# FLUOROMONOMERS AND PPA MANUFACTURING PROCESSES CARBON ADSORPTION BED EMISSIONS TEST REPORT TEST DATES: 19, 20, 25 AND 26 JULY 2018

## THE CHEMOURS COMPANY FAYETTEVILLE, NORTH CAROLINA

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4 December 2018

W.O. No. 15418.002.006

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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 Polymers Processing Aid (PPA) manufacturing areas, Wastewater Treatment, and Powerhouse.

Chemours contracted Weston Solutions, Inc. (WESTON) to perform HFPO Dimer Acid Fluoride, captured as HFPO Dimer Acid emission testing on two sources at the facility (VE North and PPA Carbon Beds). Testing was performed on 19, 20, 25 and 26 July 2018 and generally followed the "Emission Test Protocol" reviewed and approved by the North Carolina Department of Environmental Quality (NCDEQ). This report provides the results from the emission test program.

## 1.2 TEST OBJECTIVES

The specific objectives for this test program were as follows:

- Measure the emissions concentrations and mass emissions rates of HFPO Dimer Acid Fluoride from the VE North and PPA Carbon Bed inlets and outlets which are located in the Fluoromonomers and PPA processes.
- Calculate the carbon bed removal efficiency for HFPO Dimer Acid.
- Monitor and record process and emissions control data in conjunction with the test program.
- Provide representative emissions data.

## 1.3 TEST PROGRAM OVERVIEW

During the emissions test program, the concentrations and mass emissions rates of HFPO Dimer Acid Fluoride were measured on four sources.

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

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

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

## Table 1-1
## Sampling Plan for VE North Carbon Bed Periodic Testing

| **Sampling Point & Location** | **VE North Carbon Bed** | | | | |
|---|---|---|---|---|---|
| Number of Tests: | 6 (3 inlet and 3 outlet) | | | | |
| Parameters To Be Tested: | HFPO Dimer Acid (HFPO-DA) | Volumetric Flow Rate and Gas Velocity | Carbon Dioxide | Oxygen | Water Content |
| Sampling or Monitoring Method | EPA M-0010 | EPA M1, M2, M3A, and M4 in conjunction with M-0010 tests | EPA M3/3A | | EPA M4 in conjunction with M-0010 tests |
| Sample Extraction/ Analysis Method(s): | LC/MS/MS | NA[6] | NA | | NA |
| Sample Size | ≥ 1.5m$^3$ | NA | NA | NA | NA |
| Total Number of Samples Collected[1] | 6 | 6 | 6 | 6 | 6 |
| Reagent Blanks (Solvents, Resins)[1] | 1 set | 0 | 0 | 0 | 0 |
| Field Blank Trains[1] | 1 per source | 0 | 0 | 0 | 0 |
| Proof Blanks[1] | 1 per train | 0 | 0 | 0 | 0 |
| Trip Blanks[1,2] | 1 set | 0 | 0 | 0 | |
| Lab Blanks | 1 per fraction[3] | 0 | 0 | 0 | 0 |
| Laboratory or Batch Control Spike Samples (LCS) | 1 per fraction[3] | 0 | 0 | 0 | 0 |
| Laboratory or Batch Control Spike Sample Duplicate (LCSD) | 1 per fraction[3] | 0 | 0 | 0 | 0 |
| Media Blanks | 1 set[4] | 0 | 0 | 0 | 0 |
| Isotope Dilution Internal Standard Spikes | Each sample | 0 | 0 | 0 | 0 |
| Total No. of Samples | 10[5] | 4 | 4 | 4 | 4 |

Key:

[1] Sample collected in field.

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

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

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

[5] Actual number of samples collected in field.

[6] Not applicable.

## Table 1-2
## Sampling Plan for PPA Carbon Bed Periodic Testing

| **Sampling Point & Location** | **PPA Carbon Bed** | | | | |
|---|---|---|---|---|---|
| Number of Tests: | 4 (2 inlet and 2 outlet) | | | | |
| Parameters To Be Tested: | HFPO Dimer Acid (HFPO-DA) | Volumetric Flow Rate and Gas Velocity | Carbon Dioxide | Oxygen | Water Content |
| Sampling or Monitoring Method | EPA M-0010 | EPA M1, M2, M3A, and M4 in conjunction with M-0010 tests | EPA M3/3A | | EPA M4 in conjunction with M-0010 tests |
| Sample Extraction/ Analysis Method(s): | LC/MS/MS | NA[6] | NA | | NA |
| Sample Size | ≥ 1.5m$^3$ | NA | NA | NA | NA |
| Total Number of Samples Collected[1] | 4 | 4 | 4 | 4 | 4 |
| Reagent Blanks (Solvents, Resins)[1] | 1 set | 0 | 0 | 0 | 0 |
| Field Blank Trains[1] | 1 per source | 0 | 0 | 0 | 0 |
| Proof Blanks[1] | 1 per train | 0 | 0 | 0 | 0 |
| Trip Blanks[1,2] | 1 set | 0 | 0 | 0 | |
| Lab Blanks | 1 per fraction[3] | 0 | 0 | 0 | 0 |
| Laboratory or Batch Control Spike Samples (LCS) | 1 per fraction[3] | 0 | 0 | 0 | 0 |
| Laboratory or Batch Control Spike Sample Duplicate (LCSD) | 1 per fraction[3] | 0 | 0 | 0 | 0 |
| Media Blanks | 1 set[4] | 0 | 0 | 0 | 0 |
| Isotope Dilution Internal Standard Spikes | Each sample | 0 | 0 | 0 | 0 |
| Total No. of Samples | 8[5] | 4 | 4 | 4 | 4 |

Key:

[1] Sample collected in field.

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

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

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

[5] Actual number of samples collected in field.

[6] Not applicable.

## 2. SUMMARY OF TEST RESULTS

A total of three test runs were performed on the VE North carbon bed inlet and outlet. Two test runs (during Hydrolysis) were performed on the PPA (with dip tube in) carbon bed inlet and outlet (stack). Table 2-1 provides a summary of the HFPO Dimer Acid carbon bed emissions test results and removal efficiency. Detailed test results summaries are provided in Section 6.

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

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

| | Inlet | | Outlet | | Removal Efficiency |
|---|---|---|---|---|---|
| | g/sec | lb/hr | g/sec | lb/hr | % |
| PPA Carbon Bed | | | | | |
| R1 | 5.81E-4 | 4.62E-3 | 1.23E-5 | 9.73E-5 | 97.9 |
| R2 | 3.37E-4 | 2.67E-3 | 7.23E-6 | 5.75E-5 | 97.8 |
| Average | 4.59E-4 | 3.65E-3 | 9.74E-6 | 7.79E-5 | 97.9 |
| VE North Carbon Bed | | | | | |
| R1 | 3.25E-4 | 2.58E-3 | 1.71E-5 | 1.36E-4 | 94.7 |
| R2 | 2.96E-4 | 2.35E-3 | 2.19E-5 | 1.74E-4 | 92.6 |
| R3 | 4.51E-4 | 3.58E-3 | 1.49E-5 | 1.13E-4 | 96.7 |
| Average | 3.58E-4 | 2.84E-3 | 1.80E-5 | 1.43E-4 | 95.0 |

# 3. PROCESS DESCRIPTIONS

The Fluoromonomers and PPA areas are included in the scope of this test program.

## 3.1 FLUOROMONOMERS

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

The VEN building air systems are vented to the carbon bed and connected to the Tower Exhaust Blower. At the time of testing, process emissions were not vented to the VEN carbon bed.

## 3.2 POLYMER PROCESSING AID (PPA) AREA

The PPA facility produces surfactants used to produce Chemours Teflon® as well as sales to outside producers of fluoropolymers.

Process streams are vented to a caustic wet scrubber (ACD-A1) and then vented to the carbon bed. The process inside the building is under negative pressure and the building air is also vented to the carbon bed.

## 3.3 PROCESS OPERATIONS AND PARAMETERS

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

| Source | Operation/Product | Batch or Continuous |
|---|---|---|
| VE North | EVE | Semi-continuous – Condensation is continuous Agitated Bed Reactor, Refining (ether column) is batch |
| PPA | Hydrolysis, AF Column Reboiler/Virgin<br><br>Pressure Transfers/Virgin or Purified | Continuous once it starts taking off to feed tank<br>Batch (pressure transfers from one vessel to another – every 2 hours) |

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

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

- PPA Process
  - Caustic Wet Scrubber (ACD-A1)
    - Caustic recirculation flow rate
    - Differential pressure across the packing

# 4. DESCRIPTION OF TEST LOCATIONS

## 4.1 CARBON BEDS

The two carbon beds have been installed for control of HFPO Dimer Acid Fluoride emissions and located in the VE North and PPA process areas.

## 4.2 VINYL ETHERS NORTH CARBON BED

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

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

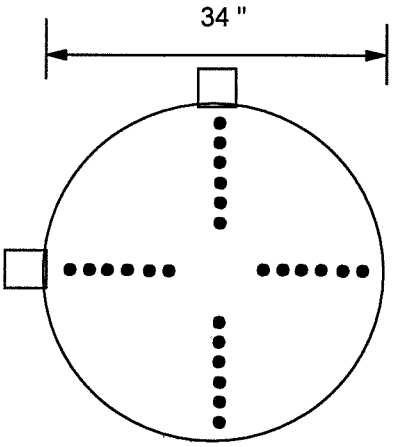
## 4.3 PPA CARBON BED

Each FRP duct at the inlet of the PPA carbon bed is 34" ID. The test ports are located a minimum of 42" (> 1.2 duct diameters) from the nearest downstream disturbance and at least 57" (> 1.7 diameters) from the nearest upstream disturbance. Based on EPA Method 1, a total of 24 traverse points (12 per port) were used for HFPO Dimer Acid sampling. Figure 4-2 provides a schematic of the test port and traverse port locations.

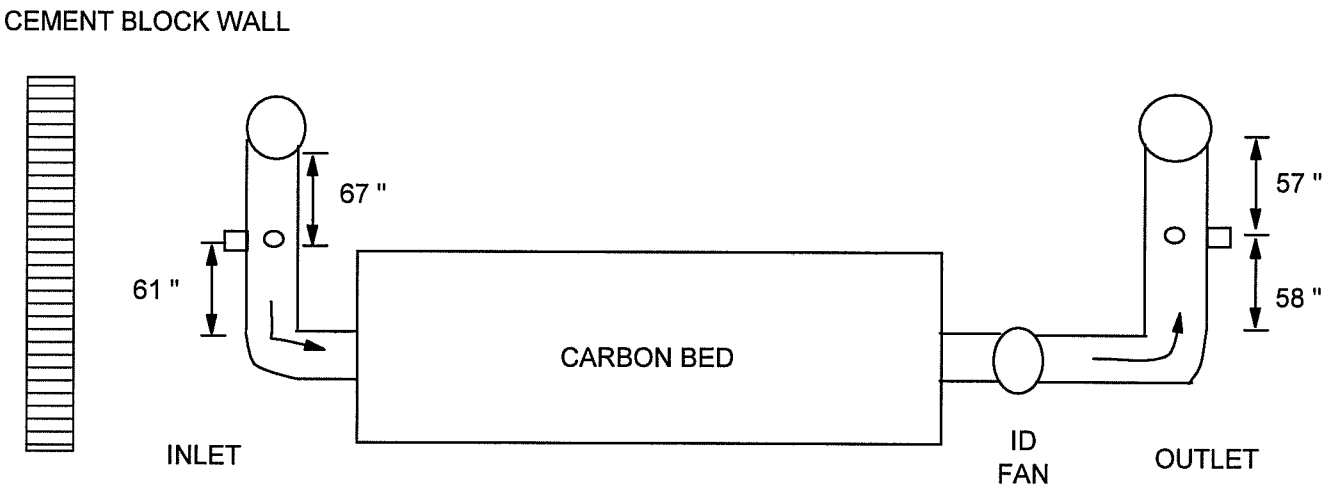
The PPA carbon bed outlet is the PPA stack. See Figure 4-3.

Two 4" ID test ports are in place on the 30" ID fiberglass stack. The ports are 12' (4.8 diameters) from the nearest downstream disturbance (a disconnected demister duct) and 32' (12.8 diameters) from the nearest upstream disturbance (stack exit.)

Per EPA Method 1, a total of 24 traverse points (12 per axis) were used for M0010 isokinetic sampling.

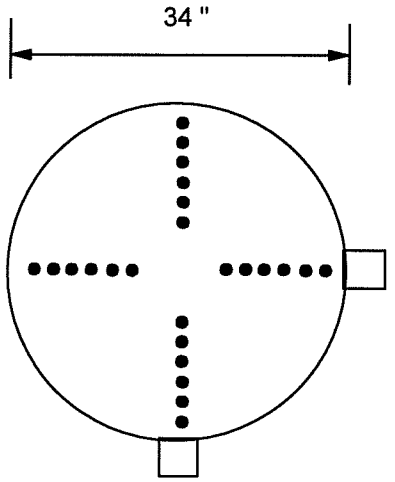


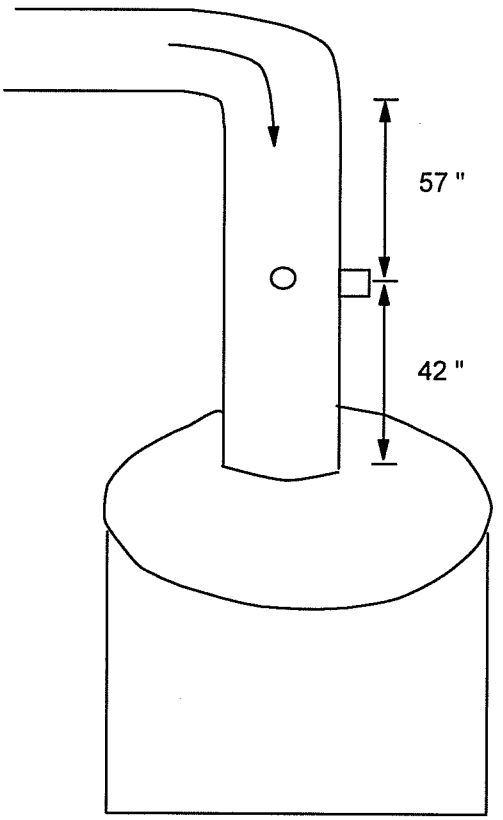

| TRAVERSE POINT NUMBER | DISTANCE FROM INSIDE NEAR WALL (INCHES) |
|---|---|
| 1 | 3/4 |
| 2 | 2 1/4 |
| 3 | 4 |
| 4 | 6 |
| 5 | 8 1/2 |
| 6 | 12 1/8 |
| 7 | 21 5/8 |
| 8 | 25 1/2 |
| 9 | 28 |
| 10 | 30 |
| 11 | 31 3/4 |
| 12 | 33 1/4 |




DRAWING NOT TO SCALE

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

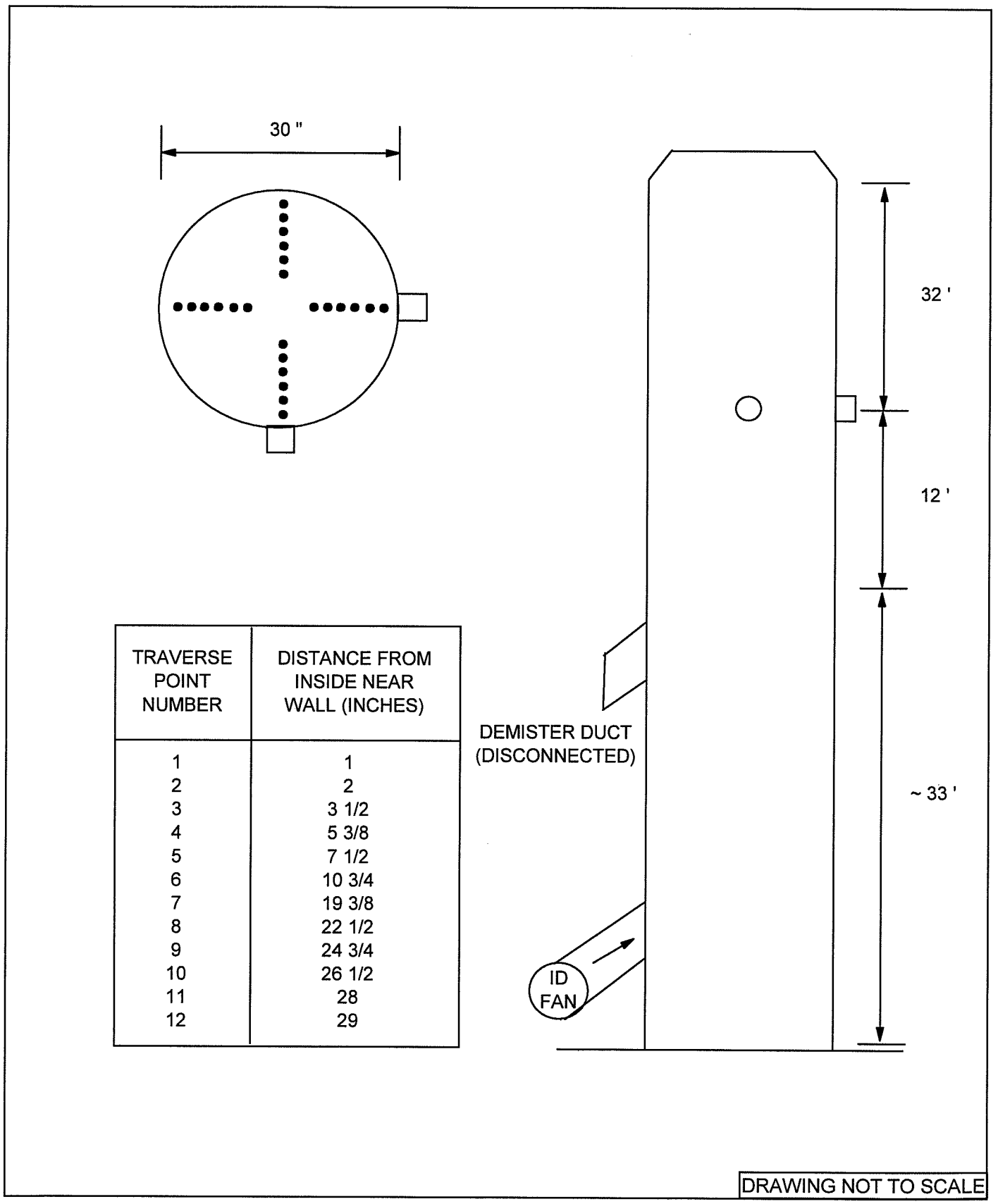



| TRAVERSE POINT NUMBER | DISTANCE FROM INSIDE NEAR WALL (INCHES) |
|---|---|
| 1 | 3/4 |
| 2 | 2 1/4 |
| 3 | 4 |
| 4 | 6 |
| 5 | 8 1/2 |
| 6 | 12 1/8 |
| 7 | 21 5/8 |
| 8 | 25 1/2 |
| 9 | 28 |
| 10 | 30 |
| 11 | 31 3/4 |
| 12 | 33 1/4 |

DRAWING NOT TO SCALE

**FIGURE 4-2**
**PPA PROCESS CARBON BED INLET SCHEMATIC**




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

**FIGURE 4-3**
**PPA EXHAUST STACK TEST PORT**
**AND TRAVERSE POINT LOCATION**

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

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

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

## 5.2 STACK PARAMETERS

### 5.2.1 EPA Method 0010

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

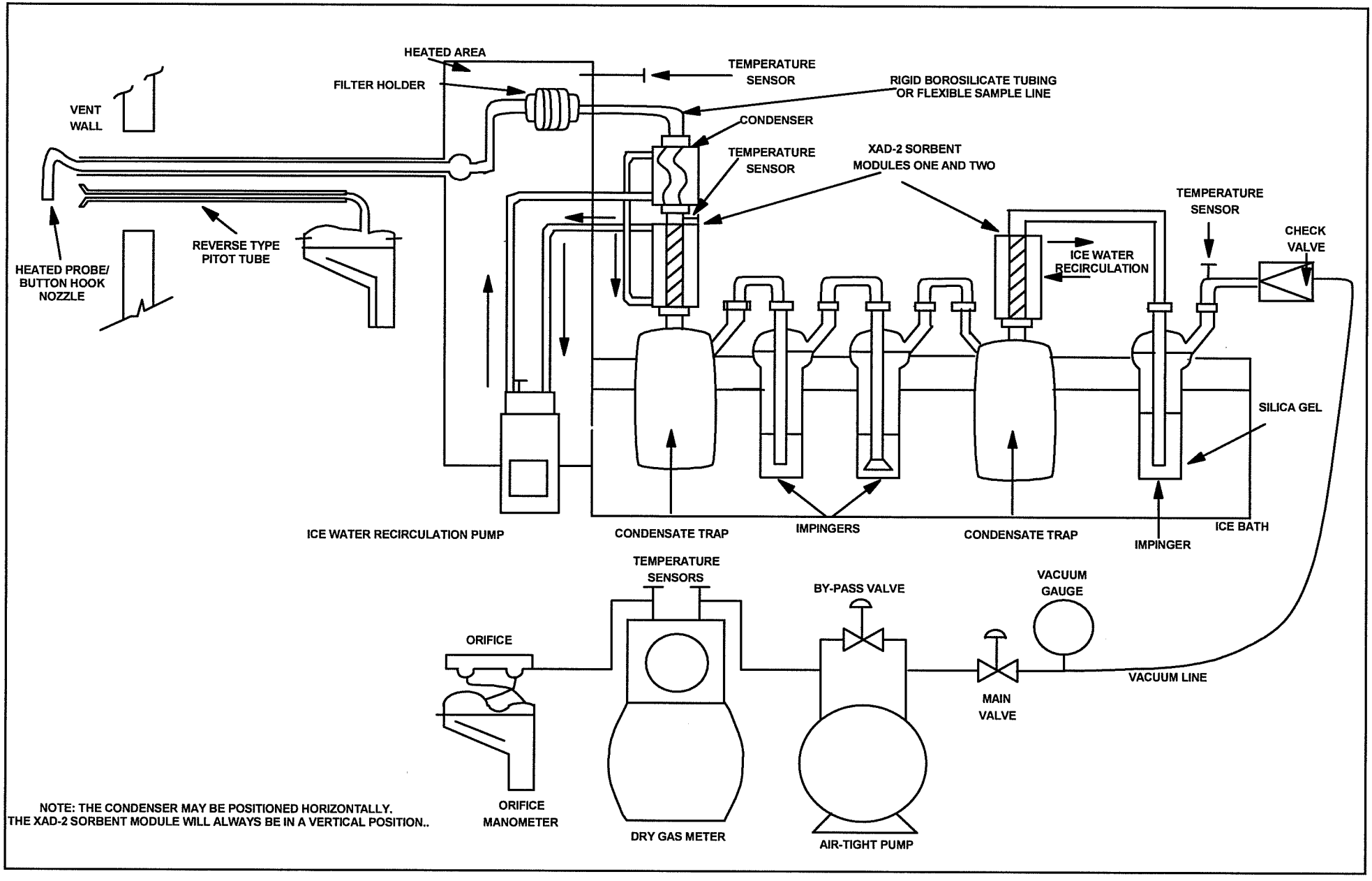



**FIGURE 5-1**
**EPA METHOD 0010 SAMPLING TRAIN**

A section of borosilicate glass [or flexible polyethylene tubing (VE North carbon bed inlet and outlet only)] connected the filter holder exit to a Grahm (spiral) type ice water-cooled condenser, an icewater-jacketed sorbent module containing approximately 40 grams of XAD-2 resin. The XAD-2 resin tube was equipped with an inlet temperature sensor. The XAD-2 resin trap was followed by a condensate knockout impinger and a series of two impingers that contained 100-ml of high purity distilled water. The train also included a second XAD-2 resin trap behind the impinger section to evaluate possible sampling train breakthrough. Each XAD-2 resin trap was connected to a 1-L condensate knockout trap. The final impinger contained 300 grams of dry pre-weighed silica gel. All impingers and the condensate traps were maintained in an ice bath. Ice water was continuously circulated in the condenser and both XAD-2 modules to maintain method required temperature. A control console with a leakless vacuum pump, a calibrated orifice, and dual inclined manometers was connected to the final impinger via an umbilical cord to complete the sample train.

