 mass emission rate, lbs/hr.

$Mass\ Rate_1$ = $Conc_1$ x Qs(std) x 60 min/hr

$Mass\ Rate_1 = \leq$ 5.84E-11 x 10546 x 60

$Mass\ Rate_1 = \leq$ 3.69E-05

Where:

$Mass\ Rate_1$ = E-1 mass emission rate, lbs/hr.

4. E-1 mass emission rate, g/sec.

$Mass\ Rate_2$ = $Mass\ Rate_1$ x 453.59 / 3600

$Mass\ Rate_2 = \leq$ 3.69E-05 x 453.59 /3600

$Mass\ Rate_2 = \leq$ 4.65E-06

Where:

$Mass\ Rate_2$ = E-1 mass emission rate, g/sec.

453.6 = Conversion factor from pounds to grams.

3600 = Conversion factor from hours to seconds.

APPENDIX E
EQUIPMENT CALIBRATION RECORDS

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

Calibrator PM **VOST Box Number** VOST 8 **Ambient Temp** 72

Date 28-Jul-17 **Wet Test Meter Number** 10BB-1 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 3602380

Setting			Gas Volume		Temperatures				Baro Press, in Hg (Pb)	29.64
Liters per minute	Roto-meter	Orifice Manometer in H_2O (ΔH)	Wet Test Meter liters (Vw)	Dry gas Meter liters (Vd)	Wet Test Meter °F (Tw)	Dry Gas Meter Outlet, °C (Td_o)	Dry Gas Meter Inlet, °C (Td_i)	Dry Gas Meter Average, °F (Td)	Time, min (O)	Results Y
0.50	0.50	0.30	5.0	0.000	72.5	23.90	23.90	75.0	8.9	1.0147
				4.947		23.90	23.90			
				4.947		23.90	23.90			
0.50	0.50	0.30	5.0	0.000	72.5	23.90	23.90	75.0	8.9	1.0122
				4.959		23.90	23.90			
				4.959		23.90	23.90			
1.0	1.0	0.65	10.0	0.000	72.5	23.90	23.90	75.5	9.9	1.0175
				9.867		24.50	24.50			
				9.867		24.20	24.20			
1.0	1.0	0.65	10.0	0.000	72.5	24.50	24.50	76.0	10.0	1.0154
				9.897		24.50	24.50			
				9.897		24.50	24.50			
									Average	**1.0150**

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

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

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

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

Reference Temperature Select Temperature ○ °C ◉ °F	Temperature Reading from Individual Thermocouple Input [1] Channel Number 1	2	3	4	5	6	Average Temperature Reading	Temp Difference [2] (%)
32	32	32	32	32			32.0	0.0%
212	213	213	213	213			212.0	0.0%
932	932	932	932	932			931.0	0.0%
1832	1829	1829	1829	1829			1830.0	0.1%

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

2 - Acceptable Temperature Difference less than 1.5 %

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

Post Test Wet Test Meter Calibration Datasheet for VOST Dry Gas Meter Console

Calibrator MDW **VOST Box Number** 8 **Client** Chemours

Date 15-Aug-18 **Wet Test Meter Number** 10BB-1 **Location/Plant** Fayetteville, NC

Dry Gas Meter Number 3602380 **PreTest Y** 1.015

Setting			Gas Volume		Temperatures				Baro Press, in Hg (Pb)	29.75
			Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter				Results
Liters per minute	Roto-meter	Orifice Manometer in H_20 (ΔH)	liters (Vw)	liters (Vd)	°F (Tw)	Outlet, °C (Td_o)	Inlet, °C (Td_i)	Average, °F (Td)	Time, min (O)	Y
0.50	0.50	1.00	10.0	0.000 10.100 10.100	72.0	24.00	24.00	75.0	11.8	0.9932
0.50	0.50	1.00	10.0	0.000 10.000 10.001	72.0	24.00	24.00	75.0	11.7	1.0031
0.50	0.50	1.00	10.0	0.000 9.998 9.998	72.0	24.00	24.00	75.0	11.5	1.0034
									Average	**0.9999**
									Difference[1]	**0.0151**