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

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

### 5.2.2 EPA Method 0010 Sample Recovery

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

A consistent procedure was employed for sample recovery:

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

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

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

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

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

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

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

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

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

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

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

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

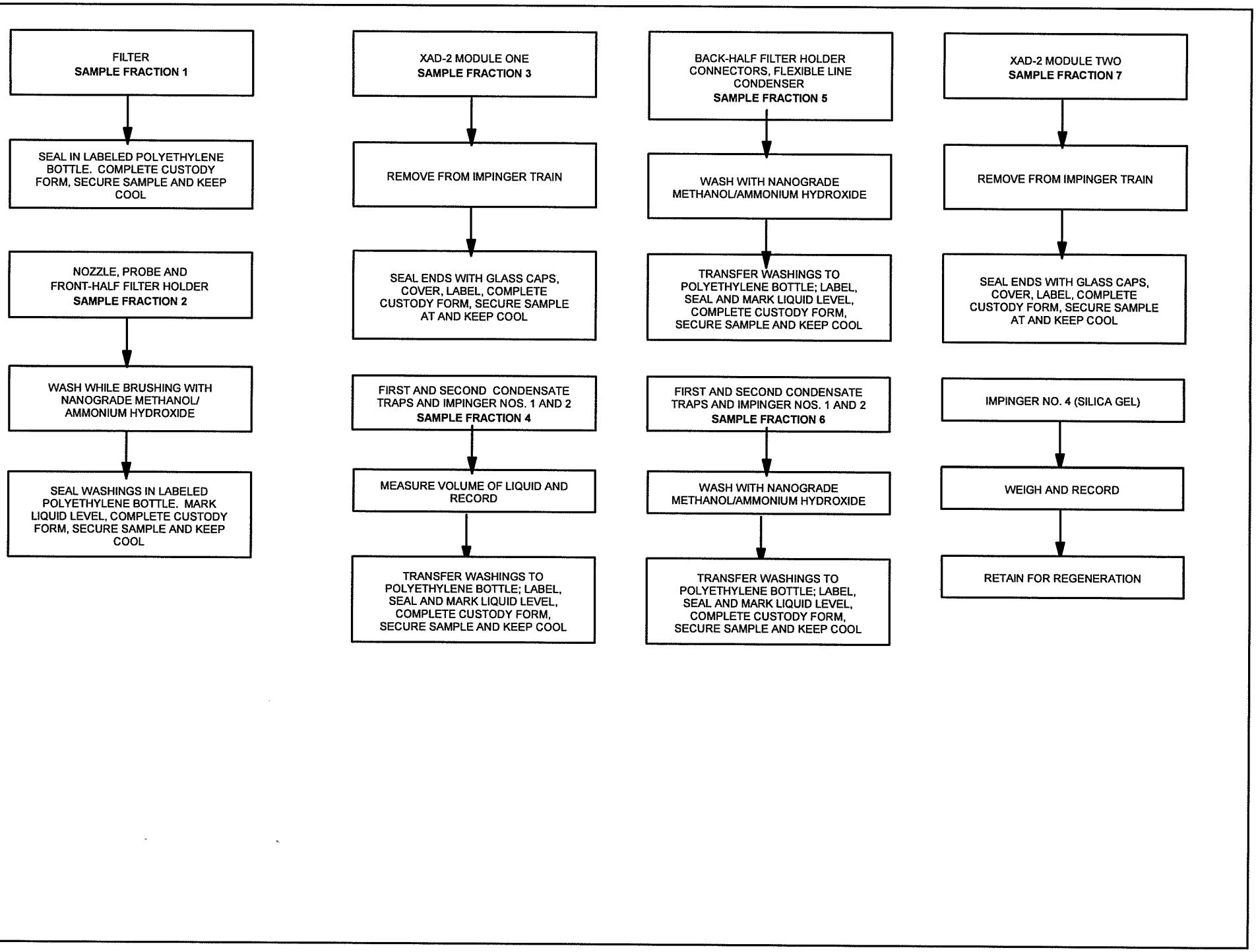



**FIGURE 5-2**
**HFPO DIMER ACID SAMPLE RECOVERY PROCEDURES FOR METHOD 0010**

IASDATA\CHEMOURS\15418.002.006\FIGURE 5-2 EPA 0010

### 5.2.3 EPA Method 0010 – Sample Analysis

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

- Front-Half Composite—comprised of the Particulate Filter, and the probe, nozzle, and front-half of the filter holder solvent rinses,
- Back-half Composite—comprised of the first XAD-2 resin material and the back-half of the filter holder with connecting glassware solvent rinses,
- Condensate Composite—comprised of the aqueous condensates and the contents of Impingers #1 and 2 with solvent rinses,
- Breakthrough XAD-2 Resin Tube—comprised of the resin tube behind the series of impingers.

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

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

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

Test America developed detailed procedures for the sample extraction and analysis for HFPO Dimer Acid..

## 5.3 GAS COMPOSITION

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

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

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

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

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

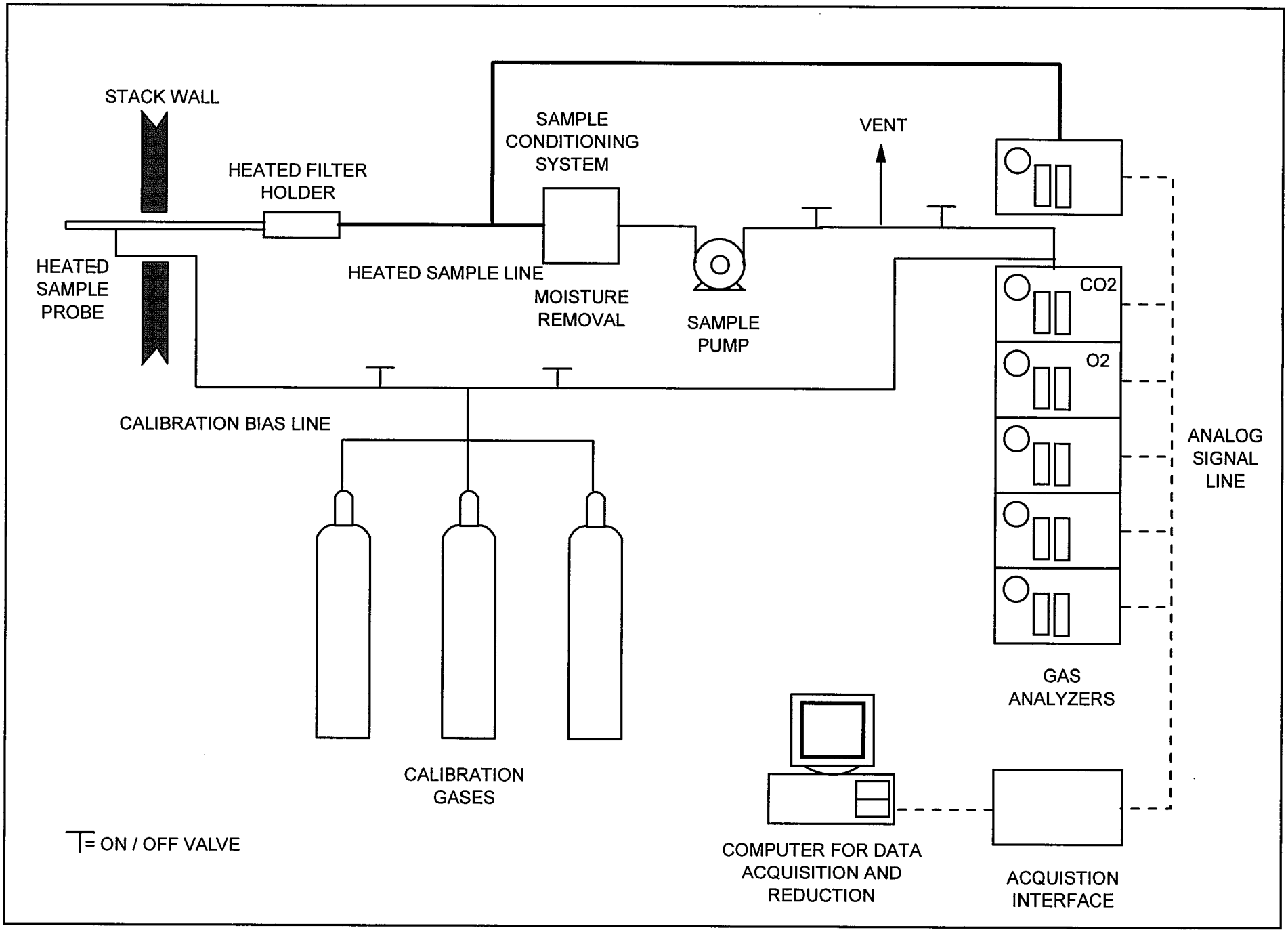



**FIGURE 5-3**
**WESTON SAMPLING SYSTEM**

IASDATA\CHEMOURS\15418.002.006\FIGURE 5-3 WESTON SAMPLING SYSTEM

# 6. DETAILED TEST RESULTS AND DISCUSSION

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

Each test was a minimum of 90 minutes in duration. A total of three test runs were performed on the VE North carbon bed and two test runs were performed on the PPA carbon bed.

Tables 6-1 through 6-4 provide detailed test data and test results for the PPA and VE North carbon beds, respectively.

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

During run 1 of the PPA Carbon Bed testing, the CEM data system shut down. The system was re-booted and recorded data for the remainder of the test.

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

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

| **Test Data** | | |
|---|---|---|
| Run number | 1 | 2 |
| Location | PPA Carbon Bed - IN | PPA Carbon Bed - IN |
| Date | 7/25/2018 | 7/26/2018 |
| Time period | 0915-1121 | 0837-1043 |
| **SAMPLING DATA:** | | |
| Sampling duration, min. | 96.0 | 96.0 |
| Nozzle diameter, in. | 0.235 | 0.235 |
| Cross sectional nozzle area, sq.ft. | 0.000301 | 0.000301 |
| Barometric pressure, in. Hg | 29.95 | 29.95 |
| Avg. orifice press. diff., in $H_2O$ | 0.88 | 0.84 |
| Avg. dry gas meter temp., deg F | 78.2 | 77.7 |
| Avg. abs. dry gas meter temp., deg. R | 538 | 538 |
| Total liquid collected by train, ml | 25.6 | 52.3 |
| Std. vol. of $H_2O$ vapor coll., cu.ft. | 1.2 | 2.5 |
| Dry gas meter calibration factor | 1.0150 | 1.0150 |
| Sample vol. at meter cond., dcf | 52.490 | 51.232 |
| Sample vol. at std. cond., dscf [1] | 52.412 | 51.197 |
| Percent of isokinetic sampling | 103.3 | 105.2 |
| **GAS STREAM COMPOSITION DATA:** | | |
| $CO_2$, % by volume, dry basis | 0.0 | 0.0 |
| $O_2$, % by volume, dry basis | 20.9 | 20.9 |
| $N_2$, % by volume, dry basis | 79.1 | 79.1 |
| Molecular wt. of dry gas, lb/lb mole | 28.84 | 28.84 |
| $H_20$ vapor in gas stream, prop. by vol. | 0.022 | 0.046 |
| Mole fraction of dry gas | 0.978 | 0.954 |
| Molecular wt. of wet gas, lb/lb mole | 28.59 | 28.34 |
| **GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:** | | |
| Static pressure, in. $H_2O$ | -2.00 | -2.00 |
| Absolute pressure, in. Hg | 29.80 | 29.80 |
| Avg. temperature, deg. F | 79 | 76 |
| Avg. absolute temperature, deg.R | 539 | 536 |
| Pitot tube coefficient | 0.84 | 0.84 |
| Total number of traverse points | 24 | 24 |
| Avg. gas stream velocity, ft./sec. | 30.7 | 30.0 |
| Stack/duct cross sectional area, sq.ft. | 6.305 | 6.305 |
| Avg. gas stream volumetric flow, wacf/min. | 11613 | 11342 |
| Avg. gas stream volumetric flow, dscf/min. | 11066 | 10614 |

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

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

| | | |
|---|---|---|
| **TEST DATA** | | |
| Run number | 1 | 2 |
| Location | PPA Carbon Bed - IN | PPA Carbon Bed - IN |
| Date | 7/25/2018 | 7/26/2018 |
| Time period | 0915-1121 | 0837-1043 |
| **LABORATORY REPORT DATA, ug.** | | |
| HFPO Dimer Acid | 165.3 | 97.53 |
| **EMISSION RESULTS, ug/dscm.** | | |
| HFPO Dimer Acid | 111.3 | 67.3 |
| **EMISSION RESULTS, lb/dscf.** | | |
| HFPO Dimer Acid | 6.95E-09 | 4.20E-09 |
| **EMISSION RESULTS, lb/hr.** | | |
| HFPO Dimer Acid | 4.62E-03 | 2.67E-03 |
| **EMISSION RESULTS, g/sec.** | | |
| HFPO Dimer Acid | 5.81E-04 | 3.37E-04 |

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

| **Test Data** | | |
|---|---|---|
| Run number | 1 | 2 |
| Location | PPA Carbon Bed - OUT | PPA Carbon Bed - OUT |
| Date | 7/25/2018 | 7/26/2018 |
| Time period | 0915-1121 | 0837-1043 |
| **SAMPLING DATA:** | | |
| Sampling duration, min. | 96.0 | 96.0 |
| Nozzle diameter, in. | 0.191 | 0.191 |
| Cross sectional nozzle area, sq.ft. | 0.000199 | 0.000199 |
| Barometric pressure, in. Hg | 29.93 | 29.85 |
| Avg. orifice press. diff., in $H_2O$ | 0.56 | 0.63 |
| Avg. dry gas meter temp., deg F | 85.3 | 83.8 |
| Avg. abs. dry gas meter temp., deg. R | 545 | 544 |
| Total liquid collected by train, ml | 30.1 | 35.9 |
| Std. vol. of $H_2O$ vapor coll., cu.ft. | 1.4 | 1.7 |
| Dry gas meter calibration factor | 0.9860 | 0.9910 |
| Sample vol. at meter cond., dcf | 43.430 | 42.835 |
| Sample vol. at std. cond., dscf [(1)] | 41.515 | 41.171 |
| Percent of isokinetic sampling | 104.1 | 102.3 |
| **GAS STREAM COMPOSITION DATA:** | | |
| $CO_2$, % by volume, dry basis | 0.0 | 0.0 |
| $O_2$, % by volume, dry basis | 20.9 | 20.9 |
| $N_2$, % by volume, dry basis | 79.1 | 79.1 |
| Molecular wt. of dry gas, lb/lb mole | 28.84 | 28.84 |
| $H_20$ vapor in gas stream, prop. by vol. | 0.033 | 0.039 |
| Mole fraction of dry gas | 0.967 | 0.961 |
| Molecular wt. of wet gas, lb/lb mole | 28.48 | 28.41 |
| **GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:** | | |
| Static pressure, in. $H_2O$ | 0.23 | 0.22 |
| Absolute pressure, in. Hg | 29.95 | 29.87 |
| Avg. temperature, deg. F | 84 | 86 |
| Avg. absolute temperature, deg.R | 544 | 546 |
| Pitot tube coefficient | 0.84 | 0.84 |
| Total number of traverse points | 24 | 24 |
| Avg. gas stream velocity, ft./sec. | 37.1 | 37.9 |
| Stack/duct cross sectional area, sq.ft. | 4.91 | 4.91 |
| Avg. gas stream volumetric flow, wacf/min. | 10920 | 11150 |
| Avg. gas stream volumetric flow, dscf/min. | 10253 | 10343 |

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

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

| | | |
|---|---|---|
| **TEST DATA** | | |
| Run number | 1 | 2 |
| Location | PPA Carbon Bed - OUT | PPA Carbon Bed - OUT |
| Date | 7/25/2018 | 7/26/2018 |
| Time period | 0915-1121 | 0837-1043 |
| **LABORATORY REPORT DATA, ug.** | | |
| HFPO Dimer Acid | 2.980 | 1.729 |
| **EMISSION RESULTS, ug/dscm.** | | |
| HFPO Dimer Acid | 2.5 | 1.5 |
| **EMISSION RESULTS, lb/dscf.** | | |
| HFPO Dimer Acid | 1.58E-10 | 9.26E-11 |
| **EMISSION RESULTS, lb/hr.** | | |
| HFPO Dimer Acid | 9.73E-05 | 5.75E-05 |
| HFPO Dimer Acid (From Inlet Data) | 4.62E-03 | 2.67E-03 |
| **EMISSION RESULTS, g/sec.** | | |
| HFPO Dimer Acid | 1.23E-05 | 7.23E-06 |
| **Carbon Bed Removal Efficiency, %** | 97.9 | 97.8 |

**TABLE 6-3**
**CHEMOURS - FAYETTEVILLE, NC**
**SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS**
**VE NORTH CARBON BED INLET**

| **Test Data** | | | |
|---|---|---|---|
| Run number | 1 | 2 | 3 |
| Location | VEN-CBed IN | VEN-CBed IN | VEN-CBed IN |
| Date | 7/19/2018 | 7/20/2018 | 7/20/2018 |
| Time period | 0952 -1428 | 0847-1054 | 1300-1504 |
| **SAMPLING DATA:** | | | |
| Sampling duration, min. | 96.0 | 96.0 | 96.0 |
| Nozzle diameter, in. | 0.218 | 0.215 | 0.215 |
| Cross sectional nozzle area, sq.ft. | 0.000259 | 0.000252 | 0.000252 |
| Barometric pressure, in. Hg | 30.05 | 30.04 | 30.04 |
| Avg. orifice press. diff., in $H_2O$ | 1.32 | 1.23 | 1.23 |
| Avg. dry gas meter temp., deg F | 93.6 | 81.1 | 87.5 |
| Avg. abs. dry gas meter temp., deg. R | 554 | 541 | 547 |
| Total liquid collected by train, ml | 48.0 | 61.7 | 56.8 |
| Std. vol. of $H_2O$ vapor coll., cu.ft. | 2.3 | 2.9 | 2.7 |
| Dry gas meter calibration factor | 0.9860 | 0.9860 | 0.9860 |
| Sample vol. at meter cond., dcf | 66.613 | 63.717 | 64.187 |
| Sample vol. at std. cond., dscf [1] | 63.096 | 61.713 | 61.444 |
| Percent of isokinetic sampling | 100.0 | 101.3 | 101.1 |
| **GAS STREAM COMPOSITION DATA:** | | | |
| $CO_2$, % by volume, dry basis | 0.0 | 0.0 | 0.0 |
| $O_2$, % by volume, dry basis | 20.9 | 20.9 | 20.9 |
| $N_2$, % by volume, dry basis | 79.1 | 79.1 | 79.1 |
| Molecular wt. of dry gas, lb/lb mole | 28.84 | 28.84 | 28.84 |
| $H_20$ vapor in gas stream, prop. by vol. | 0.035 | 0.045 | 0.042 |
| Mole fraction of dry gas | 0.965 | 0.955 | 0.958 |
| Molecular wt. of wet gas, lb/lb mole | 28.46 | 28.35 | 28.38 |
| **GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:** | | | |
| Static pressure, in. $H_2O$ | -4.20 | -4.20 | -4.20 |
| Absolute pressure, in. Hg | 29.74 | 29.73 | 29.73 |
| Avg. temperature, deg. F | 93 | 89 | 94 |
| Avg. absolute temperature, deg.R | 553 | 549 | 554 |
| Pitot tube coefficient | 0.84 | 0.84 | 0.84 |
| Total number of traverse points | 24 | 24 | 24 |
| Avg. gas stream velocity, ft./sec. | 46.1 | 46.0 | 46.1 |
| Stack/duct cross sectional area, sq.ft. | 6.31 | 6.31 | 6.31 |
| Avg. gas stream volumetric flow, wacf/min. | 17456 | 17385 | 17453 |
| Avg. gas stream volumetric flow, dscf/min. | 15985 | 15872 | 15839 |

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

**TABLE 6-3 (cont.)**
**CHEMOURS - FAYETTEVILLE, NC**
**SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS**
**VE NORTH CARBON BED INLET**

| **TEST DATA** | | | |
|---|---|---|---|
| Run number | 1 | 2 | 3 |
| Location | VEN-CBed IN | VEN-CBed IN | VEN-CBed IN |
| Date | 7/19/2018 | 7/20/2018 | 7/20/2018 |
| Time period | 0952 -1428 | 0847-1054 | 1300-1504 |
| **LABORATORY REPORT DATA, ug.** | | | |
| HFPO Dimer Acid | 77.08 | 69.21 | 105.09 |
| **EMISSION RESULTS, ug/dscm.** | | | |
| HFPO Dimer Acid | 43.13 | 39.60 | 60.39 |
| **EMISSION RESULTS, lb/dscf.** | | | |
| HFPO Dimer Acid | 2.69E-09 | 2.47E-09 | 3.77E-09 |
| **EMISSION RESULTS, lb/hr.** | | | |
| HFPO Dimer Acid | 2.58E-03 | 2.35E-03 | 3.58E-03 |
| **EMISSION RESULTS, g/sec.** | | | |
| HFPO Dimer Acid | 3.25E-04 | 2.96E-04 | 4.51E-04 |

**TABLE 6-4**
**CHEMOURS - FAYETTEVILLE, NC**
**SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS**
**VE NORTH CARBON BED OUTLET**

| **Test Data** | | | |
|---|---|---|---|
| Run number | 1 | 2 | 3 |
| Location | VEN-CBed Outlet | VEN-CBed Outlet | VEN-CBed Outlet |
| Date | 7/19/2018 | 7/20/2018 | 7/20/2018 |
| Time period | 0952 -1428 | 0847-1054 | 1300-1504 |
| **SAMPLING DATA:** | | | |
| Sampling duration, min. | 96.0 | 96.0 | 96.0 |
| Nozzle diameter, in. | 0.215 | 0.215 | 0.215 |
| Cross sectional nozzle area, sq.ft. | 0.000252 | 0.000252 | 0.000252 |
| Barometric pressure, in. Hg | 30.05 | 30.04 | 30.04 |
| Avg. orifice press. diff., in $H_2O$ | 1.64 | 1.44 | 1.33 |
| Avg. dry gas meter temp., deg F | 93.5 | 78.9 | 84.5 |
| Avg. abs. dry gas meter temp., deg. R | 554 | 539 | 544 |
| Total liquid collected by train, ml | 47.6 | 55.7 | 80.3 |
| Std. vol. of $H_2O$ vapor coll., cu.ft. | 2.2 | 2.6 | 3.8 |
| Dry gas meter calibration factor | 0.9915 | 1.0150 | 1.0150 |
| Sample vol. at meter cond., dcf | 65.982 | 66.720 | 64.865 |
| Sample vol. at std. cond., dscf [1] | 62.905 | 66.824 | 64.287 |
| Percent of isokinetic sampling | 98.5 | 104.5 | 105.2 |
| **GAS STREAM COMPOSITION DATA:** | | | |
| $CO_2$, % by volume, dry basis | 0.0 | 0.0 | 0.0 |
| $O_2$, % by volume, dry basis | 20.9 | 20.9 | 20.9 |
| $N_2$, % by volume, dry basis | 79.1 | 79.1 | 79.1 |
| Molecular wt. of dry gas, lb/lb mole | 28.84 | 28.84 | 28.84 |
| $H_20$ vapor in gas stream, prop. by vol. | 0.034 | 0.038 | 0.056 |
| Mole fraction of dry gas | 0.966 | 0.962 | 0.944 |
| Molecular wt. of wet gas, lb/lb mole | 28.46 | 28.43 | 28.23 |
| **GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:** | | | |
| Static pressure, in. $H_2O$ | 3.50 | 3.50 | 3.50 |
| Absolute pressure, in. Hg | 30.31 | 30.30 | 30.30 |
| Avg. temperature, deg. F | 96 | 96 | 97 |
| Avg. absolute temperature, deg.R | 556 | 556 | 557 |
| Pitot tube coefficient | 0.84 | 0.84 | 0.84 |
| Total number of traverse points | 24 | 24 | 24 |
| Avg. gas stream velocity, ft./sec. | 47.4 | 47.6 | 46.5 |
| Stack/duct cross sectional area, sq.ft. | 6.31 | 6.31 | 6.31 |
| Avg. gas stream volumetric flow, wacf/min. | 17925 | 18020 | 17581 |
| Avg. gas stream volumetric flow, dscf/min. | 16639 | 16658 | 15925 |

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

**TABLE 6-4 (cont.)**
**CHEMOURS - FAYETTEVILLE, NC**
**SUMMARY OF HFPO DIMER ACID TEST DATA AND TEST RESULTS**
**VE NORTH CARBON BED OUTLET**

| | | | |
|---|---|---|---|
| **TEST DATA** | | | |
| Run number | 1 | 2 | 3 |
| Location | VEN-CBed Outlet | VEN-CBed Outlet | VEN-CBed Outlet |
| Date | 7/19/2018 | 7/20/2018 | 7/20/2018 |
| Time period | 0952 -1428 | 0847-1054 | 1300-1504 |
| **LABORATORY REPORT DATA, ug.** | | | |
| HFPO Dimer Acid | 3.88 | 5.27 | 3.61 |
| **EMISSION RESULTS, ug/dscm.** | | | |
| HFPO Dimer Acid | 2.18 | 2.78 | 1.98 |
| **EMISSION RESULTS, lb/dscf.** | | | |
| HFPO Dimer Acid | 1.36E-10 | 1.74E-10 | 1.24E-10 |
| **EMISSION RESULTS, lb/hr.** | | | |
| HFPO Dimer Acid | 1.36E-04 | 1.74E-04 | 1.18E-04 |
| HFPO Dimer Acid (From Inlet Data) | 2.58E-03 | 2.35E-03 | 3.58E-03 |
| **EMISSION RESULTS, g/sec.** | | | |
| HFPO Dimer Acid | 1.71E-05 | 2.19E-05 | 1.49E-05 |
| **Carbon Bed Removal Efficiency, %** | 94.7 | 92.6 | 96.7 |

# APPENDIX A
# PROCESS OPERATIONS DATA

| Date | **7/19/2018** |
|---|---|

| Time | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 |
|---|---|---|---|---|---|---|---|---|
| Stack Testing | | | 952- 1428 (Run 1 ) | | | | | |
| HFPO | | | | | | | | |
| VEN Product | EVE | | | | | | | |
| VEN Precursor | | | | | | | | |
| VEN Condensation (HFPO) | | | | | | | | |
| VEN ABR | | | | | | | | |
| VEN Refining | | | | | | | | |
| Stripper Column Vent | | | | | | | | |
| Division WGS Recirculation Flow | 15000 kg/h | | | | | | | |
| Division WGS Inlet Flow | 47 kg/h | | | | | | | |

| Date | **7/20/2018** |
|---|---|

| Time | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
|---|---|---|---|---|---|---|---|---|---|
| Stack Testing | | 847 - 1054 (Run 2) | | | | 1300 - 1504 (Run 3) | | | |
| HFPO | | | | | | | | | |
| VEN Product | EVE | | | | | | | | |
| VEN Precursor | | | | | | | | | |
| VEN Condensation (HFPO) | | | | | | | | | |
| VEN ABR | | | | | | | | | |
| VEN Refining | | | | | | | | | |
| Stripper Column Vent | | | | | | | | | |
| Division WGS Recirculation Flow | 14500 kg/h | | | | | | | | |
| Division WGS Inlet Flow | 53 kg/h | | | | | | | | |

# APPENDIX B
# RAW AND REDUCED TEST DATA

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

| | | |
|---|---|---|
| **Test Data** | | |
| Run number | 1 | 2 |
| Location | PPA Carbon Bed - IN | PPA Carbon Bed - IN |
| Date | 7/25/2018 | 7/26/2018 |
| Time period | 0915-1121 | 0837-1043 |
| Operator | RS/AS | RS/AS |
| | | |
| **Inputs For Calcs.** | | |
| Sq. rt. delta P | 0.53734 | 0.52408 |
| Delta H | 0.8833 | 0.8379 |
| Stack temp. (deg.F) | 79.3 | 76.0 |
| Meter temp. (deg.F) | 78.2 | 77.7 |
| Sample volume (act.) | 52.490 | 51.232 |
| Barometric press. (in.Hg) | 29.95 | 29.95 |
| Volume $H_2O$ imp. (ml) | 12.4 | 36.7 |
| Weight change sil. gel (g) | 13.2 | 15.6 |
| % $CO_2$ | 0.0 | 0.0 |
| % $O_2$ | 20.9 | 20.9 |
| % $N_2$ | 79.1 | 79.1 |
| Area of stack (sq.ft.) | 6.305 | 6.305 |
| Sample time (min.) | 96.0 | 96.0 |
| Static pressure (in.$H_2O$) | -2.00 | -2.00 |
| Nozzle dia. (in.) | 0.235 | 0.235 |
| Meter box cal. | 1.0150 | 1.0150 |
| Cp of pitot tube | 0.84 | 0.84 |
| Traverse points | 24 | 24 |

# Sample and Velocity Traverse Point Data Sheet - Method 1

Client: Chemours
Loaction/Plant: Fayetteville, NC
Source: PPA Catdown Bed inlet

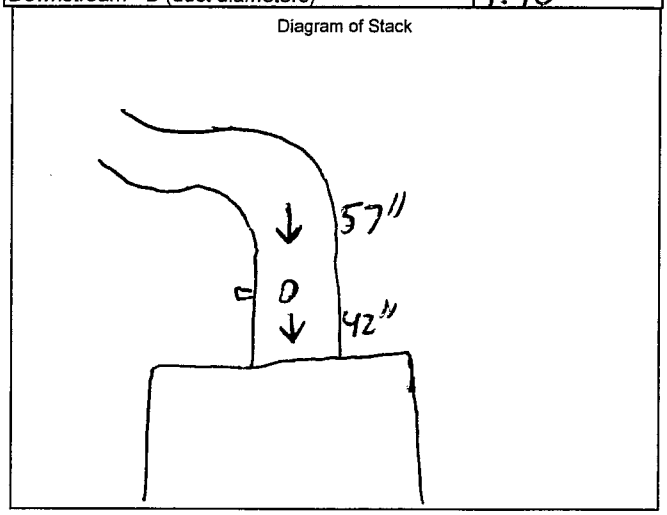
Operator: KS
Date: 6/11/18
W.O. Number:

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

| | |
|---|---|
| Distance from far wall to outside of port (in.) = C | 51 |
| Port Depth (in.) = D | ~~18~~ 17 |
| Depth of Duct, diameter (in.) = C-D | 34 |
| Area of Duct ($ft^2$) | 6.305 |
| Total Traverse Points | 24 |
| Total Traverse Points per Port | 12 |
| Port Diameter (in.) —(Flange-Threaded-Hole) | |
| Monorail Length | |
| **Rectangular Ducts Only** | |
| Width of Duct, rectangular duct only (in.) | |
| Total Ports (rectangular duct only) | |
| Equivalent Diameter = (2*L*W)/(L+W) | |

| **Flow Disturbances** | |
|---|---|
| Upstream - A (ft) | 3.50 |
| Downstream - B (ft) | 4.75 |
| Upstream - A (duct diameters) | 1.24 |
| Downstream - B (duct diameters) | 1.70 |

Diagram of Stack




**Traverse Point Locations**

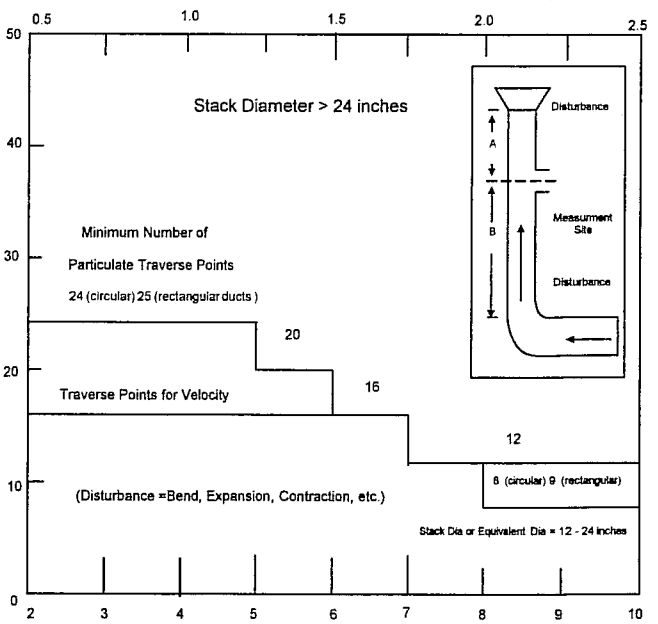
| Traverse Point | % of Duct | Distance from Inside Duct Wall (in) | Distance from Outside of Port (in) | |
|---|---|---|---|---|
| 1 | 2.1 | 0.714 | 17.41 | 18 |
| 2 | 6.7 | 2.28 | 19.28 | 19 1/3 |
| 3 | 11.8 | 4.01 | 21.01 | 21 |
| 4 | 17.7 | 6.02 | 23.02 | 23 |
| 5 | 25 | 8.50 | 25.5 | 25 1/2 |
| 6 | 35.6 | 12.10 | 29.10 | 29 |
| 7 | 64.4 | 21.90 | 38.9 | 39 |
| 8 | 75 | 25.5 | 42.5 | 42 1/2 |
| 9 | 82.3 | 27.98 | 44.98 | 45 |
| 10 | 88.2 | 29.98 | 46.98 | 47 |
| 11 | 93.3 | 31.72 | 48.72 | 48 3/4 |
| 12 | 97.9 | 33.30 | 50.3 | 50 |

**CEM 3 Point(Long Measurment Line) Stratificaton Point Locations**

| | | | |
|---|---|---|---|
| 1 | 0.167 | | |
| 2 | 0.50 | | |
| 3 | 0.833 | | |

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

Duct Diameters Upstream from Flow Disturbance (Distance A)




Duct Diameters Downstream from Flow Disturbance (Distance B)

**Traverse Point Location Percent of Stack -Circular**

| Traverse Point Location | Number of Traverse Points | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | 1 | | 14.6 | | 6.7 | | 4.4 | | 3.2 | | 2.6 | | 2.1 |
| | 2 | | 85.4 | | 25.0 | | 14.6 | | 10.5 | | 8.2 | | 6.7 |
| | 3 | | | | 75 | | 29.6 | | 19.4 | | 14.6 | | 11.8 |
| | 4 | | | | 93.3 | | 70.4 | | 32.3 | | 22.6 | | 17.7 |
| | 5 | | | | | | 85.4 | | 67.7 | | 34.2 | | 25 |
| | 6 | | | | | | 95.6 | | 80.6 | | 65.8 | | 35.6 |
| | 7 | | | | | | | | 89.5 | | 77.4 | | 64.4 |
| | 8 | | | | | | | | 96.8 | | 85.4 | | 75 |
| | 9 | | | | | | | | | | 91.8 | | 82.3 |
| | 10 | | | | | | | | | | 97.4 | | 88.2 |
| | 11 | | | | | | | | | | | | 93.3 |
| | 12 | | | | | | | | | | | | 97.9 |

**Traverse Point Location Percent of Stack -Rectangular**

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

WESTON MANAGERS DESIGNERS/CONSULTANTS

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid



| | |
|---|---|
| Client | The Chemours Company |
| W.O.# | 15418.002.006 |
| Project ID | Chemours |
| Mode/Source ID | PPA Carbon Bed |
| Samp. Loc. ID | IN |
| Run No.ID | 1 |
| Test Method ID | M0010 |
| Date ID | 25 JUL2018 |
| Source/Location | PPA Carbon Bed Inlet |
| Sample Date | 7-25-2018 |
| Baro. Press (in Hg) | 29.95 |
| Operator | RS/AS |

| Stack Conditions | Assumed | Actual |
|---|---|---|
| % Moisture | 2 | |
| Impinger Vol (ml) | | 36.7 |
| Silica gel (g) | | 15.6 |
| CO2, % by Vol | 0 | |
| O2, % by Vol | 20.9 | |
| Temperature (°F) | 80 | |
| Meter Temp (°F) | 80 | |
| Static Press (in $H_2O$) | -2 | -2 |
| Ambient Temp (°F) | ~75 | |

| | | | |
|---|---|---|---|
| Meter Box ID | AD 20 | | |
| Meter Box Y | 1.015 | | |
| Meter Box Del H | 1.709 | | |
| Probe ID / Length | P711 | 6' | Sample Train (ft³) |
| Probe Material | (Boro) | | Leak Check @ (in Hg) |
| Pitot / Thermocouple ID | P711 | | Pitot leak check good |
| Pitot Coefficient | (0.84) | | Pitot Inspection good |
| Nozzle ID | .235 | | Method 3 System good |
| Nozzle Measurements | .235 | .235 .235 | Temp Check |
| Avg Nozzle Dia (in) | .235 | | Meter Box Temp |
| Area of Stack (ft²) | 6.31 | | Reference Temp |
| Sample Time | 96 | | Pass/Fail (+/- 2°) |
| Total Traverse Pts | 24 | | Temp Change Response ? |

K Factor 3.0

| | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train (ft³) | 0.009 | 0.004 | 0.003 |
| Leak Check @ (in Hg) | 15" | 6" | 6" |
| Pitot leak check good | (yes) / no | (yes) / no | (yes) / no |
| Pitot Inspection good | (yes) / no | (yes) / no | (yes) / no |
| Method 3 System good | yes / no | yes / no | yes / no |
| | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 75 | | 82 |
| Reference Temp | 76.1 | | 83.4 |
| Pass/Fail (+/- 2°) | (Pass) / Fail | | (Pass) / Fail |
| Temp Change Response ? | (yes) / no | | (yes) / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING (ft³) | STACK TEMP (°F) | DGM OUTLET TEMP (°F) | PROBE TEMP (°F) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 9:15 | | | 780.521 | | | | | | | | | |
| A 1 | 4 | | .44 | 1.3 | 783.1 | 79 | 75 | 119 | 118 | 65 | 5.5 | 55 | | |
| 2 | 8 | | .45 | 1.3 | 785.7 | 79 | 75 | 120 | 120 | 56 | 5.5 | 56 | | |
| 3 | 12 | | .44 | 1.3 | 788.3 | 79 | 75 | 120 | 119 | 54 | 5.5 | 53 | | |
| 4 | 16 | | .42 | 1.3 | 791.0 | 79 | 76 | 118 | 119 | 55 | 5.5 | 56 | | |
| 5 | 20 | | .41 | 1.2 | 793.6 | 79 | 76 | 121 | 122 | 57 | 5.5 | 56 | | |
| 6 | 24 | | .38 | 1.1 | 796.0 | 79 | 76 | 119 | 120 | 58 | 5 | 54 | | |
| 7 | 28 | | .26 | .78 | 798.2 | 79 | 76 | 120 | 122 | 55 | 4 | 47 | | |
| 8 | 32 | | .20 | .60 | 800.0 | 79 | 76 | 119 | 123 | 54 | 3.5 | 50 | | |
| 9 | 36 | | .18 | .54 | 801.7 | 79 | 76 | 120 | 122 | 53 | 3.5 | 49 | | 26.045 |
| 10 | 40 | | .15 | .45 | 803.4 | 79 | 76 | 120 | 120 | 53 | 3 | 46 | | |
| 11 | 44 | | .15 | .45 | 805.0 | 79 | 77 | 122 | 120 | 52 | 3 | 52 | | |
| 12 | 48 | 10:03 | .14 | .42 | 806.566 | 79 | 77 | 120 | 120 | 52 | 3 | 55 | | |
| | | | | | | | | | | | | | | |
| B 1 | 52 | 10:33 | .26 | .78 | 808.8 | 79 | 79 | 121 | 119 | 62 | 4.5 | 58 | | 26.445 |
| 2 | 56 | | .26 | .78 | 810.9 | 79 | 79 | 122 | 120 | 57 | 4.5 | 53 | | |
| 3 | 60 | | .26 | .78 | 812.9 | 79 | 79 | 122 | 121 | 54 | 4.5 | 54 | | |
| 4 | 64 | | .26 | .78 | 815.0 | 79 | 80 | 118 | 118 | 54 | 4.5 | 56 | | |
| 5 | 68 | | .27 | .81 | 817.1 | 80 | 80 | 120 | 119 | 56 | 5 | 59 | | 103.2 Tm |
| 6 | 72 | | .31 | .93 | 819.4 | 80 | 80 | 119 | 120 | 59 | 5 | 61 | | |
| 7 | 76 | | .34 | 1.0 | 821.8 | 80 | 81 | 120 | 119 | 59 | 5.5 | 42 | | 2.25 %m |
| 8 | 80 | | .33 | 1.0 | 824.2 | 80 | 81 | 121 | 119 | 56 | 5.5 | 42 | | |
| 9 | 84 | | .32 | .96 | 826.4 | 80 | 81 | 122 | 119 | 55 | 5 | 48 | | 1107 scfm |
| 10 | 88 | | .29 | .87 | 828.7 | 80 | 82 | 121 | 119 | 55 | 5 | 54 | | |
| 11 | 92 | | .31 | .93 | 831.0 | 80 | 82 | 121 | 120 | 53 | 5 | 52 | | 52.4 Vm |
| 12 | 96 | 11:21 | .28 | .84 | 833.185 | 80 | 82 | 120 | 119 | 52 | 5 | 54 | | |
| | | | Avg Delta P .2962 | Avg Delta H .88333 | Total Volume 52.490 | Avg Ts 79.33 | Avg Tm 78.2083 | Min/Max 118/122 | Min/Max 118/123 | Max 65 | Max Vac 5.5 | Min/Max 42/59 | | MRW 8/03/18 |
| | | | Avg Sqrt Delta P .53733 | Avg Sqrt Del H .92282 | Comments: port change leak check. 806.566 → 806.740 = -.3474 | | | | | | | | | |

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

MRW 8/03/18 CDC

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid

Page 1 of 1

| | |
|---|---|
| Client | The Chemours Company |
| W.O.# | 15418.002.006 |
| Project ID | Chemours |
| Mode/Source ID | PPA Carbon Bed |
| Samp. Loc. ID | IN |
| Run No.ID | 2 |
| Test Method ID | M0010 |
| Date ID | 26 JUL2018 |
| Source/Location | PPA Carbon Bed Inlet |
| Sample Date | 7-26-2018 |
| Baro. Press (in Hg) | 29.95 |
| Operator | RS / AS |

| Stack Conditions | Assumed | Actual |
|---|---|---|
| % Moisture | 2 | |
| Impinger Vol (ml) | | 124 |
| Silica gel (g) | | 13.2 |
| CO2, % by Vol | 0 | |
| O2, % by Vol | 20.9 | |
| Temperature (°F) | 75 | |
| Meter Temp (°F) | 75 | |
| Static Press (in $H_2O$) | -2 | -2 |
| Ambient Temp (°F) | ~75 | |

| | | | |
|---|---|---|---|
| Meter Box ID | A0 20 | | |
| Meter Box Y | 1.015 | | |
| Meter Box Del H | 1.709 | | |
| Probe ID / Length | P711 | 6' | Sample Train ($ft^3$) |
| Probe Material | Boro | | Leak Check @ (in Hg) |
| Pitot / Thermocouple ID | P711 | | Pitot leak check good |
| Pitot Coefficient | 0.84 | | Pitot Inspection good |
| Nozzle ID | .235 | | Method 3 System good |
| Nozzle Measurements | .235 | .235 .235 | Temp Check |
| Avg Nozzle Dia (in) | .235 | | Meter Box Temp |
| Area of Stack ($ft^2$) | 6.31 | | Reference Temp |
| Sample Time | 96 | | Pass/Fail (+/- 2°) |
| Total Traverse Pts | 24 | | Temp Change Response ? |

K Factor 3.0

| | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train ($ft^3$) | 0.010 | 0.003 | 0.004 |
| Leak Check @ (in Hg) | 15" | 6" | 6" |
| Pitot leak check good | yes / no | yes / no | yes / no |
| Pitot Inspection good | yes / no | yes / no | yes / no |
| Method 3 System good | yes / no | yes / no | yes / no |
| Temp Check | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 70 | | 85 |
| Reference Temp | 71.4 | | 86.4 |
| Pass/Fail (+/- 2°) | Pass / Fail | | Pass / Fail |
| Temp Change Response ? | yes / no | | yes / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (oF) | PROBE TEMP (oF) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 8:37 | | | 833.831 | | | | | | | | | |
| A 1 | 4 | | .41 | 1.2 | 836.4 | 75 | 73 | 119 | 119 | 65 | 5.5 | 58 | | |
| 2 | 8 | | .44 | 1.3 | 839.1 | 75 | 73 | 118 | 118 | 63 | 5.5 | 52 | | |
| 3 | 12 | | .41 | 1.2 | 841.7 | 75 | 73 | 118 | 119 | 56 | 5 | 51 | | |
| 4 | 16 | | .40 | 1.2 | 844.2 | 75 | 73 | 119 | 120 | 54 | 5 | 48 | | |
| 5 | 20 | | .38 | 1.1 | 846.7 | 75 | 73 | 119 | 119 | 52 | 5 | 48 | | |
| 6 | 24 | | .34 | 1.0 | 849.0 | 76 | 74 | 119 | 120 | 51 | 4.5 | 50 | | |
| 7 | 28 | | .24 | .72 | 850.0 | 75 | 74 | 122 | 119 | 50 | 4 | 57 | | |
| 8 | 32 | | .20 | .60 | 852.8 | 75 | 75 | 122 | 120 | 51 | 3.5 | 61 | | |
| 9 | 36 | | .19 | .57 | 854.6 | 75 | 75 | 119 | 119 | 53 | 3.5 | 59 | | |
| 10 | 40 | | .15 | .45 | 856.2 | 75 | 75 | 122 | 120 | 54 | 3 | 56 | | |
| 11 | 44 | | .15 | .45 | 857.7 | 75 | 75 | 119 | 119 | 56 | 3 | 54 | | |
| 12 | 48 | 9:25 | .13 | .39 | 859.292 | 75 | 75 | 122 | 120 | 56 | 3 | 51 | | |
| | | | | | | | | | | | | | | |
| B 1 | 52 | 9:55 | .23 | .69 | 861.3 | 76 | 78 | 120 | 119 | 60 | 4 | 57 | | |
| 2 | 56 | | .26 | .78 | 863.4 | 76 | 79 | 119 | 119 | 51 | 4 | 51 | | |
| 3 | 60 | | .25 | .75 | 865.5 | 76 | 80 | 119 | 120 | 49 | 4 | 55 | | |
| 4 | 64 | | .24 | .72 | 867.4 | 77 | 80 | 121 | 120 | 50 | 4 | 60 | | |
| 5 | 68 | | .25 | .75 | 869.5 | 77 | 81 | 120 | 119 | 51 | 4 | 64 | | |
| 6 | 72 | | .28 | .84 | 871.7 | 77 | 80 | 122 | 120 | 51 | 4.5 | 56 | | |
| 7 | 76 | | .31 | .93 | 874.0 | 77 | 81 | 119 | 120 | 52 | 5 | 56 | | |
| 8 | 80 | | .31 | .93 | 876.2 | 77 | 82 | 121 | 119 | 52 | 5 | 54 | | |
| 9 | 84 | | .30 | .90 | 878.5 | 77 | 83 | 120 | 120 | 53 | 5 | 54 | | |
| 10 | 88 | | .30 | .90 | 880.7 | 77 | 84 | 118 | 118 | 59 | 5 | 58 | | |
| 11 | 92 | | .31 | .93 | 883.0 | 77 | 84 | 120 | 119 | 56 | 5 | 58 | | |
| 12 | 96 | 10:43 | .27 | .81 | 885.160 | 78 | 85 | 122 | 120 | 58 | 5 | 60 | | |
| | | | Avg Delta P .2812 | Avg Delta H .8379 | Total Volume 51.232 | Avg Ts 75.95 | Avg Tm 77.70 | Min/Max 118/122 | Min/Max 118/120 | Max 65 | Max Vac 5.5 | Min/Max 48/64 | | |
| | | | Avg Sqrt Delta P .52408 | Avg Sqrt Del H .9050 | | | | | | | | | | |

WESTON SOLUTIONS

Comments: port change leak check
859.292 → 859.389
= -.35/.097

EPA Method 0010 from EPA SW-846

MRP 8/23/18

# SAMPLE RECOVERY FIELD DATA

EPA Method 0010

PPA Carbon Bed Inlet

| | | | |
|---|---|---|---|
| Client | The Chemours Company | W.O. # | 15418.002.006 |
| Location/Plant | Fayetteville, NC | Source & Location | PPA Carbon Bed Inlet |

**Run No.** 1 — Sample Date 7-25-18 — Recovery Date 7-25-18

Sample I.D. Chemours - PPA Carbon Bed - IN - 1 - M0010 - — Analyst JMD/AS — Filter Number N14

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-1 | | XAD-2 | | Silica Gel | |
| **Final** | 12 | 90 | 100 | 0 | 322.5 | | 305.2 | 829.7 | 313.2 | 1142.9 |
| **Initial** | 0 | 100 | 100 | 0 | ~~305.4~~ 311.9 | | 305.4 | 817.3 | 300 | 1117.3 |
| **Gain** | 12 | -10 | 0 | 0 | 10.6 | | -.2 | 12.4 | ~~313~~ 13.2 | 25.6 |

Impinger Color: all clear — Labeled? ✓

Silica Gel Condition: blue 80% — Sealed? ✓

**Run No.** 2 — Sample Date 7-25-18 — Recovery Date 7-26-18

Sample I.D. Chemours - PPA Carbon Bed - IN - 2 - M0010 - — Analyst JMD/AS — Filter Number N14

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-1 | | XAD-2 | | Silica Gel | |
| **Final** | 20 | 100 | 100 | 5 | 309.0 | | ~~XA38.5~~ | 842.5 | 315.6 | 1158.1 |
| **Initial** | 0 | 100 | 100 | 0 | 297.3 | | 308.5 | 805.8 | 300 | 1105.8 |
| **Gain** | 20 | 0 | 0 | 5 | 11.7 | | 0 | 36.7 | 15.6 | 52.3 |

Impinger Color: all clear — Labeled? ✓

Silica Gel Condition: blue 80% — Sealed? ✓

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

Sample I.D. Chemours - PPA Carbon Bed - IN - 3 - M0010 - — Analyst _____ — Filter Number _____

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

Impinger Color _____ — Labeled? _____

Silica Gel Condition _____ — Sealed? _____

Check COC for Sample IDs of Media Blanks

# SAMPLE RECOVERY FIELD DATA

EPA Method 0010

PPA Carbon Bed Inlet-BLANK TRAINS

| | | | |
|---|---|---|---|
| Client | The Chemours Company | W.O. # | 15418.002.006 |
| Location/Plant | Fayetteville, NC | Source & Loaction | PPA Carbon Bed Inlet |