1 - Tolerance for Y is less than 0.0500

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

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

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

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

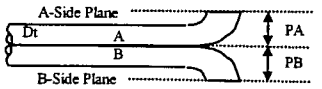
No Long Calibration Required

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-558**

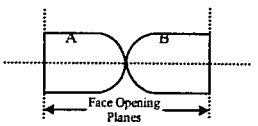
Inspection Date 1/31/18 Individual Conducting Inspection KS

If all Criteria PASS Cp is equal to 0.84

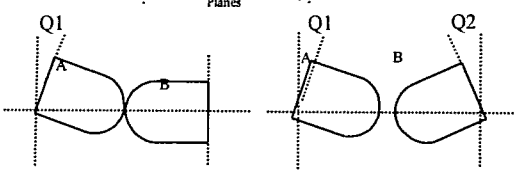


		PASS/FAIL
Distance to A Plane (PA) - inches	0.47	PASS
Distance to B Plane (PB) - inches	0.47	PASS
Pitot OD (D_t) - inches	0.375	

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

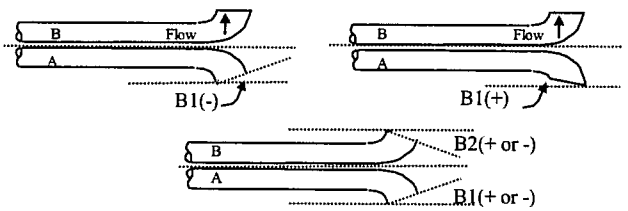


Are Open Faces Aligned Perpendicular to the Tube Axis: ◉ YES ○ NO — PASS



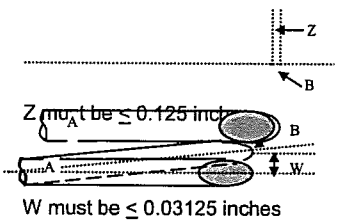
Q1 and Q2 must be ≤ 10°

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



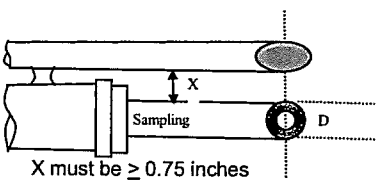
B1 or B2 must be ≤ 5°

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



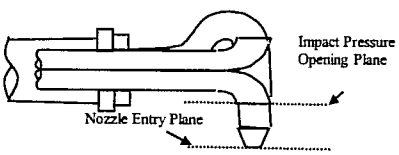
W must be ≤ 0.03125 inches

Horizontal offset between A and B Tubes (Z) - inches	0.008	PASS
Vertical offset between A and B Tubes (W) - inches	0.016	PASS

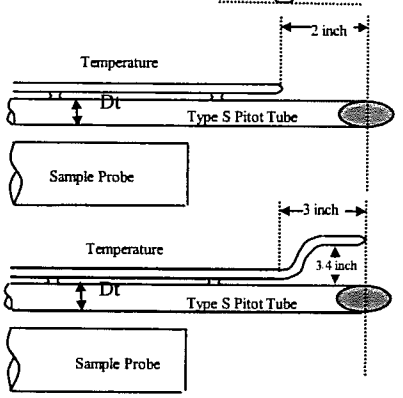


X must be ≥ 0.75 inches

Distance between Sample Nozzle and Pitot (X) - inches: NA



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



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

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

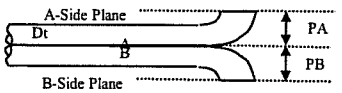
P-558.7ft.VP.xls

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-698**

Inspection Date 3/30/18 Individual Conducting Inspection SR

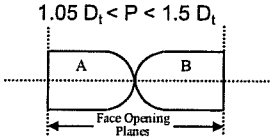
If all Criteria PASS Cp is equal to 0.84



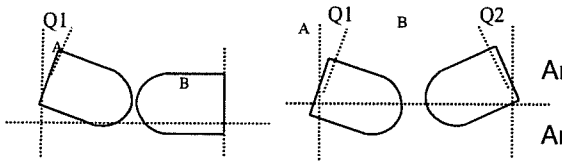
		PASS/FAIL
Distance to A Plane (PA) - inches	0.475	PASS
Distance to B Plane (PB) - inches	0.475	PASS
Pitot OD (D_t) - inches	0.375	