**Run No.** ___ Sample Date 7/25/13 Recovery Date 7/31/13

Sample I.D. Chemours -PPA Carbon Bed - Inlet - BT - M0010 - Analyst BNO Filter Number NA

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | empty | XXX | | XXX | | Silica Gel | |
| **Final** | 0 | 100 | 100 | 0 | 300.6 | | 293.0 | 793.6 | 300 | 1093.6 |
| **Initial** | 0 | 100 | 100 | 0 | 300.5 | | 293.1 | 793.6 | 300 | 1093.6 |
| **Gain** | 0 | 0 | 0 | 0 | .1 | | -.1 | 0 | 0 | 0 |

Impinger Color Dark clear Labeled? ✓

Silica Gel Condition 100% blue Sealed? ✓

**Run No.** ___ Sample Date _____ Recovery Date _____

Sample I.D. Chemours -PPA Carbon Bed - Inlet - BT - M0010 - Analyst _____ Filter Number _____

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

Impinger Color _____ Labeled? _____

Silica Gel Condition _____ Sealed? _____

**Run No.** ___ Sample Date _____ Recovery Date _____

Sample I.D. Chemours -PPA Carbon Bed - Inlet - BT - M0010 - Analyst _____ Filter Number _____

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

Impinger Color _____ Labeled? _____

Silica Gel Condition _____ Sealed? _____

Check COC for Sample IDs of Media Blanks

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

| **Test Data** | | |
|---|---|---|
| Run number | 1 | 2 |
| Location | PPA Carbon Bed - OUT | PPA Carbon Bed - OUT |
| Date | 7/25/2018 | 7/26/2018 |
| Time period | 0915-1121 | 0837-1043 |
| Operator | RS/AS | RS/AS |
| | | |
| **Inputs For Calcs.** | | |
| Sq. rt. delta P | 0.64638 | 0.65743 |
| Delta H | 0.5600 | 0.6333 |
| Stack temp. (deg.F) | 84.1 | 85.5 |
| Meter temp. (deg.F) | 85.3 | 83.8 |
| Sample volume (act.) | 43.430 | 42.835 |
| Barometric press. (in.Hg) | 29.93 | 29.85 |
| Volume $H_2O$ imp. (ml) | 21.3 | 25.0 |
| Weight change sil. gel (g) | 8.8 | 10.9 |
| % $CO_2$ | 0.0 | 0.0 |
| % $O_2$ | 20.9 | 20.9 |
| % $N_2$ | 79.1 | 79.1 |
| Area of stack (sq.ft.) | 4.909 | 4.909 |
| Sample time (min.) | 96.0 | 96.0 |
| Static pressure (in.$H_2O$) | 0.23 | 0.22 |
| Nozzle dia. (in.) | 0.191 | 0.191 |
| Meter box cal. | 0.9860 | 0.9910 |
| Cp of pitot tube | 0.84 | 0.84 |
| Traverse points | 24 | 24 |

# Sample and Velocity Traverse Point Data Sheet - Method 1

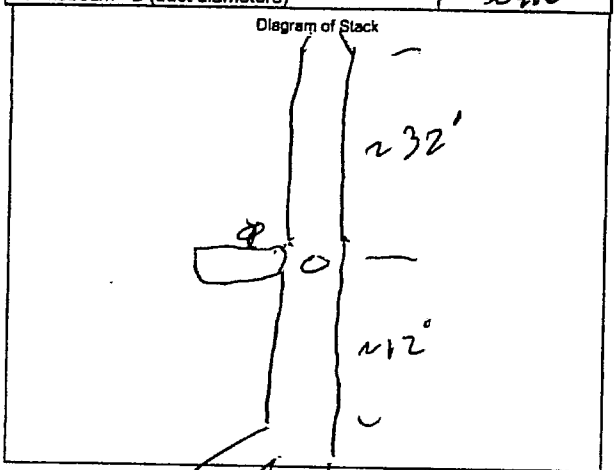
Client: Chemours
Location/Plant: Fayetteville NC
Source: PAA Stack
Operator: Paul
Date: 11/8/18
W.O. Number: 15418.002.002

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

| | |
|---|---|
| Distance from far wall to outside of port (in.) = C | 45 |
| Port Depth (in.) = D | 15 |
| Depth of Duct, diameter (in.) = C-D | 30 |
| Area of Duct (ft²) | 4.909 |
| Total Traverse Points | 24 |
| Total Traverse Points per Port | 12 |
| Port Diameter (in.) —(Flange-Threaded-Hole) | 4" |
| Monorail Length | — |
| **Rectangular Ducts Only** | |
| Width of Duct, rectangular duct only (in.) | N/A |
| Total Ports (rectangular duct only) | |
| Equivalent Diameter = (2*L*W)/(L+W) | |

| Flow Disturbances | |
|---|---|
| Upstream - A (ft) | ~32 |
| Downstream - B (ft) | ~12 |
| Upstream - A (duct diameters) | ~12.8 |
| Downstream - B (duct diameters) | ~4.8 |

Diagram of Stack



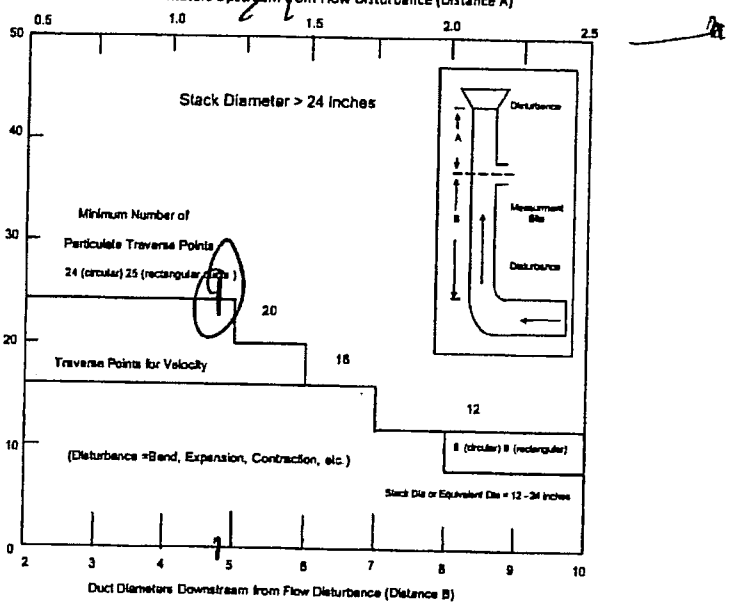

**Traverse Point Locations**

| Traverse Point | % of Duct | Distance from Inside Duct Wall (in) | Distance from Outside of Port (in) |
|---|---|---|---|
| 1 | 2.1 | 0.6 | 16 |
| 2 | 6.7 | 2.0 | 17 |
| 3 | 10.9 | 3.5 | 18 1/2 |
| 4 | 17.7 | 5.3 | 20 3/8 |
| 5 | 25 | 7.5 | 22 1/2 |
| 6 | 35.6 | 10.7 | 25 3/4 |
| 7 | 64.4 | 19.3 | 34 3/8 |
| 8 | 75 | 22.5 | 37 1/2 |
| 9 | 82.3 | 24.7 | 39 3/4 |
| 10 | 88.2 | 26.5 | 41 1/2 |
| 11 | 93.3 | 28.0 | 43 |
| 12 | 97.9 | 29.4 | 44 |

**CEM 3 Point(Long Measurment Line) Stratificaton Point Locations**

| | | | |
|---|---|---|---|
| 1 | 0.167 | | |
| 2 | 0.50 | | |
| 3 | 0.833 | | |

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




**Traverse Point Location Percent of Stack -Circular**

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

**Traverse Point Location Percent of Stack -Rectangular**

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

WESTON

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid



| | | Stack Conditions | Assumed | Actual |
|---|---|---|---|---|
| Client | The Chemours Company | | | |
| W.O.# | 15418.002.006 | | | |
| Project ID | Chemours | % Moisture | 2 | |
| Mode/Source ID | PPA | Impinger Vol (ml) | | 21.3 |
| Samp. Loc. ID | STK | Silica gel (g) | | 8.7 |
| Run No.ID | 1 | CO2, % by Vol | 0.1 | |
| Test Method ID | M0010 | O2, % by Vol | 20.8 | |
| Date ID | 16JUL2018 | Temperature (°F) | 64 | |
| Source/Location | PPA Stack | Meter Temp (°F) | 80 | |
| Sample Date | 7/25/18 | Static Press (in $H_2O$) | -0.23 | 0.23 |
| Baro. Press (in Hg) | 29.93 | | | |
| Operator | KS/KH | Ambient Temp (°F) | 770f | |

| | | | |
|---|---|---|---|
| Meter Box ID | A026 | | |
| Meter Box Y | 0.986 | | |
| Meter Box Del H | 1.674 | | |
| Probe ID / Length | P707 | 6' | Sample Train (ft³) |
| Probe Material | Boro | | Leak Check @ (in Hg) |
| Pitot / Thermocouple ID | P707 | | Pitot leak check good |
| Pitot Coefficient | 0.84 | | Pitot Inspection good |
| Nozzle ID | 0.191 | | Method 3 System good |
| Nozzle Measurements | 0.191 / 0.191 / 0.191 | | Temp Check |
| Avg Nozzle Dia (in) | 0.191 | | Meter Box Temp |
| Area of Stack (ft²) | 4.90 | | Reference Temp |
| Sample Time | 96 | | Pass/Fail (+/- 2°) |
| Total Traverse Pts | 24 | | Temp Change Response ? |

K Factor 1.33

| | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train (ft³) | 0.016 | 0.008 | 0.008 |
| Leak Check @ (in Hg) | 15 | 7 | 7 |
| Pitot leak check good | yes / no | yes / no | yes / no |
| Pitot Inspection good | yes / no | yes / no | yes / no |
| Method 3 System good | yes / no | yes / no | yes / no |
| Temp Check | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 80 | | 82 |
| Reference Temp | 80.3 | | 82.4 |
| Pass/Fail (+/- 2°) | Pass / Fail | | Pass / Fail |
| Temp Change Response ? | yes / no | | yes / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (°F) | PROBE TEMP (°F) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0915 | | | 658.190 | | | | | | | | | |
| A1 | 4 | | 0.50 | 0.67 | 660.0 | 83 | 79 | 122 | 123 | 65 | 2.0 | 64 | | |
| 2 | 8 | | 0.50 | 0.67 | 662.0 | 84 | 80 | 127 | 123 | 65 | 2.0 | 62 | | |
| 3 | 12 | | 0.50 | 0.67 | 663.9 | 84 | 80 | 125 | 123 | 60 | 2.0 | 60 | | |
| 4 | 16 | | 0.52 | 0.69 | 665.9 | 84 | 80 | 121 | 124 | 58 | 2.5 | 57 | | |
| 5 | 20 | | 0.46 | 0.61 | 667.7 | 85 | 81 | 126 | 124 | 57 | 2.0 | 56 | | |
| 6 | 24 | | 0.46 | 0.61 | 669.7 | 85 | 81 | 127 | 124 | 57 | 2.0 | 56 | | |
| 7 | 28 | | 0.43 | 0.57 | 671.5 | 85 | 82 | 124 | 123 | 57 | 2.0 | 56 | | |
| 8 | 32 | | 0.42 | 0.56 | 673.3 | 84 | 82 | 126 | 124 | 57 | 2.0 | 55 | | |
| 9 | 36 | | 0.40 | 0.53 | 675.1 | 84 | 83 | 125 | 124 | 57 | 2.0 | 53 | | |
| 10 | 40 | | 0.38 | 0.51 | 676.8 | 84 | 83 | 124 | 123 | 58 | 2.0 | 53 | | // |
| 11 | 44 | | 0.30 | 0.40 | 678.4 | 84 | 84 | 124 | 124 | 58 | 2.0 | 54 | | |
| 12 | 48 | 1003 | 0.28 | 0.37 | 680.010 | 84 | 84 | 125 | 123 | 59 | 2.0 | 55 | | 21.820 |
| - | - | - | - | - | 680.125 | - | - | - | - | - | - | - | | |
| B1 | 4 | 1033 | 0.45 | 0.60 | 682.0 | 84 | 87 | 127 | 124 | 63 | 2.0 | 56 | | |
| 2 | 8 | | 0.45 | 0.60 | 683.9 | 84 | 87 | 126 | 124 | 63 | 2.0 | 54 | | |
| 3 | 12 | | 0.45 | 0.60 | 685.7 | 84 | 87 | 127 | 124 | 59 | 2.0 | 54 | | |
| 4 | 16 | | 0.43 | 0.57 | 687.6 | 84 | 88 | 126 | 123 | 58 | 2.0 | 53 | | |
| 5 | 20 | | 0.45 | 0.60 | 689.5 | 84 | 88 | 125 | 125 | 58 | 2.0 | 53 | | |
| 6 | 24 | | 0.45 | 0.60 | 691.3 | 84 | 89 | 127 | 124 | 58 | 2.0 | 54 | | |
| 7 | 28 | | 0.43 | 0.57 | 693.0 | 84 | 90 | 125 | 125 | 59 | 2.0 | 54 | | |
| 8 | 32 | | 0.43 | 0.57 | 694.8 | 84 | 90 | 125 | 127 | 59 | 2.0 | 55 | | |
| 9 | 36 | | 0.40 | 0.53 | 696.6 | 84 | 90 | 127 | 124 | 60 | 2.0 | 55 | | |
| 10 | 40 | | 0.35 | 0.47 | 698.3 | 84 | 91 | 124 | 123 | 60 | 2.0 | 55 | | |
| 11 | 44 | | 0.35 | 0.47 | 700.0 | 84 | 91 | 125 | 123 | 60 | 2.0 | 54 | | // |
| 12 | 48 | 1121 | 0.36 | 0.40 | 701.735 | 84 | 91 | 123 | 124 | 60 | 2.0 | 54 | | 21.610 |
| | | | Avg Delta P | Avg Delta H | Total Volume | Avg Ts | Avg Tm | Min/Max | Min/Max | Max | Max Vac | Min/Max | | |
| | | | 0.4204 | 0.5600 | 43.430 | 84.1 | 85.3 | 122/127 | 123/127 | 65 | 2.5 | 53/64 | | |
| | | | Avg Sqrt Delta P | Avg Sqrt Del H | Comments: | | | | | | | | | |
| | | | 0.6464 | 0.7460 | | | | | | | | | | |

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

MPR 8/03/18

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid

Page 1 of 1

| | | Stack Conditions | Assumed | Actual |
|---|---|---|---|---|
| Client | The Chemours Company | | | |
| W.O.# | 15418.002.006 | | | |
| Project ID | Chemours | % Moisture | 2 | |
| Mode/Source ID | PPA | Impinger Vol (ml) | | 25 |
| Samp. Loc. ID | STK | Silica gel (g) | | 10.9 |
| Run No.ID | 2 | CO2, % by Vol | 0.1 | |
| Test Method ID | M0010 | O2, % by Vol | 20.8 | |
| Date ID | 16JUL2018 | Temperature (°F) | 80 | |
| Source/Location | PPA Stack | Meter Temp (°F) | 80 | |
| Sample Date | 7/26/18 | Static Press (in $H_2O$) | +0.23 | 0.22 |
| Baro. Press (in Hg) | 29.85 | | | |
| Operator | KS/KA | Ambient Temp (°F) | 77°F | |

| | | | |
|---|---|---|---|
| Meter Box ID | ~~A015~~ | A04 | |
| Meter Box Y | ~~0.986~~ | 0.991 | |
| Meter Box Del H | ~~1.694~~ | 1.884 | |
| Probe ID / Length | P707 | 6' | |
| Probe Material | Boro | | |
| Pitot / Thermocouple ID | P707 | | |
| Pitot Coefficient | 0.84 | | |
| Nozzle ID | 0.191 | | |
| Nozzle Measurements | 0.191 | 0.191 | 0.191 |
| Avg Nozzle Dia (in) | 0.191 | | |
| Area of Stack ($ft^2$) | 4.96 | | |
| Sample Time | 96 | | |
| Total Traverse Pts | 24 | | |

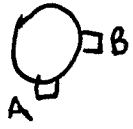
| K Factor 1.46 | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train ($ft^3$) | 0.012 | 0.008 | 0.004 |
| Leak Check @ (in Hg) | 15 | 8 | 6 |
| Pitot leak check good | (yes) / no | (yes) / no | (yes) / no |
| Pitot Inspection good | (yes) / no | (yes) / no | (yes) / no |
| Method 3 System good | (yes) / no | (yes) / no | (yes) / no |
| **Temp Check** | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 85 | | 88 |
| Reference Temp | 84.8 | | 88.2 |
| Pass/Fail (+/- 2°) | Pass / Fail | | (Pass) / Fail |
| Temp Change Response ? | (yes) / no | | (yes) / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (oF) | PROBE TEMP (oF) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0837 | | | 969.514 | | | | | | | | | |
| A 1 | 4 | | 0.55 | 0.80 | 971.4 | 85 | 77 | 120 | 121 | 65 | 2.0 | 63 | | |
| 2 | 8 | | 0.50 | 0.73 | 973.4 | 85 | 77 | 122 | 120 | 60 | 2.0 | 57 | | |
| 3 | 12 | | 0.48 | 0.70 | 975.3 | 85 | 79 | 122 | 120 | 56 | 2.0 | 53 | | |
| 4 | 16 | | 0.45 | 0.66 | 977.1 | 85 | 80 | 123 | 122 | 58 | 2.0 | 53 | | |
| 5 | 20 | | 0.45 | 0.66 | 978.8 | 85 | 80 | 124 | 120 | 60 | 2.0 | 54 | | |
| 6 | 24 | | 0.45 | 0.66 | 980.7 | 85 | 80 | 121 | 118 | 60 | 2.0 | 55 | | |
| 7 | 28 | | 0.45 | 0.66 | 982.4 | 85 | 81 | 126 | 121 | 60 | 2.0 | 56 | | |
| 8 | 32 | | 0.44 | 0.64 | 984.2 | 85 | 81 | 125 | 122 | 57 | 2.0 | 54 | | |
| 9 | 36 | | 0.42 | 0.61 | 986.0 | 85 | 82 | 121 | 120 | 56 | 2.0 | 56 | | |
| 10 | 40 | | 0.40 | 0.58 | 987.8 | 85 | 82 | 122 | 119 | 56 | 2.0 | 56 | | |
| 11 | 44 | | 0.38 | 0.55 | 989.3 | 85 | 82 | 121 | 120 | 56 | 2.0 | 55 | | |
| 12 | 48 | 0925 | 0.35 | 0.51 | 990.970 | 85 | 83 | 120 | 120 | 55 | 2.0 | 53 | | 21.456 |
| — | — | — | — | — | 991.075 | — | — | — | — | — | — | — | | |
| B 1 | 4 | 0955 | 0.50 | 0.73 | 992.9 | 85 | 85 | 122 | 123 | 66 | 2.0 | 60 | | |
| 2 | 8 | | 0.45 | 0.66 | 994.7 | 85 | 86 | 121 | 119 | 62 | 2.0 | 55 | | |
| 3 | 12 | | 0.45 | 0.66 | 996.6 | 85 | 86 | 120 | 119 | 59 | 2.0 | 54 | | |
| 4 | 16 | | 0.45 | 0.66 | 998.4 | 85 | 86 | 121 | 118 | 57 | 2.0 | 53 | | |
| 5 | 20 | | 0.45 | 0.66 | 1000.3 | 85 | 86 | 121 | 120 | 59 | 2.0 | 53 | | |
| 6 | 24 | | 0.45 | 0.66 | 1002.0 | 86 | 88 | 124 | 119 | 59 | 2.0 | 52 | | |
| 7 | 28 | | 0.43 | 0.63 | 1003.9 | 87 | 88 | 122 | 118 | 60 | 2.0 | 52 | | |
| 8 | 32 | | 0.43 | 0.63 | 1005.7 | 87 | 88 | 120 | 119 | 61 | 2.0 | 52 | | |
| 9 | 36 | | 0.40 | 0.58 | 1007.4 | 87 | ~~88~~ 88 | 120 | 120 | 61 | 2.0 | 53 | | |
| 10 | 40 | | 0.42 | 0.61 | 1009.3 | 87 | 89 | 121 | 120 | 62 | 2.0 | 54 | | |
| 11 | 44 | | 0.35 | 0.51 | 1010.9 | 87 | 88 | 120 | 121 | 61 | 2.0 | 55 | | |
| 12 | 48 | 1043 | 0.31 | 0.45 | 1012.454 | 87 | 89 | 120 | 122 | 67 | | 56 | | 21.379 |
| | | | Avg Delta P 0.4338 | Avg Delta H 0.6333 | Total Volume 42.835 | Avg Ts 85.5 | Avg Tm ~~83.8~~ | Min/Max 120/126 | Min/Max 118/123 | Max 66 | Max Vac 2.0 | Min/Max 52/63 | | |
| | | | Avg Sqrt Delta P 0.6574 | Avg Sqrt Del H 0.7944 | Comments: | | 83.8 MP 8/03/18 | | | | | | | |

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

✓ MP 8/03/18



# SAMPLE RECOVERY FIELD DATA

OUT

EPA Method 0010

PPA Stack

Client: The Chemours Company | W.O. #: 15418.002.006

Location/Plant: Fayetteville, NC | Source & Location: PPA Stack

**Run No.** 1 | Sample Date 7/25/18 | Recovery Date 7/25/18

Sample I.D. Chemours - PPA - STK - 1 - M0010 - | Analyst JMO/AS | Filter Number N/A

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-2 | | XAD 2 | | Silica Gel | |
| **Final** | 18 | 90 | 100 | 0 | 307.1 | | 301.7 | 816.8 | 308.8 | 1125.6 |
| **Initial** | 0 | 100 | 100 | 0 | 294.1 | | ~~303.1~~ | 795.5 | 300 | 1095.5 |
| **Gain** | 18 | -10 | 0 | 0 | 13 | | .3 | 21.3 | 8.8 | 30.1 |

Impinger Color: all clear | Labeled? ✓ | 301.4 ✓

Silica Gel Condition: blue 30% | Sealed? ✓

**Run No.** 2 | Sample Date 7/26/18 | Recovery Date 7-26-18

Sample I.D. Chemours - PPA - STK - 2 - M0010 - | Analyst JMO/AS | Filter Number N/A

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-2 | | XAD-2 | | Silica Gel | |
| **Final** | 5 | 102 | 100 | 3 | 320.6 | | 293.4 | 824 | 310.9 | 1134.9 |
| **Initial** | 0 | 100 | 100 | 0 | 305.6 | | 293.4 | 799 | 300 | 1099 |
| **Gain** | 5 | 2 | 0 | 3 | | 15 | 0 | 25 | 10.9 | 35.9 |

Impinger Color: All clear | Labeled? ✓

Silica Gel Condition: 80% Blue | Sealed? ✓

**Run No.** 3 | Sample Date _____ | Recovery Date _____

Sample I.D. Chemours - PPA - STK - 3 - M0010 - | Analyst _____ | Filter Number _____

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

Impinger Color _____ | Labeled? _____

Silica Gel Condition _____ | Sealed? _____

Check COC for Sample IDs of Media Blanks

# METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **25 Jul 2018**

**File:** E:\Chemours carbon bed inlet.cem
**Program Version:** 2.0, built 21 Feb 2015 **File Version:** 2.02
**Computer:** WSWCEQUIP2 **Trailer:**
**Analog Input Device:** MCC USB-1608G

**Channel 1**

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

**Channel 2**

| | |
|---|---|
| Analyte | **$CO_2$** |
| Method | **EPA 3A**, Using Bias |
| Analyzer Make, Model & Serial No. | **Servomex 1440 S/N 0144001** |
| Full-Scale Output, mv | **1000** |
| Analyzer Range, % | **20.0** |
| Span Concentration, % | **16.3** |

# CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **25 Jul 2018**

Start Time: 10:22

## $O_2$

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

Calibration Standards

| % | Cylinder ID |
|---|---|
| 12.0 | XC016060B |
| 20.9 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | 31 mv |
| **Span, 20.9 %** | 876 mv |

Curve Coefficients

| Slope | Intercept |
|---|---|
| 40.47 | 31 |

## $CO_2$

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

Calibration Standards

| % | Cylinder ID |
|---|---|
| 8.9 | XC016060B |
| 16.3 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | -2 mv |
| **Span, 16.3 %** | 809 mv |

Curve Coefficients

| Slope | Intercept |
|---|---|
| 49.85 | -2 |

# CALIBRATION ERROR DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **25 Jul 2018**

Start Time: 10:22

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %
**Slope** 40.47 **Intercept** 31.0

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %
**Slope** 49.85 **Intercept** -2.0

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

# BIAS
Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **25 Jul 2018**

Start Time: 10:26

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

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

# RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **25 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| **CEMS PROGRAM SHUT DOWN DURNING PORT CHANGE** | | |
| 10:30 | 20.8 | 0.2 |
| 10:31 | 20.8 | 0.2 |
| 10:32 | 20.9 | 0.1 |
| 10:33 | 20.9 | 0.1 |
| 10:34 | 20.9 | 0.1 |
| 10:35 | 20.9 | 0.1 |
| 10:36 | 20.9 | 0.1 |
| 10:37 | 20.9 | 0.1 |
| 10:38 | 20.9 | 0.1 |
| 10:39 | 20.9 | 0.1 |
| 10:40 | 20.9 | 0.1 |
| 10:41 | 20.9 | 0.1 |
| 10:42 | 20.9 | 0.1 |
| 10:43 | 20.9 | 0.1 |
| 10:44 | 20.9 | 0.1 |
| 10:45 | 20.9 | 0.1 |
| 10:46 | 20.9 | 0.1 |
| 10:47 | 20.9 | 0.1 |
| 10:48 | 20.8 | 0.1 |
| 10:49 | 20.9 | 0.1 |
| 10:50 | 20.9 | 0.1 |
| 10:51 | 20.8 | 0.1 |
| 10:52 | 20.8 | 0.1 |
| 10:53 | 20.8 | 0.1 |
| 10:54 | 20.9 | 0.1 |
| 10:55 | 20.8 | 0.1 |
| 10:56 | 20.8 | 0.1 |
| 10:57 | 20.8 | 0.1 |
| 10:58 | 20.9 | 0.1 |
| 10:59 | 20.9 | 0.1 |
| 11:00 | 20.9 | 0.1 |
| 11:01 | 20.9 | 0.1 |
| 11:02 | 20.9 | 0.1 |
| 11:03 | 20.9 | 0.1 |
| 11:04 | 20.9 | 0.1 |
| 11:05 | 20.9 | 0.1 |
| 11:06 | 20.9 | 0.1 |
| 11:07 | 20.9 | 0.1 |
| 11:08 | 20.9 | 0.1 |
| 11:09 | 20.9 | 0.1 |
| 11:10 | 20.9 | 0.1 |

# RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **25 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 11:11 | 20.9 | 0.1 |
| 11:12 | 20.9 | 0.1 |
| 11:13 | 20.9 | 0.1 |
| 11:14 | 20.9 | 0.1 |
| 11:15 | 20.9 | 0.1 |
| 11:16 | 20.9 | 0.1 |
| 11:17 | 20.9 | 0.1 |
| 11:18 | 20.9 | 0.1 |
| 11:19 | 20.9 | 0.1 |
| 11:20 | 20.9 | 0.1 |
| 11:21 | 20.9 | 0.1 |
| 11:22 | 20.9 | 0.1 |
| 11:23 | 20.9 | 0.1 |
| **Avgs** | **20.9** | **0.1** |

# RUN SUMMARY

Number 1

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **dryden**
Source: **PPA Carbon Bed** | Calibration **1** | Date: **25 Jul 2018**

| | $O_2$ | $CO_2$ |
|---|---|---|
| **Method** | EPA 3A | EPA 3A |
| **Conc. Units** | % | % |

Time: 10:29 to 11:23

**Run Averages**

| | |
|---|---|
| 20.9 | 0.1 |

**Pre-run Bias at 10:26**

| | | |
|---|---|---|
| **Zero Bias** | 0.0 | 0.1 |
| **Span Bias** | 12.0 | 8.9 |
| **Span Gas** | 12.0 | 8.9 |

**Post-run Bias at 11:25**

| | | |
|---|---|---|
| **Zero Bias** | 0.0 | 0.0 |
| **Span Bias** | 12.0 | 8.8 |
| **Span Gas** | 12.0 | 8.9 |

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

| | |
|---|---|
| 20.9 | 0.1 |

# BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **dryden**
Source: **PPA Carbon Bed** | Calibration **1** | Date: **25 Jul 2018**

Start Time: 11:25

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**Calibration Drift**

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

*Bias No. 1

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| Zero | 0.0 | 0.0 | 0.0 | 0.0 | Pass |
| Span | 8.9 | 8.8 | -0.1 | -0.6 | Pass |

**Calibration Drift**

| Standard Gas | Initial* % | Final % | Difference % | Drift % | Status |
|---|---|---|---|---|---|
| Zero | 0.1 | 0.0 | -0.1 | -0.6 | Pass |
| Span | 8.9 | 8.8 | -0.1 | -0.6 | Pass |

*Bias No. 1



WESTON SOLUTIONS

# CALIBRATION DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **26 Jul 2018**

Start Time: 07:22

**$O_2$**

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

Calibration Standards

| **%** | **Cylinder ID** |
|---|---|
| 12.0 | XC016060B |
| 20.9 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | 25 mv |
| **Span, 20.9 %** | 875 mv |

Curve Coefficients

| **Slope** | **Intercept** |
|---|---|
| 40.71 | 25 |

**$CO_2$**

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

Calibration Standards

| **%** | **Cylinder ID** |
|---|---|
| 8.9 | XC016060B |
| 16.3 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | -8 mv |
| **Span, 16.3 %** | 808 mv |

Curve Coefficients

| **Slope** | **Intercept** |
|---|---|
| 50.15 | -8 |

# CALIBRATION ERROR DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **26 Jul 2018**

Start Time: 07:22

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %
**Slope** 40.47 **Intercept** 31.0

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %
**Slope** 49.85 **Intercept** -2.0

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

# BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **dryden**
Source: **PPA Carbon Bed** | Calibration **2** | Date: **26 Jul 2018**

Start Time: 07:31

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**Calibration Drift**

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

*Bias No. 2

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

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

**Calibration Drift**

| Standard Gas | Initial* % | Final % | Difference % | Drift % | Status |
|---|---|---|---|---|---|
| Zero | 0.0 | 0.1 | 0.1 | 0.6 | Pass |
| Span | 8.8 | 8.9 | 0.1 | 0.6 | Pass |

*Bias No. 2

# RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **2**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **26 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 08:38 | 20.9 | 0.1 |
| 08:39 | 20.8 | 0.1 |
| 08:40 | 20.9 | 0.1 |
| 08:41 | 20.9 | 0.1 |
| 08:42 | 20.9 | 0.1 |
| 08:43 | 20.9 | 0.1 |
| 08:44 | 20.8 | 0.1 |
| 08:45 | 20.8 | 0.1 |
| 08:46 | 20.8 | 0.1 |
| 08:47 | 20.8 | 0.1 |
| 08:48 | 20.8 | 0.1 |
| 08:49 | 20.8 | 0.1 |
| 08:50 | 20.8 | 0.1 |
| 08:51 | 20.8 | 0.1 |
| 08:52 | 20.8 | 0.1 |
| 08:53 | 20.8 | 0.1 |
| 08:54 | 20.8 | 0.0 |
| 08:55 | 20.8 | 0.1 |
| 08:56 | 20.8 | 0.1 |
| 08:57 | 20.9 | 0.1 |
| 08:58 | 20.9 | 0.1 |
| 08:59 | 20.9 | 0.0 |
| 09:00 | 20.9 | 0.1 |
| 09:01 | 20.9 | 0.0 |
| 09:02 | 20.9 | 0.1 |
| 09:03 | 20.9 | 0.1 |
| 09:04 | 20.9 | 0.0 |
| 09:05 | 20.9 | 0.1 |
| 09:06 | 20.9 | 0.1 |
| 09:07 | 20.9 | 0.1 |
| 09:08 | 20.9 | 0.1 |
| 09:09 | 20.9 | 0.1 |
| 09:10 | 20.9 | 0.1 |
| 09:11 | 20.9 | 0.1 |
| 09:12 | 20.9 | 0.1 |
| 09:13 | 20.9 | 0.1 |
| 09:14 | 20.9 | 0.1 |
| 09:15 | 20.9 | 0.1 |
| 09:16 | 20.9 | 0.1 |
| 09:17 | 20.9 | 0.1 |
| 09:18 | 20.9 | 0.1 |
| 09:19 | 20.9 | 0.1 |



WESTON SOLUTIONS

# RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **2**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **26 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 09:20 | 20.9 | 0.0 |
| 09:21 | 20.9 | 0.1 |
| 09:22 | 20.9 | 0.1 |
| 09:23 | 20.9 | 0.0 |
| 09:24 | 20.9 | 0.1 |
| 09:25 | 20.9 | 0.0 |
| 09:26 | 21.0 | 0.0 |
| 09:27 | 20.9 | 0.1 |
| 09:28 | 21.0 | 0.1 |
| 09:29 | 21.0 | 0.1 |
| 09:30 | 20.9 | 0.1 |
| 09:31 | 21.0 | 0.1 |
| 09:32 | 21.0 | 0.1 |
| 09:33 | 21.0 | 0.1 |
| 09:34 | 21.0 | 0.1 |
| 09:35 | 20.9 | 0.1 |
| 09:36 | 20.9 | 0.1 |
| 09:37 | 20.9 | 0.1 |
| 09:38 | 20.9 | 0.1 |
| 09:39 | 20.9 | 0.1 |
| 09:40 | 20.9 | 0.1 |
| 09:41 | 20.9 | 0.1 |
| 09:42 | 20.9 | 0.1 |
| 09:43 | 20.9 | 0.1 |
| 09:44 | 20.9 | 0.1 |
| 09:45 | 20.9 | 0.1 |
| 09:46 | 20.9 | 0.1 |
| 09:47 | 20.9 | 0.0 |
| 09:48 | 21.0 | 0.1 |
| 09:49 | 21.0 | 0.1 |
| 09:50 | 21.0 | 0.1 |
| 09:51 | 21.0 | 0.1 |
| 09:52 | 21.0 | 0.1 |
| 09:53 | 21.0 | 0.1 |
| 09:54 | 21.0 | 0.1 |
| 09:55 | 21.0 | 0.0 |
| 09:56 | 21.0 | 0.1 |
| 09:57 | 20.9 | 0.1 |
| 09:58 | 20.9 | 0.1 |
| 09:59 | 20.9 | 0.1 |
| 10:00 | 20.9 | 0.1 |
| 10:01 | 20.9 | 0.1 |



WESTON SOLUTIONS

# RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **2**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **26 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 10:02 | 20.9 | 0.1 |
| 10:03 | 20.9 | 0.1 |
| 10:04 | 20.9 | 0.1 |
| 10:05 | 20.9 | 0.1 |
| 10:06 | 20.9 | 0.1 |
| 10:07 | 20.8 | 0.1 |
| 10:08 | 20.9 | 0.1 |
| 10:09 | 20.9 | 0.1 |
| 10:10 | 20.9 | 0.1 |
| 10:11 | 20.9 | 0.1 |
| 10:12 | 20.9 | 0.1 |
| 10:13 | 20.9 | 0.1 |
| 10:14 | 20.9 | 0.1 |
| 10:15 | 20.9 | 0.1 |
| 10:16 | 20.9 | 0.1 |
| 10:17 | 20.9 | 0.1 |
| 10:18 | 20.9 | 0.1 |
| 10:19 | 20.9 | 0.1 |
| 10:20 | 20.9 | 0.1 |
| 10:21 | 20.9 | 0.1 |
| 10:22 | 20.9 | 0.1 |
| 10:23 | 20.9 | 0.1 |
| 10:24 | 20.9 | 0.1 |
| 10:25 | 20.9 | 0.1 |
| 10:26 | 20.9 | 0.1 |
| 10:27 | 20.9 | 0.1 |
| 10:28 | 20.9 | 0.1 |
| 10:29 | 20.9 | 0.1 |
| 10:30 | 20.9 | 0.1 |
| 10:31 | 20.8 | 0.1 |
| 10:32 | 20.8 | 0.1 |
| 10:33 | 20.8 | 0.1 |
| 10:34 | 20.8 | 0.1 |
| 10:35 | 20.8 | 0.0 |
| 10:36 | 20.9 | 0.0 |
| 10:37 | 20.9 | 0.0 |
| 10:38 | 20.9 | 0.0 |
| 10:39 | 20.9 | 0.0 |
| 10:40 | 20.9 | 0.1 |
| 10:41 | 20.9 | 0.1 |
| 10:42 | 20.9 | 0.1 |
| 10:43 | 20.9 | 0.1 |

# RUN DATA

Number 2

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **PPA Carbon Bed**

Calibration **2**

Project Number: **15418.002.006.0001**
Operator: **dryden**
Date: **26 Jul 2018**

| | Time | $O_2$ % | $CO_2$ % |
|---|---|---|---|
| | **Avgs** | **20.9** | **0.1** |

# RUN SUMMARY

Number 2

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **dryden**
Source: **PPA Carbon Bed** | Calibration **2** | Date: **26 Jul 2018**

| | $O_2$ | $CO_2$ |
|---|---|---|
| **Method** | EPA 3A | EPA 3A |
| **Conc. Units** | % | % |

Time: 08:37 to 10:43

**Run Averages**

| | | |
|---|---|---|
| | 20.9 | 0.1 |

**Pre-run Bias at 07:31**

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

**Post-run Bias at 10:50**

| | | |
|---|---|---|
| **Zero Bias** | 0.0 | 0.0 |
| **Span Bias** | 11.9 | 8.9 |
| **Span Gas** | 12.0 | 8.9 |

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

| | | |
|---|---|---|
| | 21.1 | 0.0 |

# BIAS AND CALIBRATION DRIFT

Number 4

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **dryden**
Source: **PPA Carbon Bed** | Calibration **2** | Date: **26 Jul 2018**

Start Time: 10:50

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**Calibration Drift**

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

*Bias No. 3

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

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

**Calibration Drift**

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

*Bias No. 3

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

| **Test Data** | | | |
|---|---|---|---|
| Run number | 1 | 2 | 3 |
| Location | VEN-CBed IN | VEN-CBed IN | VEN-CBed IN |
| Date | 7/19/2018 | 7/20/2018 | 7/20/2018 |
| Time period | 0952 -1428 | 0847-1054 | 1300-1504 |
| Operator | RS | RS | RS |
| **Inputs For Calcs.** | | | |
| Sq. rt. delta P | 0.79491 | 0.79321 | 0.79305 |
| Delta H | 1.3233 | 1.2346 | 1.2342 |
| Stack temp. (deg.F) | 93.1 | 88.6 | 93.8 |
| Meter temp. (deg.F) | 93.6 | 81.1 | 87.5 |
| Sample volume (act.) | 66.613 | 63.717 | 64.187 |
| Barometric press. (in.Hg) | 30.05 | 30.04 | 30.04 |
| Volume $H_2O$ imp. (ml) | 26.2 | 44.7 | 37.0 |
| Weight change sil. gel (g) | 21.8 | 17.0 | 19.8 |
| % $CO_2$ | 0.0 | 0.0 | 0.0 |
| % $O_2$ | 20.9 | 20.9 | 20.9 |
| % $N_2$ | 79.1 | 79.1 | 79.1 |
| Area of stack (sq.ft.) | 6.305 | 6.305 | 6.305 |
| Sample time (min.) | 96.0 | 96.0 | 96.0 |
| Static pressure (in.$H_2O$) | -4.20 | -4.20 | -4.20 |
| Nozzle dia. (in.) | 0.218 | 0.215 | 0.215 |
| Meter box cal. | 0.9860 | 0.9860 | 0.9860 |
| Cp of pitot tube | 0.84 | 0.84 | 0.84 |
| Traverse points | 24 | 24 | 24 |

INLET

# Sample and Velocity Traverse Point Data Sheet - Method 1

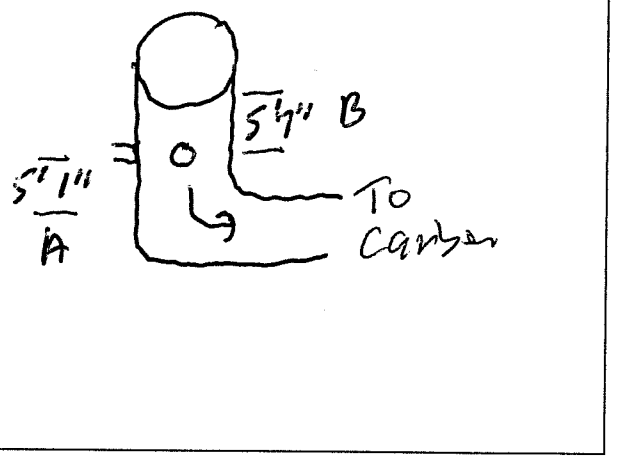
Client Chemours Operator AS
Loaction/Plant Fayetteville NC Date 6-13-13
Source VE Nort Carbon Inlet W.O. Number

| | | | | | |
|---|---|---|---|---|---|
| **Duct Type** | ☒ | Circular | ☐ | Rectangular Duct | Indicate appropriate type |
| **Traverse Type** | ☑ | Particulate Traverse | ☐ | Velocity Traverse | ☐ CEM Traverse |

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

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

Diagram of Stack

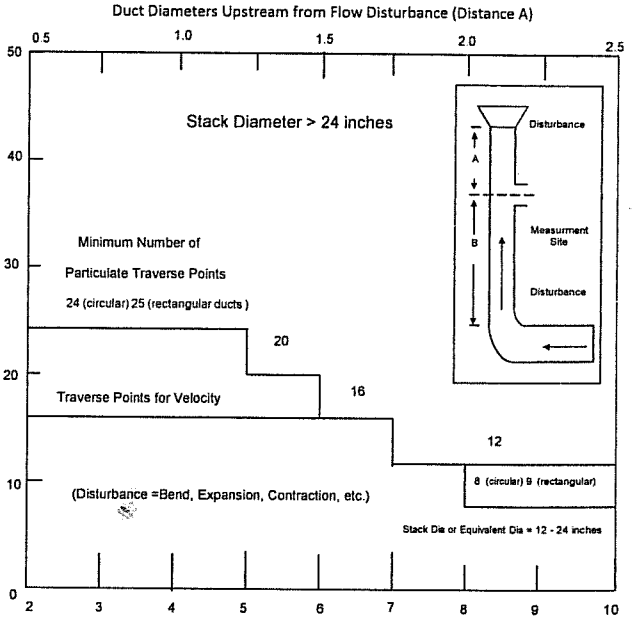



**Traverse Point Locations**

| Traverse Point | % of Duct | Distance from Inside Duct Wall (in) | Distance from Outside of Port (in) |
|---|---|---|---|
| 1 | .021 | 3/4 | ~~21~~ 21 3/8 |
| 2 | .067 | 2 1/4 | 22 7/8 |
| 3 | .118 | 4 | 24 5/8 |
| 4 | .177 | 6 | 26 5/8 |
| 5 | .250 | 8 1/2 | 29 1/8 |
| 6 | .356 | 12 1/8 | 32 3/4 3/4 |
| 7 | .644 | 21 7/8 | 42 1/2 |
| 8 | .750 | 25 1/2 | 46 1/8 |
| 9 | .822 | 28 | 48 5/8 |
| 10 | .882 | 30 | 50 5/8 |
| 11 | .933 | 31 3/4 | 52 3/8 |
| 12 | .979 | 33 1/4 | 53 7/8 |
| **CEM 3 Point(Long Measurment Line) Stratificaton Point Locations** | | | |
| 1 | 0.167 | | |
| 2 | 0.50 | | |
| 3 | 0.833 | | |

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

Duct Diameters Upstream from Flow Disturbance (Distance A)




Duct Diameters Downstream from Flow Disturbance (Distance B)

**Traverse Point Location Percent of Stack -Circular**

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

**Traverse Point Location Percent of Stack -Rectangular**

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

WESTON MANAGERS DESIGNERS/CONSULTANTS

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid



| | |
|---|---|
| Client | The Chemours Company |
| W.O.# | 15418.002.006 |
| Project ID | Chemours |
| Mode/Source ID | VEN Carbon Bed |
| Samp. Loc. ID | IN |
| Run No.ID | 1 |
| Test Method ID | M0010 |
| Date ID | 16JUL2018 |
| Source/Location | VEN Carbon Bed Inlet |
| Sample Date | 7/19/18 |
| Baro. Press (in Hg) | 30.05 |
| Operator | RS |

**Stack Conditions**

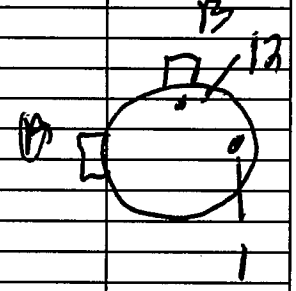
| | Assumed | Actual |
|---|---|---|
| % Moisture | 4 | |
| Impinger Vol (ml) | | 26.2 |
| Silica gel (g) | | 21.8 |
| CO2, % by Vol | 0 | 0.0 |
| O2, % by Vol | 20.9 | 20.9 |
| Temperature (°F) | 95 | |
| Meter Temp (°F) | 90 | |
| Static Press (in $H_2O$) | -4.2 | ~4.2 |
| Ambient Temp (°F) | 81 | |

| | | |
|---|---|---|
| Meter Box ID | AO 26 | |
| Meter Box Y | .986 | |
| Meter Box Del H | 1.674 | |
| Probe ID / Length | P711 | 6' |
| Probe Material | Boro | |
| Pitot / Thermocouple ID | P711 | |
| Pitot Coefficient | 0.84 | |
| Nozzle ID | .218 | |
| Nozzle Measurements | .218 | .218 .218 |
| Avg Nozzle Dia (in) | .218 | |
| Area of Stack ($ft^2$) | 6.305 | |
| Sample Time | 96 min | |
| Total Traverse Pts | 24 | |

K Factor 2.09

| | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train ($ft^3$) | 0.015 | 0.008 | 0.006 |
| Leak Check @ (in Hg) | 15" | 10" | 10" |
| Pitot leak check good | (yes) / no | (yes) / no | (yes) / no |
| Pitot Inspection good | (yes) / no | (yes) / no | (yes) / no |
| Method 3 System good | yes / no | yes / no | yes / no |
| **Temp Check** | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 73 | | 75 |
| Reference Temp | 74 | | 76 |
| Pass/Fail (+/- 2°) | (Pass) / Fail | | (Pass) / Fail |
| Temp Change Response ? | (yes) / no | | (yes) / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (°F) | PROBE TEMP (°F) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0952 | | | 460.237 | | | | | | | | | |
| B 12 | 4 | | .42 | .88 | 462.4 | 90 | 86 | 128 | 128 | 66 | 5 | 57 | | |
| 11 | 8 | | .45 | .94 | 464.7 | 90 | 88 | 128 | 126 | 63 | 6 | 55 | | |
| 10 | 12 | | .47 | .98 | 467.1 | 90 | 88 | 128 | 125 | 60 | 6 | 56 | | |
| 9 | 16 | | .46 | .96 | 469.4 | 90 | 89 | 126 | 129 | 59 | 6 | 55 | | |
| 8 | 20 | | .50 | 1.0 | 471.8 | 90 | 90 | 128 | 125 | 59 | 6 | 56 | | |
| 7 | 24 | | .55 | 1.1 | 474.2 | 91 | 91 | 126 | 125 | 60 | 6 | 56 | | |
| 6 | 28 | | .70 | 1.4 | 477.2 | 91 | 92 | 128 | 128 | 60 | 7.5 | 54 | | |
| 5 | 32 | | .74 | 1.5 | 480.5 | 91 | 92 | 128 | 126 | 60 | 7.5 | 55 | | |
| 4 | 36 | | .77 | 1.6 | 483.7 | 91 | 93 | 126 | 125 | 61 | 8 | 54 | | |
| 3 | 40 | | .78 | 1.6 | 486.1 | 92 | 94 | 127 | 128 | 62 | 8 | 52 | | |
| 2 | 44 | | .82 | 1.7 | 489.4 | 92 | 95 | 126 | 126 | 63 | 8.5 | 54 | | |
| 1 | 48 | 1040 | .84 | 1.7 | 492.508 | 92 | 95 | 127 | 127 | 64 | 8.5 | 53 | | |
| A 1 | 52 | 1340 | .78 | 1.6 | 495.9 | 95 | 97 | 128 | 127 | 66 | 9 | 55 | | |
| 2 | 56 | | .74 | 1.5 | 498.9 | 95 | 96 | 126 | 126 | 65 | 9 | 54 | | |
| 3 | 60 | | .72 | 1.5 | 502.0 | 95 | 96 | 128 | 126 | 64 | 8.5 | 48 | | |
| 4 | 64 | | .67 | 1.4 | 504.9 | 95 | 96 | 127 | 128 | 63 | 8 | 43 | | |
| 5 | 68 | | .67 | 1.4 | 507.5 | 95 | 96 | 128 | 126 | 63 | 8 | 44 | | |
| 6 | 72 | | .65 | 1.4 | 510.6 | 95 | 96 | 127 | 126 | 61 | 8 | 47 | | |
| 7 | 76 | | .67 | 1.4 | 513.5 | 95 | 96 | 128 | 126 | 61 | 8 | 51 | | |
| 8 | 80 | | .61 | 1.3 | 516.3 | 95 | 96 | 127 | 125 | 62 | 8 | 52 | | |
| 9 | 84 | | .61 | 1.3 | 519.2 | 96 | 96 | 127 | 126 | 63 | 8 | 54 | | |
| 10 | 88 | | .60 | 1.3 | 521.9 | 96 | 96 | 127 | 125 | 64 | 8 | 47 | | |
| 11 | 92 | | .56 | 1.2 | 524.6 | 96 | 96 | 126 | 127 | 65 | 7.5 | 50 | | |
| 12 | 96 | 1428 | .53 | 1.1 | 527.225 | 96 | 96 | 128 | 127 | 66 | 7 | 51 | | |
| | | | | | ~~63.546~~ | | | | | | | | | |
| | | | Avg Delta P .6379 | Avg Delta H 1.3233 | Total Volume ~~66.613~~ | Avg Ts 93.08 | Avg Tm 93.58 | Min/Max 126/128 | Min/Max 125/129 | Max 66 | Max Vac 9 | Min/Max 43/57 | | |
| | | | Avg Sqrt Delta P .7949 | Avg Sqrt Del H 1.1451 | | | | | | | | | | |