$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB

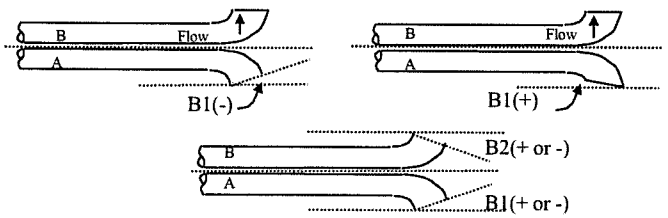


Are Open Faces Aligned Perpendicular to the Tube Axis — ◉ YES ○ NO — PASS



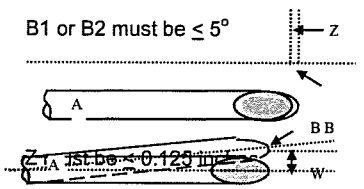
Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	0	PASS

Q1 and Q2 must be ≤ 10°



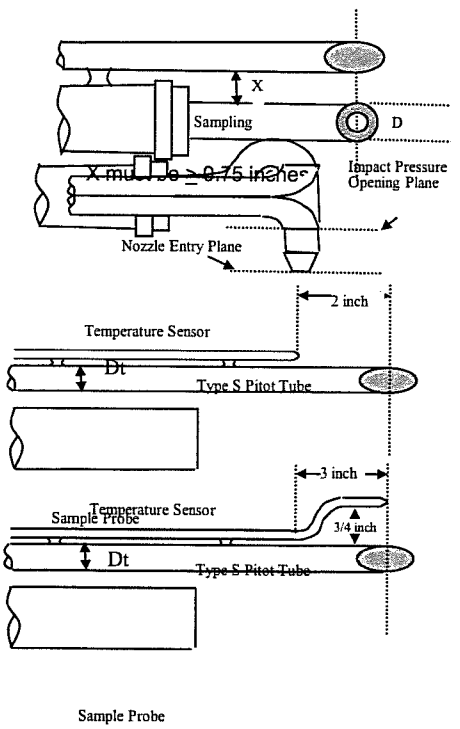
Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	0	PASS

B1 or B2 must be ≤ 5°



Horizontal offset between A and B Tubes (Z) - inches	0.009	PASS
Vertical offset between A and B Tubes (W) - inches	0.005	PASS

W must be ≤ 0.03125 inches



Sample Probe

Distance between Sample Nozzle and Pitot (X) - inches	N/A	PASS

Impact Pressure Opening Plane is above the Nozzle Entry Plane	○ YES ○ NO ◉ NA	
Thermocouple meets the Distance Criteria in the adjacent figure	○ YES ○ NO ◉ NA	
Thermocouple meets the Distance Criteria in the adjacent figure	◉ YES ○ NO ○ NA	

P-698.7FT VEL

Airgas
an Air Liquide company

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

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

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

Expiration Date: Nov 18, 2025

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

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

ANALYTICAL RESULTS

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

CALIBRATION STANDARDS

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

ANALYTICAL EQUIPMENT

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

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

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

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	82-401151034-1
Cylinder Number:	SG9164618	Cylinder Volume:	150.5 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Mar 16, 2018

Expiration Date: Mar 16, 2026

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

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.948 %	G1	+/- 0.7% NIST Traceable	03/16/2018
OXYGEN	12.00 %	11.98 %	G1	+/- 0.4% NIST Traceable	03/16/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060609	CC413575	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019
NTRMplus	09060208	CC262337	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-19GYCXEG	NDIR	Feb 23, 2018
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Feb 23, 2018

Triad Data Available Upon Request

Signature on file
Approved for Release

APPENDIX F
LIST OF PROJECT PARTICIPANTS

The following WESTON employees participated in this project.

Paul Meeter	Senior Project Manager
Steve Rathfon	Team Leader
Kyle Schweitzer	Team Member
Matt Winkeler	Team Member
Jack Mills	Team Member