WESTON SOLUTIONS

Comments: MW Mid point leak check. 08/06/18 492.508 → 492.883 66.613 = .375 62

MW 8/06/18

EPA Method 0010 from EPA SW-846

63.09 Vm

100 Ts

3.5 % M

15984 dscfm

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid



| | | Stack Conditions | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Client | The Chemours Company | | Assumed | Actual | Meter Box ID | AC 26 | | Sample Train ($ft^3$) |
| W.O.# | 15418.002.006 | | | | Meter Box Y | .986 | | Leak Check @ (in Hg) |
| Project ID | Chemours | % Moisture | 3.5 | | Meter Box Del H | 1.674 | | Pitot leak check good |
| Mode/Source ID | VEN Carbon Bed | Impinger Vol (ml) | | 447 | Probe ID / Length | P711 | | Pitot Inspection good |
| Samp. Loc. ID | IN | Silica gel (g) | | 17 | Probe Material | (Boro) | | Method 3 System good |
| Run No.ID | 2 | CO2, % by Vol | 0 | 0 | Pitot / Thermocouple ID | P711 | | Temp Check |
| Test Method ID | M0010 | O2, % by Vol | 20.9 | 20.9 | Pitot Coefficient | (0.84) | | Meter Box Temp |
| Date ID | 16JUL2018 | Temperature (°F) | 93 | 88.62 | Nozzle ID | .215 | | Reference Temp |
| Source/Location | VEN Carbon Bed Inlet | Meter Temp (°F) | 80 | 81.08 | Nozzle Measurements | .215 / .215 / .215 | | Pass/Fail (+/- 2°) |
| Sample Date | 7/20/18 | Static Press (in $H_2O$) | -4.2 | -4.2 | Avg Nozzle Dia (in) | .215 | | Temp Change Response ? |
| Baro. Press (in Hg) | 30.04 | | | | Area of Stack ($ft^2$) | 6.305 | | |
| Operator | RS | Ambient Temp (°F) | 75 | | Sample Time | 96 min | | |
| | | | | | Total Traverse Pts | 24 | | |

K Factor 1.95

| | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train ($ft^3$) | 0.015 | 0.009 | 0.005 |
| Leak Check @ (in Hg) | 15" | 8" | 8" |
| Pitot leak check good | (yes) / no | (yes) / no | (yes) / no |
| Pitot Inspection good | (yes) / no | (yes) / no | (yes) / no |
| Method 3 System good | yes / no | yes / no | yes / no |
| **Temp Check** | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 74 | | 88 |
| Reference Temp | 75.4 | | 89.0 |
| Pass/Fail (+/- 2°) | (Pass) / Fail | | Pass / Fail |
| Temp Change Response ? | (yes) / no | | (yes) / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (oF) | PROBE TEMP (oF) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0847 | | | 528.000 | | | | | | | | | |
| B 12 | 4 | | .42 | .81 | 530.1 | 86 | 76 | 122 | 126 | 66 | 5 | 40 | | |
| 11 | 8 | | .42 | .81 | 532.3 | 86 | 76 | 120 | 125 | 62 | 5 | 39 | | |
| 10 | 12 | | .46 | .89 | 534.5 | 87 | 76 | 120 | 124 | 56 | 5 | 37 | | |
| 9 | 16 | | .49 | .95 | 536.7 | 87 | 77 | 121 | 123 | 53 | 5 | 38 | | |
| 8 | 20 | | .50 | .97 | 539.1 | 87 | 77 | 119 | 123 | 52 | 5 | 39 | | |
| 7 | 24 | | .54 | 1.0 | 541.5 | 87 | 78 | 120 | 124 | 52 | 5 | 38 | | |
| 6 | 28 | | .68 | 1.3 | 544.2 | 88 | 78 | 120 | 123 | 52 | 6 | 39 | | |
| 5 | 32 | | .76 | 1.5 | 547.1 | 88 | 78 | 120 | 123 | 51 | 7 | 40 | | 31.003 |
| 4 | 36 | | .78 | 1.5 | 550.0 | 88 | 79 | 121 | 123 | 51 | 7 | 39 | | |
| 3 | 40 | | .79 | 1.5 | 553.0 | 88 | 80 | 120 | 124 | 52 | 7.5 | 40 | | |
| 2 | 44 | | .81 | 1.6 | 555.9 | 89 | 80 | 121 | 123 | 52 | 8 | 42 | | |
| 1 | 48 | 0955 | .81 | 1.6 | 559.003 | 89 | 81 | 121 | 124 | 53 | 8 | 40 | | |
| A 1 | 52 | 1006 | .77 | 1.5 | 562.1 | 89 | 82 | 121 | 120 | 61 | 7.5 | 41 | | |
| 2 | 56 | | .73 | 1.4 | 564.0 | 89 | 82 | 120 | 121 | 54 | 7 | 39 | | |
| 3 | 60 | | .73 | 1.4 | 567.7 | 90 | 83 | 121 | 121 | 51 | 7 | 39 | | |
| 4 | 64 | | .70 | 1.3 | 570.6 | 89 | 83 | 120 | 120 | 51 | 6.5 | 40 | | 32.714 |
| 5 | 68 | | .67 | 1.3 | 573.3 | 90 | 83 | 120 | 121 | 52 | 6.5 | 41 | | |
| 6 | 72 | | .67 | 1.3 | 576.1 | 90 | 84 | 119 | 122 | 53 | 6.5 | 41 | | |
| 7 | 76 | | .66 | 1.3 | 578.9 | 90 | 84 | 122 | 121 | 54 | 6.5 | 42 | | |
| 8 | 80 | | .60 | 1.2 | 581.5 | 90 | 85 | 120 | 122 | 55 | 6.5 | 43 | | |
| 9 | 84 | | .60 | 1.2 | 584.2 | 90 | 86 | 120 | 121 | 57 | 6.5 | 44 | | |
| 10 | 88 | | .59 | 1.2 | 586.9 | 90 | 86 | 121 | 121 | 57 | 6.5 | 46 | | |
| 11 | 92 | | .56 | 1.1 | 589.4 | 90 | 86 | 120 | 121 | 58 | 6.5 | 44 | | |
| 12 | 96 | 1054 | .51 | 1.0 | 591.888 | 90 | 86 | 123 | 123 | 59 | 6 | 47 | | |
| | | | | | | | | | | | | | | |
| | | | Avg Delta P ✓ .6354 | Avg Delta H ✓ 1.2345 | Total Volume ✓ 63.717 | Avg Ts ✓ 88.62 | Avg Tm ✓ 81.08 | Min/Max ✓ 119/123 | Min/Max ✓ 120/126 | Max ✓ 66 | Max Vac ✓ 8 | Min/Max ✓ 37/47 | | |
| | | | Avg Sqrt Delta P ✓ .7932 | Avg Sqrt Del H ✓ 1.1059 | Comments: ✓ | | | | | | | | | |

WESTON SOLUTIONS

Port change leak check
559.003 → 559.174
= .171

✓ MPJ 8/06/18

EPA Method 0010 from EPA SW-846
150 - 101.31
moist - 4.49
scfm - 15872.115
Svel - 61.71341708

# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid



| | | | Stack Conditions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client | The Chemours Company | | Assumed | Actual | Meter Box ID | A0 26 | | | K Factor | 1.96 | |
| W.O.# | 15418.002.006 | | | | Meter Box Y | .986 | | | | Initial | Mid-Point | Final |
| Project ID | Chemours | % Moisture | 4.49 | | Meter Box Del H | 1.674 | | | | | | |
| Mode/Source ID | VEN Carbon Bed | Impinger Vol (ml) | | 37 | Probe ID / Length | P711 | | | Sample Train ($ft^3$) | 0.044 | 0.009 | 0.010 |
| Samp. Loc. ID | IN | Silica gel (g) | | 19.8 | Probe Material | (Boro) | | | Leak Check @ (in Hg) | 15" | 7" | 7" |
| Run No.ID | 3 | CO2, % by Vol | 0 | 0.0 | Pitot / Thermocouple ID | P711 | | | Pitot leak check good | (yes) / no | (yes) / no | (yes) / no |
| Test Method ID | M0010 | O2, % by Vol | 20.9 | 20.9 | Pitot Coefficient | (0.84) | | | Pitot Inspection good | (yes) / no | (yes) / no | (yes) / no |
| Date ID | 16JUL2018 | Temperature (°F) | 88-90 | | Nozzle ID | .215 | | | Method 3 System good | yes / no | yes / no | yes / no |
| Source/Location | VEN Carbon Bed Inlet | Meter Temp (°F) | 90 | | Nozzle Measurements | .215 | .215 | .215 | **Temp Check** | Pre-Test Set | | Post-Test Set |
| Sample Date | 7/20/18 | Static Press (in $H_2O$) | -4.2 | -4.2 | Avg Nozzle Dia (in) | .215 | | | Meter Box Temp | 85 | | 83 |
| Baro. Press (in Hg) | 30.04 | | | | Area of Stack ($ft^2$) | 6.305 | | | Reference Temp | 84.7 | | 82.7 |
| Operator | RS | Ambient Temp (°F) | 80 | | Sample Time | 96 | | | Pass/Fail (+/- 2°) | (Pass) / Fail | | (Pass) / Fail |
| | | | | | Total Traverse Pts | 24 | | | Temp Change Response ? | (yes) / no | | (yes) no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (oF) | PROBE TEMP (oF) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1300 | | | 592.352 | | | | | | | | | |
| B 12 | 4 | | .41 | .80 | 594.5 | 93 | 85 | 121 | 122 | 66 | 4.5 | 51 | | |
| 11 | 8 | | .44 | .86 | 596.7 | 93 | 85 | 123 | 123 | 62 | 4.5 | 46 | | |
| 10 | 12 | | .47 | .92 | 599.0 | 93 | 86 | 120 | 120 | 58 | 4.5 | 45 | | |
| 9 | 16 | | .49 | .96 | 601.3 | 93 | 86 | 120 | 122 | 56 | 5 | 46 | | |
| 8 | 20 | | .50 | .98 | 603.7 | 94 | 87 | 120 | 120 | 56 | 5 | 47 | | |
| 7 | 24 | | .55 | 1.0 | 606.1 | 94 | 87 | 120 | 122 | 57 | 5 | 48 | | |
| 6 | 28 | | .68 | 1.3 | 608.8 (RS) | 94 | 87 | 122 | 124 | 57 | 6 | 48 | | 608.8 DGM (RS) |
| 5 | 32 | | .74 | 1.4 | 611.8 | 94 | 87 | 122 | 124 | 57 | 6 | 49 | | |
| 4 | 36 | | .77 | 1.5 | 614.6 | 94 | 88 | 120 | 123 | 59 | 6.5 | 51 | | |
| 3 | 40 | | .79 | 1.5 | 617.6 | 94 | 88 | 122 | 124 | 60 | 6.5 | 52 | | |
| 2 | 44 | | .81 | 1.6 | 620.6 | 94 | 88 | 122 | 124 | 62 | 7 | 54 | | |
| 1 | 48 | 1348 | .81 | 1.6 | 623.770 | 94 | 89 | 120 | 123 | 63 | 7 | 53 | | |
| A 1 | 52 | 1416 | .74 | 1.4 | 626.7 | 94 | 87 | 120 | 123 | 65 | 6.5 | 47 | | 101.9% I |
| 2 | 56 | | .72 | 1.4 | 629.5 | 94 | 87 | 120 | 123 | 59 | 6.5 | 43 | | |
| 3 | 60 | | .71 | 1.4 | 632.4 | 94 | 88 | 120 | 121 | 56 | 6.5 | 43 | | 4.2% M |
| 4 | 64 | | .70 | 1.4 | 635.3 | 94 | 87 | 122 | 124 | 56 | 6.5 | 44 | | |
| 5 | 68 | | .67 | 1.3 | 638.1 | 95 | 89 | 120 | 124 | 58 | 6 | 44 | | 1,000 |
| 6 | 72 | | .67 | 1.3 | 640.9 | 94 | 89 | 121 | 124 | 59 | 6 | 45 | | |
| 7 | 76 | | .65 | 1.3 | 643.7 | 94 | 88 | 122 | 123 | 59 | 6 | 44 | | dscf |
| 8 | 80 | | .61 | 1.2 | 646.3 | 94 | 89 | 122 | 123 | 60 | 6 | 46 | | |
| 9 | 84 | | .61 | 1.2 | 649.0 | 94 | 88 | 123 | 123 | 60 | 6 | 47 | | 61.4 Vm |
| 10 | 88 | | .60 | 1.2 | (RS) 651.7 | 94 | 88 | 121 | 124 | 61 | 6 | 48 | | |
| 11 | 92 | | .57 | 1.1 | 654.3 | 93 | 88 | 120 | 124 | 62 | 5.5 | 49 | | |
| 12 | 96 | 1504 | .52 | 1.0 | 656.689 | 93 | 88 | 120 | 123 | 63 | 5 | 52 | | |
| | | | | | | | | | | | | | | |
| | | | Avg Delta P .6345 | Avg Delta H 1.2341 | Total Volume 64.187 | Avg Ts 93.79 | Avg Tm 87.458 | Min/Max 120/123 | Min/Max 120/124 | Max 66 | Max Vac 7 | Min/Max 43/54 | | |
| | | | Avg Sqrt Delta P .7930 | Avg Sqrt Del H 1.1059 | Comments: | | | | | | | | | |

WESTON SOLUTIONS

EPA Method 0010 from EPA SW-846

Port change leak check

623.770 → 623.920

64

= .150

MW 7/06/18

# SAMPLE RECOVERY FIELD DATA

EPA Method 0010

VEN Carbon Bed Inlet

Client: The Chemours Company | W.O. #: 15418.002.006

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

**Run No.** 1 | Sample Date 7/19/18 | Recovery Date 7/19/18

Sample I.D. Chemours - VEN Carbon Bed - IN - 1 - M0010 - | Analyst DM/JL/RM | Filter Number N14

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD 1 | | XAD 2 | | Silica Gel | |
| **Final** | 20 | 90 | 110 | | 283.1 | | 312.6 | | 321.8 | |
| **Initial** | 0 | 100 | 100 | | 277.1 | | 312.4 | | 300 | |
| **Gain** | 20 | -10 | 10 | | 6.0 | | .2 | 26.2 | 21.8 | 73 |

Impinger Color: all clear | Labeled? ✓

Silica Gel Condition: blue 90% | Sealed? ✓

**Run No.** 2 | Sample Date 7/20/18 | Recovery Date 7/20/18

Sample I.D. Chemours - VEN Carbon Bed - IN - 2 - M0010 - | Analyst DM/JL | Filter Number N14

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-1 | | XAD 2 | | Silica Gel | |
| **Final** | 30 | 100 | 100 | 6 | 309.4 | | 305.6 | | 317 | |
| **Initial** | | 100 | 100 | | 301.7 | | 304.6 | | 300 | |
| **Gain** | 30 | 0 | 0 | 6 | 7.7 | | 1 | 44.7 | 17 | 61.7 |

Impinger Color: all clear | Labeled? ✓ ✓ ✓

Silica Gel Condition: blue 90% | Sealed? ✓

**Run No.** 3 | Sample Date 7/20/18 | Recovery Date 7/20/18

Sample I.D. Chemours - VEN Carbon Bed - IN - 3 - M0010 - | Analyst DM/AS | Filter Number N14

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-1 | | XAD-2 | | Silica Gel | |
| **Final** | 15 | 103 | 105 | 4 | 319.6 | | 304.7 | | 319.8 | |
| **Initial** | 0 | 100 | 100 | 0 | 309.7 | | 304.6 | | 300 | |
| **Gain** | 15 | 3 | 5 | 4 | 9.9 | | .1 | 37 | 19.8 | 56.9 |

Impinger Color: all clear | Labeled? ✓ ✓ ✓

Silica Gel Condition: blue 70% | Sealed? ✓

Check COC for Sample IDs of Media Blanks

✓ MP 08/06/18

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

| **Test Data** | | | |
|---|---|---|---|
| Run number | 1 | 2 | 3 |
| Location | VEN-CBed Outlet | VEN-CBed Outlet | VEN-CBed Outlet |
| Date | 7/19/2018 | 7/20/2018 | 7/20/2018 |
| Time period | 0952 -1428 | 0847-1054 | 1300-1504 |
| Operator | SR | DRYDEN | DRYDEN |
| **Inputs For Calcs.** | | | |
| Sq. rt. delta P | 0.82180 | 0.82536 | 0.80184 |
| Delta H | 1.6417 | 1.4436 | 1.3303 |
| Stack temp. (deg.F) | 96.1 | 96.3 | 97.3 |
| Meter temp. (deg.F) | 93.5 | 78.9 | 84.5 |
| Sample volume (act.) | 65.982 | 66.720 | 64.865 |
| Barometric press. (in.Hg) | 30.05 | 30.04 | 30.04 |
| Volume $H_2O$ imp. (ml) | 28.0 | 34.8 | 54.8 |
| Weight change sil. gel (g) | 19.6 | 20.9 | 25.5 |
| % $CO_2$ | 0.0 | 0.0 | 0.0 |
| % $O_2$ | 20.9 | 20.9 | 20.9 |
| % $N_2$ | 79.1 | 79.1 | 79.1 |
| Area of stack (sq.ft.) | 6.305 | 6.305 | 6.305 |
| Sample time (min.) | 96.0 | 96.0 | 96.0 |
| Static pressure (in.$H_2O$) | 3.50 | 3.50 | 3.50 |
| Nozzle dia. (in.) | 0.215 | 0.215 | 0.215 |
| Meter box cal. | 0.9915 | 1.0150 | 1.0150 |
| Cp of pitot tube | 0.84 | 0.84 | 0.84 |
| Traverse points | 24 | 24 | 24 |

OUTLET

# Sample and Velocity Traverse Point Data Sheet - Method 1

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

| | | | | |
|---|---|---|---|---|
| **Duct Type** | X | Circular | ☐ | Rectangular Duct |
| **Traverse Type** | X | Particulate Traverse | ☐ | Velocity Traverse |

Indicate appropriate type: ☐ CEM Traverse

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

**Traverse Point Locations**

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

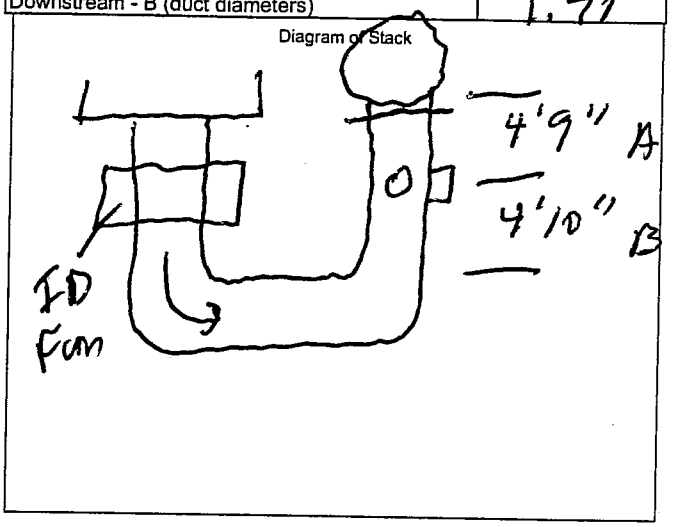
**CEM 3 Point(Long Measurment Line) Stratificaton Point Locations**

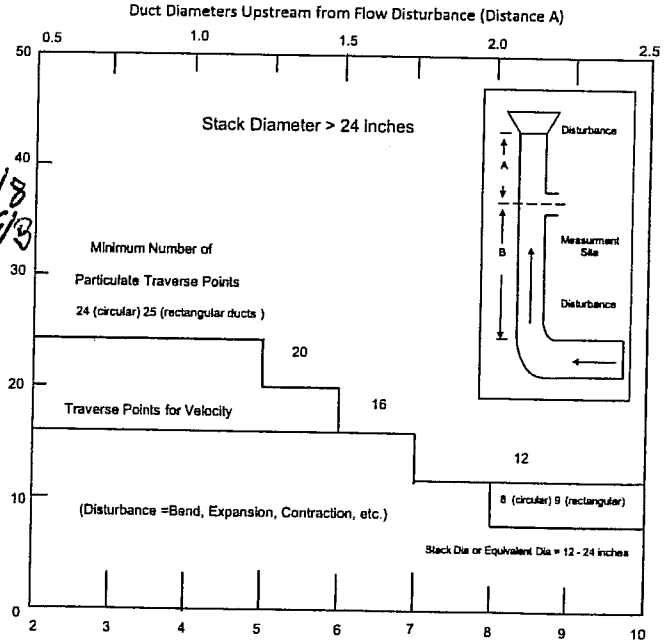
| | | | |
|---|---|---|---|
| 1 | 0.167 | | |
| 2 | 0.50 | | |
| 3 | 0.833 | | |

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

| Flow Disturbances | |
|---|---|
| Upstream - A (ft) | 4' 9" |
| Downstream - B (ft) | 4' 10" |
| Upstream - A (duct diameters) | 1.53 |
| Downstream - B (duct diameters) | 1.77 |

Diagram of Stack




**Traverse Point Location Percent of Stack -Circular**

| Traverse Point Location | Number of Traverse Points: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 14.6 | | 6.7 | | 4.4 | | 3.2 | | 2.6 | | 2.1 |
| 2 | | 85.4 | | 25.0 | | 14.6 | | 10.5 | | 8.2 | | 6.7 |
| 3 | | | | 75 | | 29.6 | | 19.4 | | 14.6 | | 11.8 |
| 4 | | | | 93.3 | | 70.4 | | 32.3 | | 22.6 | | 17.7 |
| 5 | | | | | | 85.4 | | 67.7 | | 34.2 | | 25 |
| 6 | | | | | | 95.6 | | 80.6 | | 65.8 | | 35.6 |
| 7 | | | | | | | | 89.5 | | 77.4 | | 64.4 |
| 8 | | | | | | | | 96.8 | | 85.4 | | 75.3 |
| 9 | | | | | | | | | | 91.8 | | 82.3 |
| 10 | | | | | | | | | | 97.4 | | 88.2 |
| 11 | | | | | | | | | | | | 93.3 |
| 12 | | | | | | | | | | | | 97.9 |

**Traverse Point Location Percent of Stack -Rectangular**

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

Nozzle =

# ISOKINETIC FIELD DATA SHEET

## EPA Method 0010- HFPO Dimer Acid

Page 1 of 1

| | | Stack Conditions | |
|---|---|---|---|
| | | Assumed | Actual |
| Client | The Chemours Company | | |
| W.O.# | 15418.002.006 | | |
| Project ID | Chemours | 2 | |
| Mode/Source ID | VEN Carbon Bed | | 28 |
| Samp. Loc. ID | OUT | | 19.6 |
| Run No.ID | 1 | 0.0 | 0.0 |
| Test Method ID | M0010 | 20.9 | 20.9 |
| Date ID | 16JUL2018 | 95 | |
| Source/Location | VEN Carbon Bed Outlet | 90 | |
| Sample Date | 7/19/18 | 4.2 | 3.5 |
| Baro. Press (in Hg) | 30.05 | | |
| Operator | SL | Ambient Temp (°F) | 90 |

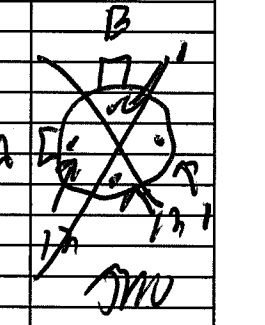
| | | | |
|---|---|---|---|
| Meter Box ID | WC~~A8~~21 | | |
| Meter Box Y | .9915 | | |
| Meter Box Del H | 2.0059 | | |
| Probe ID / Length | 1-7D1 | 6' | Sample Train (ft³) |
| Probe Material | | Boro | Leak Check @ (in Hg) |
| Pitot / Thermocouple ID | 1-7M1 | | Pitot leak check good |
| Pitot Coefficient | | 0.84 | Pitot Inspection good |
| Nozzle ID | SD | 6-214 | 6-215 Method 3 System good |
| Nozzle Measurements | ~~.214~~ | .214 | ~~.216~~ .215 Temp Check |
| Avg Nozzle Dia (in) | | .214 | .215 Meter Box Temp |
| Area of Stack (ft²) | | 6.305 | Reference Temp |
| Sample Time | | 96 | Pass/Fail (+/- 2°) |
| Total Traverse Pts | | 24 | Temp Change Response ? |

215, 215, 215

K Factor ~~2.6~~ 2.36

| | Initial | Mid-Point | Final |
|---|---|---|---|
| | .004 | .004 | .002 |
| | 14 | 15 | 15 |
| | yes / no | yes / no | yes / no |
| | yes / no | yes / no | yes / no |
| | yes / no | yes / no | yes / no |
| | Pre-Test Set | | Post-Test Set |
| | 74 | | 75 |
| | 74.6 | | 75.2 |
| | Pass / Fail | | Pass / Fail |
| | yes / no | | yes / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING (ft³) | STACK TEMP (°F) | DGM OUTLET TEMP (°F) | PROBE TEMP (°F) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0952 | | | 381.805 | | | | | | | | | |
| B 1 | 4 | | 0.55 | 1.30 | 384.4 | 93 | 83 | 117 | 120 | 65 | 4.0 | 59 | | |
| 2 | 8 | | 0.55 | 1.30 | 387.1 | 93 | 83 | 118 | 115 | 61 | 3.5 | 54 | | |
| 3 | 12 | | 0.56 | 1.47 | 389.4 | 93 | 83 | 116 | 110 | 57 | 3.5 | 53 | | |
| 4 | 16 | | 0.61 | 1.44 | 392.0 | 93 | 84 | 117 | 112 | 56 | 3.5 | 56 | | |
| 5 | 20 | | 0.67 | 1.58 | 394.68 | 93 | 85 | 117 | 116 | 57 | 3.5 | 53 | | |
| 6 | 24 | | 0.74 | 1.75 | 397.8 | 93 | 85 | 117 | 116 | 57 | 3.5 | 54 | | |
| 7 | 28 | | 0.74 | 1.75 | 400.2 | 93 | 86 | 117 | 113 | 55 | 3.5 | 54 | | |
| 8 | 32 | | 0.61 | 1.44 | 403.2 | 93 | 87 | 117 | 114 | 56 | 3.5 | 54 | | |
| 9 | 36 | | 0.64 | 1.51 | 406.0 | 93 | 87 | 118 | 113 | 57 | 3.5 | 55 | | |
| 10 | 40 | | 0.60 | 1.42 | 408.8 | 93 | 87 | 116 | 115 | 58 | 3.5 | 58 | | |
| 11 | 44 | | 0.55 | 1.30 | 410.8 | 93 | 88 | 116 | 116 | 54 | 3.5 | 60 | | |
| 12 | 48 | 1040 | 0.50 | 1.19 | 413.025 | 93 | 88 | 116 | 115 | 61 | 3.5 | 61 | | |
| L | 0 | 1340 | — | — | 413.163 | | | | | | | | | |
| 1 | 4 | ~~1340~~ | 0.40 | 0.94 | 415.363 | 98 | 102 | 116 | 114 | 60 | 4.0 | 60 | | |
| 2 | 8 | | 0.43 | 1.02 | 415.340 | 98 | 101 | 115 | 115 | 60 | 4.0 | 60 | | |
| 3 | 12 | | 0.44 | 1.03 | 417.690 | 98 | 101 | 117 | 115 | 56 | 4.0 | 53 | | |
| 4 | 16 | | 0.47 | 1.11 | 419.830 | 99 | 101 | 117 | 113 | 51 | 4.0 | 55 | | |
| 5 | 20 | | 0.53 | 1.25 | 422.125 | 99 | 101 | 117 | 113 | 50 | 4.1 | 56 | | |
| 6 | 24 | | 0.63 | 1.49 | 424.457 | 99 | 101 | 116 | 115 | 50 | 4.16 | 59 | | |
| 7 | 28 | | 1.0 | 2.36 | 427.390 | 99 | 101 | 116 | 115 | 52 | 7.0 | 60 | | |
| 8 | 32 | | 1.0 | 2.36 | 430.985 | 99 | 101 | 117 | 114 | 54 | 7.0 | 56 | | |
| 9 | 36 | | 1.1 | 2.60 | 434.765 | 100 | 102 | 116 | 117 | 56 | 7.0 | 56 | | |
| 10 | 40 | | 1.1 | 2.60 | 440.010 | 100 | 102 | 117 | 117 | 56 | 7.0 | 55 | | |
| 11 | 44 | | 1.1 | 2.60 | 444.480 | 101 | 102 | 117 | 117 | 56 | 7.0 | 54 | | |
| 12 | 48 | 1428 | 1.1 | 2.60 | 447.925 | 101 | 103 | 117 | 115 | 58 | 7.0 | 56 | | |
| | | | Avg Delta P | Avg Delta H | Total Volume | Avg Ts | Avg Tm | Min/Max | Min/Max | Max | Max Vac | Min/Max | | |
| | | | 0.69 | 1.642 | 65.98 | ~~96.00~~ 96.125 | 93.5 | 115/118 | 110/120 | 65 | 7.0 | 53/61 | | |
| | | | Avg Sqrt Delta P | Avg Sqrt Del H | | | | | | | | | | |
| | | | 0.822 | 1.265 | | | | | | | | | | |




Comments:

MW 08/06/18

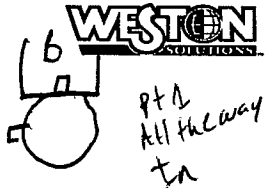
EPA Method 0010 from EPA SW-846

ISO 98.54

Moisture 3.44

SCFM 16633.15283

SVOL 62.90307551



# ISOKINETIC FIELD DATA SHEET

# EPA Method 0010- HFPO Dimer Acid

08/06/18

Page 1 of 1

| | |
|---|---|
| Client | The Chemours Company |
| W.O.# | 15418.002.006 |
| Project ID | Chemours |
| Mode/Source ID | VEN Carbon Bed |
| Samp. Loc. ID | OUT |
| Run No.ID | 2 |
| Test Method ID | M0010 |
| Date ID | 16JUL2018 |
| Source/Location | VEN Carbon Bed Outlet |
| Sample Date | July 20, 2018 |
| Baro. Press (in Hg) | 30.04 |
| Operator | Dayton |

**Stack Conditions**

| | Assumed | Actual |
|---|---|---|
| % Moisture | 3.44 | 3.78 |
| Impinger Vol (ml) | | 34.8 |
| Silica gel (g) | | 20.9 |
| CO2, % by Vol | 0 | 0 |
| O2, % by Vol | 20.9 | 20.9 |
| Temperature (°F) | 96.80 | |
| Meter Temp (°F) | 90 | |
| Static Press (in $H_2O$) | 3.5 | 3.5 |
| Ambient Temp (°F) | 73 | |

| | | | |
|---|---|---|---|
| Meter Box ID | A020 | | |
| Meter Box Y | 1.015 | | |
| Meter Box Del H | 1.709 | | |
| Probe ID / Length | P-709 | 6' | |
| Probe Material | Boro | | |
| Pitot / Thermocouple ID | P-709 | | |
| Pitot Coefficient | 0.84 | | |
| Nozzle ID | 6-215 | | |
| Nozzle Measurements | .215 | .215 | .215 |
| Avg Nozzle Dia (in) | .215 | .215 | .215 |
| Area of Stack ($ft^2$) | 6.305 | | |
| Sample Time | 96 | | |
| Total Traverse Pts | 24 | | |

K Factor 2.06 2.06

| | Initial | Mid-Point | Final |
|---|---|---|---|
| Sample Train ($ft^3$) | 0.002 | 0.002 | 0.010 |
| Leak Check @ (in Hg) | 15 | 10 | 11 |
| Pitot leak check good | yes / no | yes / no | yes / no |
| Pitot Inspection good | yes / no | yes / no | yes / no |
| Method 3 System good | yes / no | yes / no | yes / no |

| Temp Check | Pre-Test Set | Post-Test Set |
|---|---|---|
| Meter Box Temp | 73 | 78 |
| Reference Temp | 74 | 79 |
| Pass/Fail (+/- 2°) | Pass / Fail | Pass / Fail |
| Temp Change Response ? | yes / no | yes / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (oF) | PROBE TEMP (oF) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0847 | | | 647.805 | | | | | | | | | |
| A-1 | 4 | | 0.55 | 1.133 | 650.730 | 95 | 74 | 122 | 121 | 64 | 5 | 64 | | |
| 2 | 8 | | 0.55 | 1.133 | 653.200 | 95 | 74 | 121 | 120 | 64 | 5 | 64 | | |
| 3 | 12 | | 0.60 | 1.236 | 655.820 | 96 | 75 | 120 | 123 | 57 | 5 | 53 | | |
| 4 | 16 | | 0.65 | 1.339 | 658.550 | 95 | 75 | 120 | 122 | 56 | 5 | 52 | | 31.97 |
| 5 | 20 | | 0.70 | 1.442 | 661.305 | 95 | 76 | 123 | 121 | 58 | 5 | 53 | | 34.75 |
| 6 | 24 | | 0.77 | 1.586 | 664.220 | 95 | 76 | 120 | 121 | 58 | 5 | 52 | | |
| 7 | 28 | | 0.69 | 1.421 | 667.105 | 95 | 77 | 121 | 120 | 59 | 5 | 52 | | |
| 8 | 32 | | 0.65 | 1.339 | 669.825 | 96 | 76 | 119 | 119 | 60 | 5 | 52 | | Chipped Nozz @ move - Replaced Same size |
| 9 | 36 | | 0.60 | 1.236 | 672.105 | 96 | 76 | 122 | 119 | 59 | 4.5 | 51 | | |
| 10 | 40 | | 0.58 | 1.195 | 675.110 | 96 | 78 | 120 | 121 | 59 | 4.5 | 53 | | |
| 11 | 44 | | 0.52 | 1.071 | 677.45 | 96 | 78 | 121 | 121 | 60 | 4 | 54 | | 679.775 |
| 12 | 48 | 0935 | 0.52 | 1.071 | 679.775 | 95 | 79 | 121 | 119 | 59 | 4 | 55 | | 679.905 Leak Check @ |
| — | — | 1006 | — | — | 680.000 | — | — | — | — | — | — | — | | 680.000 |
| B-1 | 4 | | 0.37 | 0.7622 | 682.115 | 94 | 80 | 119 | 122 | 66 | 3.5 | 57 | | |
| 2 | 8 | | 0.40 | 0.824 | 684.225 | 97 | 81 | 121 | 121 | 51 | 4 | 54 | | |
| 3 | 12 | | 0.42 | 0.865 | 686.450 | 97 | 81 | 121 | 121 | 48 | 4 | 55 | | |
| 4 | 16 | | 0.45 | 0.927 | 688.700 | 97 | 80 | 121 | 121 | 47 | 4 | 54 | | |
| 5 | 20 | | 0.52 | 1.071 | 691.135 | 97 | 81 | 119 | 121 | 48 | 4.5 | 54 | | |
| 6 | 24 | | 0.94 | 1.936 | 694.360 | 97 | 82 | 121 | 121 | 49 | 6 | 54 | | |
| 7 | 28 | | 0.94 | 1.936 | 697.540 | 98 | 81 | 121 | 122 | 50 | 6 | 55 | | |
| 8 | 32 | | 1.00 | 2.06 | 700.80 | 98 | 82 | 119 | 121 | 51 | 6.5 | 55 | | |
| 9 | 36 | | 1.1 | 2.266 | 704.260 | 97 | 83 | 120 | 121 | 53 | 7 | 54 | | |
| 10 | 40 | | 1.1 | 2.266 | 707.450 | 98 | 83 | 121 | 121 | 55 | 7 | 54 | | |
| 11 | 44 | | 1.1 | 2.266 | 711.250 | 98 | 83 | 119 | 121 | 56 | 7 | 56 | | |
| 12 | 48 | 1054 | 1.1 | 2.266 | 714.750 | 98 | 83 | 120 | 121 | 57 | 7 | 57 | | |
| | | | Avg Delta P | Avg Delta H | Total Volume | Avg Ts | Avg Tm | Min/Max | Min/Max | Max | Max Vac | Min/Max | | |
| | | | 0.701 | 1.444 | 66.720 | 96.29 | 78.92 | 119/123 | 119/123 | 66 | 7 | 51/64 | | |
| | | | Avg Sqrt Delta P | Avg Sqrt Del H | Comments: | | | | | | | | | |
| | | | 0.8254 | 1.185 | | | | | | | | | | |

WESTON SOLUTIONS

69 08/06/18

EPA Method 0010 from EPA SW-846

| | |
|---|---|
| ISO | 104.5666 |
| Moist | 3.78 |
| SCFM | 166.51.30286 |
| SVOL | 66.82340427 |

# ISOKINETIC FIELD DATA SHEET

## EPA Method 0010- HFPO Dimer Acid

MRW 08/06/18



| | | Stack Conditions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Client | The Chemours Company | | Assumed | Actual | Meter Box ID | A020 | | | |
| W.O.# | 15418.002.006 | | | | Meter Box Y | 1.015 | | | |
| Project ID | Chemours | % Moisture | 3.78 | | Meter Box Del H | 1.799 | | | |
| Mode/Source ID | VEN Carbon Bed | Impinger Vol (ml) | | 54.8 | Probe ID / Length | ~~P-709~~ P709 | 6' | Sample Train ($ft^3$) | |
| Samp. Loc. ID | OUT | Silica gel (g) | | 25.5 | Probe Material | Boro | | Leak Check @ (in Hg) | |
| Run No.ID | 3 | CO2, % by Vol | 0 | 0 | Pitot / Thermocouple ID | 6-715 | | Pitot leak check good | |
| Test Method ID | M0010 | O2, % by Vol | 20.9 | 20.9 | Pitot Coefficient | 0.84 | | Pitot Inspection good | |
| Date ID | 16JUL2018 | Temperature (°F) | 96.29 | | Nozzle ID | 1215 | | Method 3 System good | |
| Source/Location | VEN Carbon Bed Outlet | Meter Temp (°F) | 78.92 | | Nozzle Measurements | .215 | .215 | .215 | **Temp Check** |
| Sample Date | July 20, 2018 | Static Press (in $H_2O$) | 3.5 | 3.5 | Avg Nozzle Dia (in) | .215 | | | |
| Baro. Press (in Hg) | 30.04 | | | | Area of Stack ($ft^2$) | 6.305 | | | |
| Operator | DRYDEN | Ambient Temp (°F) | 80° | | Sample Time | 96 | | | |
| | | | | | Total Traverse Pts | 24 | | | |

| | Initial | Mid-Point | Final |
|---|---|---|---|
| K Factor ~~2.016~~ 2.01 | | | |
| Sample Train ($ft^3$) | 0.006 | 0.02 / 0.015 | 0.01 |
| Leak Check @ (in Hg) | 10 | 10 / 10 | 10 |
| Pitot leak check good | yes / no | yes / no | yes / no |
| Pitot Inspection good | yes / no | yes / no | yes / no |
| Method 3 System good | yes / no | yes / no | yes / no |
| | Pre-Test Set | | Post-Test Set |
| Meter Box Temp | 74°F | | 82°F |
| Reference Temp | 75°F | | 83°F |
| Pass/Fail (+/- 2°) | Pass / Fail | | Pass / Fail |
| Temp Change Response ? | yes / no | | yes / no |

| TRAVERSE POINT NO. | SAMPLE TIME (min) | CLOCK TIME (plant time) | VELOCITY PRESSURE Delta P (in H2O) | ORIFICE PRESSURE Delta H (in H2O) | DRY GAS METER READING ($ft^3$) | STACK TEMP (°F) | DGM OUTLET TEMP (oF) | PROBE TEMP (oF) | FILTER BOX TEMP (F) | IMPINGER EXIT TEMP (oF) | SAMPLE TRAIN VAC (in Hg) | XAD EXIT TEMP (F) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1300 | | | 715.140 | | | | | | | | | |
| A 1 | 4 | | 0.48 | 0.965 | 717.480 | 97 | 84 | 120 | 121 | 62 | 4 | 56 | | |
| 2 | 8 | | 0.52 | 1.045 | 719.975 | 97 | 84 | 120 | 120 | 51 | 4.5 | 50 | | |
| 3 | 12 | | 0.56 | 1.126 | 722.580 | 97 | 84 | 119 | 120 | 48 | 5 | 51 | | |
| 4 | 16 | | 0.63 | 1.266 | 725.250 | 97 | 84 | 120 | 120 | 47 | 5 | *4751 | | |
| 5 | 20 | | 0.63 | 1.266 | 727.955 | 97 | 84 | 120 | 120 | 48 | 5 | 53 | | |
| 6 | 24 | | 0.65 | 1.307 | 730.745 | 98 | 85 | 120 | 120 | 49 | 5 | 55 | | |
| 7 | 28 | | 0.62 | 1.246 | 733.43 | 97 | 83 | 119 | 119 | 50 | 5 | 54 | | |
| 8 | 32 | | 0.57 | 1.146 | 735.995 | 97 | 85 | 119 | 119 | 51 | 4.5 | 56 | | |
| 9 | 36 | | 0.58 | 1.166 | 738.510 | 97 | 85 | 121 | 121 | 53 | 4.5 | 56 | | 746.125 |
| 10 | 40 | | 0.58 | 1.166 | 741.080 | 97 | 85 | 120 | 120 | 54 | 4.5 | 55 | | 746.195 |
| 11 | 44 | | 0.56 | 1.126 | 743.575 | 98 | 85 | 120 | 120 | 54 | 4.5 | 55 | | |
| 12 | 48 | 1348 | 0.56 | 1.126 | 746.030 | 98 | 86 | 120 | 120 | 54 | 4.5 | 55 | | Post Leak check PASS |
| — | 0 | 1416 | ~~0.03~~ | — | 746.285 | — | — | — | — | — | — | — | | |
| B 1 | 4 | | 0.38 | 0.764 | 748.375 | 95 | 84 | 122 | 117 | 61 | 4 | 56 | | |
| 2 | 8 | | 0.38 | 0.764 | 750.485 | 97 | 84 | 119 | 119 | 48 | 4 | 55 | | |
| 3 | 12 | | 0.40 | 0.804 | 752.640 | 98 | 84 | 122 | 121 | 46 | 4 | 55 | | |
| 4 | 16 | | 0.45 | 0.905 | 754.975 | 97 | 85 | 120 | 120 | 46 | 4.5 | 54 | | |
| 5 | 20 | | 0.50 | 1.01 | 757.350 | 97 | 85 | 123 | 119 | 48 | 5 | 56 | | |
| 6 | 24 | | 0.58 | 1.166 | 760.000 | 97 | 85 | 124 | 120 | 49 | 5 | 56 | | |
| 7 | 28 | | 0.95 | 1.91 | 763.250 | 98 | 84 | 122 | 120 | 51 | 7 | 55 | | |
| 8 | 32 | | 1.0 | 2.01 | 766.530 | 98 | 84 | 121 | 120 | 53 | 7 | 55 | | |
| 9 | 36 | | 1.1 | 2.211 | 769.940 | 98 | 84 | 121 | 120 | 57 | 7.5 | 57 | | |
| 10 | 40 | | 1.1 | 2.211 | 773.420 | 98 | 84 | 120 | 121 | 60 | 7.5 | 59 | | |
| 11 | 44 | | 1.0 | 2.01 | 776.880 | 97 | 85 | 121 | 120 | 63 | 7 | 59 | | |
| 12 | 48 | 1504 | 1.1 | 2.211 | 780.260 | 97 | 85 | 121 | 121 | 65 | 7.5 | 60 | | |
| | | | Avg Delta P | Avg Delta H | Total Volume | Avg Ts | Avg Tm | Min/Max | Min/Max | Max | Max Vac | Min/Max | | |
| | | | 0.662 | 1.330 | 64.865 | 97.25 | 84.46 | 119/124 | 117/121 | 65 | 7.5 | 50/60 | | |
| | | | Avg Sqrt Delta P | Avg Sqrt Del H | Comments: | | | | | | | | | |
| | | | 0.802 | 1.137 | | | | | | | | | | |

MRW 08/06/2018

EPA Method 0010 from EPA SW-846

ISO 105.16

moist 5.56

SCFM 15928.33521

SVOL 64.28661052

# SAMPLE RECOVERY FIELD DATA

EPA Method 0010

VEN Carbon Bed Outlet

Client: The Chemours Company | W.O. #: 15418.002.006

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

**Run No.** 1 | Sample Date 7/19/18 | Recovery Date 7/19/18

Sample I.D. Chemours - VEN Carbon Bed - OUT - 1 - M0010 - | Analyst JMD / MS | Filter Number NA

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-1 | | XAD-2 | | Silica Gel | |
| **Final** | 8 | 105 | 105 | 0 | 312.4 | | 304.5 | | 319.6 | |
| **Initial** | 0 | 100 | 100 | 0 | 302.6 | | 304.3 | | 300 | |
| **Gain** | 8 | 5 | 5 | 0 | 9.8 | | 0.2 | 25.0 | 19.6 | 47.6 |

Impinger Color: all clear | Labeled? ✓

Silica Gel Condition: 4/4 90% | Sealed?

**Run No.** 2 | Sample Date 7/20/18 | Recovery Date 7/20/18

Sample I.D. Chemours - VEN Carbon Bed - OUT - 2 - M0010 - | Analyst JMD / MS | Filter Number NA

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | XAD-1 | | XAD-2 | | Silica Gel | |
| **Final** | 15 | 98 | 105 | 5 | 315.7 | | 311.8 | | 320.9 | |
| **Initial** | 0 | 100 | 100 | 0 | 305.2 | | 310.5 | | 300 | |
| **Gain** | 15 | -2 | 5 | 5 | ~~302.2~~ 10.5 | | ~~310.5~~ 1.3 | 40 34.5 | 20.9 | ~~55.7~~ |

Impinger Color: all clear | Labeled? ✓

Silica Gel Condition: 4/4, 80% | Sealed? ✓

**Run No.** 3 | Sample Date 7/20/18 | Recovery Date 7/20/18

Sample I.D. Chemours - VEN Carbon Bed - OUT - 3 - M0010 - | Analyst JMD / MS | Filter Number NA

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | Empty | 330.1 | | 295.5 | | Silica Gel | |
| **Final** | 17 | 108 | 110 | 5 | XAD-1 | | XAD-2 | | 325.5 | |
| **Initial** | 0 | 100 | 100 | 0 | 316.7 | 296.9 | 313.6 | | 300 | |
| **Gain** | 17 | 8 | 10 | 5 | 13.4 | | 1.4 | 54.8 | 25.5 | 80.3 |

Impinger Color: all clear | Labeled? ✓

Silica Gel Condition: 4/4 80% | Sealed? ✓

Check COC for Sample IDs of Media Blanks

✓ MW 08/06/18

WESTON SOLUTIONS

# SAMPLE RECOVERY FIELD DATA

EPA Method 0010

VEN Carbon Bed Outlet-BLANK TRAINS

| | | | |
|---|---|---|---|
| Client | The Chemours Company | W.O. # | 15418.002.006 |
| Location/Plant | Fayetteville, NC | Source & Loaction | VEN Carbon Bed Outlet |

**Run No.** ___ Sample Date 7-19-18 Recovery Date 7-12-18

Sample I.D. Chemours -VEN Carbon Bed - Outlet - BT - M0010 - Analyst JNS Filter Number N/A

| | Impinger | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Imp.Total | 8 | Total |
| **Contents** | Empty | HPLC H20 | HPLC H20 | XAD-1 | | | XAD-2 | | Silica Gel | |
| **Final** | 0 | 100 | 100 | 318.3 | | | 204.7 | | 300 | |
| **Initial** | 0 | 100 | 100 | 318.1 | | | 204.7 | | 300 | |
| **Gain** | 0 | 0 | 0 | .2 | | | 0 | | 0 | 0.2 |

Impinger Color all clear Labeled? ✓

Silica Gel Condition blue 100% Sealed? ✓

**Run No.** ___ Sample Date _____ Recovery Date _____

Sample I.D. Chemours -VEN Carbon Bed - Outlet - BT - M0010 - Analyst _____ Filter Number _____

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

Impinger Color _____ Labeled? _____

Silica Gel Condition _____ Sealed? _____

**Run No.** ___ Sample Date _____ Recovery Date _____

Sample I.D. Chemours -VEN Carbon Bed - Outlet - BT - M0010 - Analyst _____ Filter Number _____

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

Impinger Color _____ Labeled? _____

Silica Gel Condition _____ Sealed? _____

Check COC for Sample IDs of Media Blanks

# METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

C:\Users\Administrator.WSWCEQUIP2\Desktop\DATA\Chemours\CHEMOURS DIVISION STACK JULY 071918

**Program Version:** 2.0, built 21 Feb 2015 **File Version:** 2.02
**Computer:** WSWCEQUIP2 **Trailer:**
**Analog Input Device:** MCC USB-1608G

**Channel 1**

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

**Channel 2**

| | |
|---|---|
| Analyte | **$CO_2$** |
| Method | **EPA 3A**, Using Bias |
| Analyzer Make, Model & Serial No. | **Servomex 1440 S/N 0144001** |
| Full-Scale Output, mv | **1000** |
| Analyzer Range, % | **20.0** |
| Span Concentration, % | **16.3** |

# CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

Start Time: 07:00

**$O_2$**

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

Calibration Standards

| % | Cylinder ID |
|---|---|
| 12.0 | XC016060B |
| 20.9 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | 16 mv |
| **Span, 20.9 %** | 846 mv |

Curve Coefficients

| Slope | Intercept |
|---|---|
| 39.75 | 16 |

**$CO_2$**

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

Calibration Standards

| % | Cylinder ID |
|---|---|
| 8.9 | XC016060B |
| 16.3 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | 6 mv |
| **Span, 16.3 %** | 808 mv |

Curve Coefficients

| Slope | Intercept |
|---|---|
| 49.29 | 6 |

# CALIBRATION ERROR DATA

Number 1

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **SDRYDEN**
Source: **DIVISION STACK** | Calibration **1** | Date: **19 Jul 2018**

Start Time: 07:00

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %
**Slope** 39.75 **Intercept** 16.0

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %
**Slope** 49.29 **Intercept** 6.0

| Standard % | Result % | Difference % | Error % | Status |
|---|---|---|---|---|
| Zero | 0.0 | 0.0 | 0.0 | Pass |
| 8.9 | 9.0 | 0.1 | 0.6 | Pass |
| 16.3 | 16.3 | 0.0 | 0.0 | Pass |

# BIAS

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

Start Time: 07:05

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| **Zero** | 0.0 | 0.0 | 0.0 | 0.0 | Pass |
| **Span** | 9.0 | 9.0 | 0.0 | 0.0 | Pass |

# RUN DATA

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| **RESPONSE TIMES** | | |
| 07:07:10 | 0.0 | 0.0 |
| **O2/ CO2 UP** | | |
| 07:07:20 | 0.0 | 0.0 |
| 07:07:30 | 0.0 | 0.0 |
| 07:07:40 | 0.0 | 0.0 |
| 07:07:50 | 7.3 | 5.2 |
| 07:08:00 | 11.4 | 8.8 |
| 07:08:10 | 11.9 | 9.0 |
| **O2/CO2 DOWN** | | |
| 07:08:20 | 11.9 | 9.0 |
| 07:08:30 | 11.9 | 9.0 |
| 07:08:40 | 5.9 | 4.6 |
| 07:08:50 | 0.3 | 0.1 |
| 07:09:00 | 0.0 | 0.0 |
| **Avgs** | **5.0** | **3.8** |

# RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| **RUN 1** | | |
| **ALL TIME EASTERN STANDARD TIME** | | |
| 09:53 | 20.8 | 0.0 |
| 09:54 | 20.8 | 0.0 |
| 09:55 | 20.8 | 0.0 |
| 09:56 | 20.9 | 0.0 |
| 09:57 | 20.8 | 0.0 |
| 09:58 | 20.9 | 0.0 |
| 09:59 | 20.9 | 0.0 |
| 10:00 | 20.9 | 0.0 |
| 10:01 | 20.9 | 0.0 |
| 10:02 | 20.9 | 0.0 |
| 10:03 | 20.9 | 0.0 |
| 10:04 | 20.9 | 0.0 |
| 10:05 | 20.9 | 0.0 |
| 10:06 | 20.9 | 0.0 |
| 10:07 | 20.9 | 0.0 |
| 10:08 | 20.8 | 0.0 |
| 10:09 | 20.9 | 0.0 |
| 10:10 | 20.9 | 0.0 |
| 10:11 | 20.9 | 0.0 |
| 10:12 | 20.9 | 0.0 |
| 10:13 | 20.9 | 0.0 |
| 10:14 | 20.9 | 0.0 |
| 10:15 | 20.9 | 0.0 |
| 10:16 | 20.9 | 0.0 |
| 10:17 | 20.9 | 0.0 |
| 10:18 | 20.9 | 0.0 |
| 10:19 | 20.9 | 0.0 |
| 10:20 | 20.9 | 0.0 |
| 10:21 | 20.9 | 0.0 |
| 10:22 | 20.9 | 0.0 |
| 10:23 | 20.9 | 0.0 |
| 10:24 | 20.9 | 0.0 |
| 10:25 | 20.9 | 0.0 |
| 10:26 | 20.9 | 0.0 |
| 10:27 | 20.9 | 0.0 |
| 10:28 | 20.9 | 0.0 |
| 10:29 | 20.9 | 0.0 |
| 10:30 | 20.9 | 0.0 |
| 10:31 | 20.9 | 0.0 |
| 10:32 | 20.9 | 0.0 |



WESTON SOLUTIONS

# RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 10:33 | 20.8 | 0.0 |
| 10:34 | 20.8 | 0.0 |
| 10:35 | 20.8 | 0.0 |
| 10:36 | 20.9 | 0.0 |
| 10:37 | 20.9 | 0.0 |
| 10:38 | 20.9 | 0.0 |
| 10:39 | 20.9 | 0.0 |
| 10:40 | 20.9 | 0.0 |
| **END FIRST PORT** | | |
| **LEAK CHECK ISSUE ON STACK** | | |
| 13:40 | 20.8 | 0.0 |
| 13:41 | 20.8 | 0.0 |
| 13:42 | 20.8 | 0.0 |
| 13:43 | 20.8 | 0.0 |
| 13:44 | 20.9 | 0.0 |
| 13:45 | 20.9 | 0.0 |
| 13:46 | 20.9 | 0.0 |
| 13:47 | 20.9 | 0.0 |
| 13:48 | 20.9 | 0.0 |
| 13:49 | 20.9 | 0.0 |
| 13:50 | 20.9 | 0.0 |
| 13:51 | 20.9 | 0.0 |
| 13:52 | 20.9 | 0.0 |
| 13:53 | 20.9 | 0.0 |
| 13:54 | 20.9 | 0.0 |
| 13:55 | 20.8 | 0.0 |
| 13:56 | 20.8 | 0.0 |
| 13:57 | 20.8 | 0.0 |
| 13:58 | 20.8 | 0.0 |
| 13:59 | 20.8 | 0.0 |
| 14:00 | 20.8 | 0.0 |
| 14:01 | 20.8 | 0.0 |
| 14:02 | 20.8 | 0.0 |
| 14:03 | 20.8 | 0.0 |
| 14:04 | 20.8 | 0.0 |
| 14:05 | 20.8 | 0.0 |
| 14:06 | 20.8 | 0.0 |
| 14:07 | 20.9 | 0.0 |
| 14:08 | 20.9 | 0.0 |
| 14:09 | 20.9 | 0.0 |
| 14:10 | 20.9 | 0.0 |
| 14:11 | 20.9 | 0.0 |



WESTON SOLUTIONS

# RUN DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 14:12 | 20.9 | 0.0 |
| 14:13 | 20.9 | 0.0 |
| 14:14 | 20.9 | 0.0 |
| 14:15 | 20.9 | 0.0 |
| 14:16 | 20.9 | 0.0 |
| 14:17 | 20.9 | 0.0 |
| 14:18 | 20.9 | 0.0 |
| 14:19 | 20.9 | 0.0 |
| 14:20 | 20.9 | 0.0 |
| 14:21 | 20.9 | 0.0 |
| 14:22 | 20.9 | 0.0 |
| 14:23 | 20.9 | 0.0 |
| 14:24 | 20.9 | 0.0 |
| 14:25 | 20.9 | 0.0 |
| 14:26 | 20.9 | 0.0 |
| 14:27 | 20.9 | 0.0 |
| 14:28 | 20.9 | 0.0 |
| **Avgs** | **20.9** | **0.0** |

# RUN SUMMARY

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK**

Calibration **1**

Project Number: **15418.002.006.0001**
Operator: **SDRYDEN**
Date: **19 Jul 2018**

| | $O_2$ | $CO_2$ |
|---|---|---|
| **Method** | EPA 3A | EPA 3A |
| **Conc. Units** | % | % |

Time: 09:52 to 14:28

**Run Averages**

| | | |
|---|---|---|
| | 20.9 | 0.0 |

**Pre-run Bias at 07:05**

| | | |
|---|---|---|
| **Zero Bias** | 0.0 | 0.0 |
| **Span Bias** | 11.9 | 9.0 |
| **Span Gas** | 12.0 | 8.9 |

**Post-run Bias at 15:15**

| | | |
|---|---|---|
| **Zero Bias** | -0.1 | -0.2 |
| **Span Bias** | 11.9 | 8.9 |
| **Span Gas** | 12.0 | 8.9 |

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

| | | |
|---|---|---|
| | 21.0 | 0.1 |

# BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **SDRYDEN**
Source: **DIVISION STACK** | Calibration **1** | Date: **19 Jul 2018**

Start Time: 15:15

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**Calibration Drift**

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

*Bias No. 1

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| **Zero** | 0.0 | -0.2 | -0.2 | -1.2 | Pass |
| **Span** | 9.0 | 8.9 | -0.1 | -0.6 | Pass |

**Calibration Drift**

| Standard Gas | Initial* % | Final % | Difference % | Drift % | Status |
|---|---|---|---|---|---|
| **Zero** | 0.0 | -0.2 | -0.2 | -1.2 | Pass |
| **Span** | 9.0 | 8.9 | -0.1 | -0.6 | Pass |

*Bias No. 1

# METHODS AND ANALYZERS

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK RUNS 2+3**

Project Number: **15418.002.006.0001**
Operator: **SR**
Date: **20 Jul 2018**

**File:** C:\Users\Administrator.WSWCEQUIP2\Desktop\DATA\Chemours\072018 DIVISION.cem
**Program Version:** 2.0, built 21 Feb 2015 **File Version:** 2.02
**Computer:** WSWCEQUIP2 **Trailer:**
**Analog Input Device:** MCC USB-1608G

**Channel 1**

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

**Channel 2**

| | |
|---|---|
| Analyte | **$CO_2$** |
| Method | **EPA 3A**, Using Bias |
| Analyzer Make, Model & Serial No. | **Servomex 1440 S/N 0144001** |
| Full-Scale Output, mv | **1000** |
| Analyzer Range, % | **20.0** |
| Span Concentration, % | **16.3** |

# CALIBRATION DATA

Number 1

Client: **Chemours**
Location: **Fayetteville, NC**
Source: **DIVISION STACK RUNS 2+3**

Project Number: **15418.002.006.0001**
Operator: **SR**
Date: **20 Jul 2018**

Start Time: 07:30

**$O_2$**

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

Calibration Standards

| **%** | **Cylinder ID** |
|---|---|
| 12.0 | XC016060B |
| 20.9 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | 9 mv |
| **Span, 20.9 %** | 841 mv |

Curve Coefficients

| **Slope** | **Intercept** |
|---|---|
| 39.85 | 9 |

**$CO_2$**

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

Calibration Standards

| **%** | **Cylinder ID** |
|---|---|
| 8.9 | XC016060B |
| 16.3 | CC72346 |

Calibration Results

| | |
|---|---|
| **Zero** | 14 mv |
| **Span, 16.3 %** | 830 mv |

Curve Coefficients

| **Slope** | **Intercept** |
|---|---|
| 50.15 | 14 |

# CALIBRATION ERROR DATA

Number 1

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

Start Time: 07:30

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %
**Slope** 39.85 **Intercept** 9.0

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %
**Slope** 50.15 **Intercept** 14.0

| Standard % | Result % | Difference % | Error % | Status |
|---|---|---|---|---|
| Zero | 0.0 | 0.0 | 0.0 | Pass |
| 8.9 | 9.1 | 0.2 | 1.2 | Pass |
| 16.3 | 16.3 | 0.0 | 0.0 | Pass |

# BIAS
Number 1

Client: **Chemours** | Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** | Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** | Calibration **1** | Date: **20 Jul 2018**

Start Time: 07:34

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| **Zero** | 0.0 | 0.1 | 0.1 | 0.6 | Pass |
| **Span** | 9.1 | 9.1 | 0.0 | 0.0 | Pass |

# RUN DATA

Number 1

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 08:48 | 20.7 | 0.0 |
| 08:49 | 20.9 | 0.0 |
| 08:50 | 20.9 | 0.0 |
| 08:51 | 20.9 | 0.0 |
| 08:52 | 20.9 | 0.0 |
| 08:53 | 20.9 | 0.0 |
| 08:54 | 20.9 | 0.0 |
| 08:55 | 21.0 | 0.0 |
| 08:56 | 20.9 | 0.0 |
| 08:57 | 21.1 | 0.0 |
| 08:58 | 21.1 | 0.0 |
| 08:59 | 21.1 | 0.0 |
| 09:00 | 21.1 | 0.0 |
| 09:01 | 21.0 | 0.0 |
| 09:02 | 21.1 | 0.0 |
| 09:03 | 21.1 | 0.0 |
| 09:04 | 21.0 | 0.0 |
| 09:05 | 21.0 | 0.0 |
| 09:06 | 21.0 | 0.0 |
| 09:07 | 21.0 | 0.0 |
| 09:08 | 21.0 | 0.0 |
| 09:09 | 21.0 | 0.0 |
| 09:10 | 21.0 | 0.0 |
| 09:11 | 21.0 | 0.0 |
| 09:12 | 21.1 | 0.0 |
| 09:13 | 21.0 | 0.0 |
| 09:14 | 21.0 | 0.0 |
| 09:15 | 21.1 | 0.0 |
| 09:16 | 21.1 | 0.0 |
| 09:17 | 21.1 | 0.0 |
| 09:18 | 21.0 | 0.0 |
| 09:19 | 20.9 | 0.0 |
| 09:20 | 20.9 | 0.0 |
| 09:21 | 20.9 | 0.0 |
| 09:22 | 20.9 | 0.0 |
| 09:23 | 20.9 | 0.0 |
| 09:24 | 20.9 | 0.0 |
| 09:25 | 20.9 | 0.0 |
| 09:26 | 20.9 | 0.0 |
| 09:27 | 21.0 | 0.0 |
| 09:28 | 21.1 | 0.0 |
| 09:29 | 21.0 | 0.0 |

# RUN DATA

Number 1

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 09:30 | 20.8 | 0.0 |
| 09:31 | 20.9 | 0.0 |
| 09:32 | 21.0 | 0.0 |
| 09:33 | 20.9 | 0.0 |
| 09:34 | 20.9 | 0.0 |
| 09:35 | 20.9 | 0.0 |
| 09:36 | 20.9 | 0.0 |
| 09:37 | 20.9 | 0.0 |
| 09:38 | 20.9 | 0.0 |
| 09:39 | 20.9 | 0.0 |
| 09:40 | 20.9 | 0.0 |
| 09:41 | 20.9 | 0.0 |
| 09:42 | 21.0 | 0.0 |
| 09:43 | 21.1 | 0.0 |
| 09:44 | 21.0 | 0.0 |
| 09:45 | 20.9 | 0.0 |
| 09:46 | 20.8 | 0.0 |
| 09:47 | 20.9 | 0.0 |
| 09:48 | 20.9 | 0.0 |
| 09:49 | 21.0 | 0.0 |
| 09:50 | 21.0 | 0.0 |
| 09:51 | 20.9 | 0.0 |
| 09:52 | 20.9 | 0.0 |
| 09:53 | 20.9 | 0.0 |
| 09:54 | 20.9 | 0.0 |
| 09:55 | 20.8 | 0.0 |
| **SAMPLE PORT CHANGE** | | |
| 10:05 | 20.9 | 0.0 |
| 10:06 | 21.0 | 0.0 |
| 10:07 | 21.0 | 0.0 |
| 10:08 | 21.0 | 0.0 |
| 10:09 | 20.9 | 0.0 |
| 10:10 | 20.9 | 0.0 |
| 10:11 | 20.8 | 0.0 |
| 10:12 | 20.8 | 0.0 |
| 10:13 | 20.8 | 0.0 |
| 10:14 | 20.8 | 0.0 |
| 10:15 | 20.9 | 0.0 |
| 10:16 | 20.9 | 0.0 |
| 10:17 | 20.8 | 0.0 |
| 10:18 | 20.8 | 0.0 |
| 10:19 | 20.8 | 0.0 |



WESTON SOLUTIONS

# RUN DATA

Number 1

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 10:20 | 20.9 | 0.0 |
| 10:21 | 20.9 | 0.0 |
| 10:22 | 20.9 | 0.0 |
| 10:23 | 20.9 | 0.0 |
| 10:24 | 20.9 | 0.0 |
| 10:25 | 20.8 | 0.0 |
| 10:26 | 20.8 | 0.0 |
| 10:27 | 20.8 | 0.0 |
| 10:28 | 20.8 | 0.0 |
| 10:29 | 20.8 | 0.0 |
| 10:30 | 20.8 | 0.0 |
| 10:31 | 20.8 | 0.0 |
| 10:32 | 20.9 | 0.0 |
| 10:33 | 20.9 | 0.0 |
| 10:34 | 20.9 | 0.0 |
| 10:35 | 20.9 | 0.0 |
| 10:36 | 20.9 | 0.0 |
| 10:37 | 20.9 | 0.0 |
| 10:38 | 20.9 | 0.0 |
| 10:39 | 20.9 | 0.0 |
| 10:40 | 20.9 | 0.0 |
| 10:41 | 20.9 | 0.0 |
| 10:42 | 20.8 | 0.0 |
| 10:43 | 20.8 | 0.0 |
| 10:44 | 20.8 | 0.0 |
| 10:45 | 20.8 | 0.0 |
| 10:46 | 20.8 | 0.0 |
| 10:47 | 20.8 | 0.0 |
| 10:48 | 20.9 | 0.0 |
| 10:49 | 20.9 | 0.0 |
| 10:50 | 20.9 | 0.0 |
| 10:51 | 20.9 | 0.0 |
| 10:52 | 21.2 | 0.0 |
| 10:53 | 21.1 | 0.0 |
| 10:54 | 21.1 | 0.0 |
| **Avgs** | **20.9** | **0.0** |

# RUN SUMMARY

Number 1

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| | $O_2$ | $CO_2$ |
|---|---|---|
| **Method** | EPA 3A | EPA 3A |
| **Conc. Units** | % | % |

Time: 08:47 to 10:54

**Run Averages**

| | | |
|---|---|---|
| | 20.9 | 0.0 |

**Pre-run Bias at 07:34**

| | | |
|---|---|---|
| **Zero Bias** | 0.1 | 0.1 |
| **Span Bias** | 12.0 | 9.1 |
| **Span Gas** | 12.0 | 8.9 |

**Post-run Bias at 07:34**

| | | |
|---|---|---|
| **Zero Bias** | 0.1 | 0.1 |
| **Span Bias** | 12.0 | 9.1 |
| **Span Gas** | 12.0 | 8.9 |

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

| | | |
|---|---|---|
| | 21.0 | 0.0 |

# BIAS AND CALIBRATION DRIFT

Number 2

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

Start Time: 07:34

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

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

**Calibration Drift**

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

*Bias No. 1

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| Zero | 0.0 | 0.1 | 0.1 | 0.6 | Pass |
| Span | 9.1 | 9.1 | 0.0 | 0.0 | Pass |

**Calibration Drift**

| Standard Gas | Initial* % | Final % | Difference % | Drift % | Status |
|---|---|---|---|---|---|
| Zero | 0.1 | 0.1 | 0.0 | 0.0 | Pass |
| Span | 9.1 | 9.1 | 0.0 | 0.0 | Pass |

*Bias No. 1

# RUN DATA

Number 2

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 13:01 | 20.8 | 0.0 |
| 13:02 | 20.8 | 0.0 |
| 13:03 | 20.8 | 0.0 |
| 13:04 | 20.7 | 0.0 |
| 13:05 | 20.7 | 0.0 |
| 13:06 | 20.7 | 0.0 |
| 13:07 | 20.7 | 0.0 |
| 13:08 | 20.7 | 0.0 |
| 13:09 | 20.7 | 0.0 |
| 13:10 | 20.7 | 0.0 |
| 13:11 | 20.7 | 0.0 |
| 13:12 | 20.7 | 0.0 |
| 13:13 | 20.7 | 0.0 |
| 13:14 | 20.7 | 0.0 |
| 13:15 | 20.7 | 0.0 |
| 13:16 | 20.7 | 0.0 |
| 13:17 | 20.7 | 0.0 |
| 13:18 | 20.7 | 0.0 |
| 13:19 | 20.7 | 0.0 |
| 13:20 | 20.7 | 0.0 |
| 13:21 | 20.7 | 0.0 |
| 13:22 | 20.7 | 0.0 |
| 13:23 | 20.7 | 0.0 |
| 13:24 | 20.7 | 0.0 |
| 13:25 | 20.7 | 0.0 |
| 13:26 | 20.7 | 0.0 |
| 13:27 | 20.7 | 0.0 |
| 13:28 | 20.7 | 0.0 |
| 13:29 | 20.7 | 0.0 |
| 13:30 | 20.8 | 0.0 |
| 13:31 | 20.8 | 0.0 |
| 13:32 | 20.8 | 0.0 |
| 13:33 | 20.8 | 0.0 |
| 13:34 | 20.8 | 0.0 |
| 13:35 | 20.8 | 0.0 |
| 13:36 | 20.8 | 0.0 |
| 13:37 | 20.7 | 0.0 |
| 13:38 | 20.7 | 0.0 |
| 13:39 | 20.7 | 0.0 |
| 13:40 | 20.7 | 0.0 |
| 13:41 | 20.7 | 0.0 |
| 13:42 | 20.7 | 0.0 |

# RUN DATA

Number 2

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 13:43 | 20.7 | 0.0 |
| 13:44 | 20.7 | 0.0 |
| 13:45 | 20.7 | 0.0 |
| 13:46 | 20.7 | 0.0 |
| 13:47 | 20.7 | 0.0 |
| 13:48 | 20.7 | 0.0 |
| 13:49 | 20.7 | 0.0 |
| 13:50 | 20.7 | 0.0 |
| 13:51 | 20.7 | 0.0 |
| 13:52 | 20.7 | 0.0 |
| 13:53 | 20.7 | 0.0 |
| 13:54 | 20.7 | 0.0 |
| 13:55 | 20.7 | 0.0 |
| 13:56 | 20.7 | 0.0 |
| 13:57 | 20.7 | 0.0 |
| 13:58 | 20.7 | 0.0 |
| 13:59 | 20.7 | 0.0 |
| 14:00 | 20.8 | 0.0 |
| 14:01 | 20.7 | 0.0 |
| 14:02 | 20.7 | 0.0 |
| 14:03 | 20.7 | 0.0 |
| 14:04 | 20.7 | 0.0 |
| 14:05 | 20.7 | 0.0 |
| 14:06 | 20.7 | 0.0 |
| 14:07 | 20.7 | 0.0 |
| 14:08 | 20.7 | 0.0 |
| 14:09 | 20.7 | 0.0 |
| 14:10 | 20.7 | 0.0 |
| 14:11 | 20.7 | 0.0 |
| 14:12 | 20.7 | 0.0 |
| 14:13 | 20.7 | 0.0 |
| 14:14 | 20.7 | 0.0 |
| 14:15 | 20.7 | 0.0 |
| 14:16 | 20.7 | 0.0 |
| 14:17 | 20.7 | 0.0 |
| 14:18 | 20.7 | 0.0 |
| 14:19 | 20.7 | 0.0 |
| 14:20 | 20.7 | 0.0 |
| 14:21 | 20.7 | 0.0 |
| 14:22 | 20.7 | 0.0 |
| 14:23 | 20.6 | 0.0 |
| 14:24 | 20.6 | 0.0 |



WESTON SOLUTIONS

# RUN DATA

Number 2

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| Time | $O_2$ % | $CO_2$ % |
|---|---|---|
| 14:25 | 20.6 | 0.0 |
| 14:26 | 20.6 | 0.0 |
| 14:27 | 20.6 | 0.0 |
| 14:28 | 20.6 | 0.0 |
| 14:29 | 20.6 | 0.0 |
| 14:30 | 20.6 | 0.0 |
| 14:31 | 20.6 | 0.0 |
| 14:32 | 20.6 | 0.0 |
| 14:33 | 20.6 | 0.0 |
| 14:34 | 20.6 | 0.0 |
| 14:35 | 20.6 | 0.0 |
| 14:36 | 20.7 | 0.0 |
| 14:37 | 20.7 | 0.0 |
| 14:38 | 20.7 | 0.0 |
| 14:39 | 20.7 | 0.0 |
| 14:40 | 20.7 | 0.0 |
| 14:41 | 20.7 | 0.0 |
| 14:42 | 20.7 | 0.0 |
| 14:43 | 20.7 | 0.0 |
| 14:44 | 20.7 | 0.0 |
| 14:45 | 20.7 | 0.0 |
| 14:46 | 20.8 | 0.0 |
| 14:47 | 20.8 | 0.0 |
| 14:48 | 20.8 | 0.0 |
| 14:49 | 20.7 | 0.0 |
| 14:50 | 20.6 | 0.0 |
| 14:51 | 20.7 | 0.0 |
| 14:52 | 20.7 | 0.0 |
| 14:53 | 20.7 | 0.0 |
| 14:54 | 20.7 | 0.0 |
| 14:55 | 20.7 | 0.0 |
| 14:56 | 20.7 | 0.0 |
| 14:57 | 20.7 | 0.0 |
| 14:58 | 20.7 | 0.0 |
| 14:59 | 20.7 | 0.0 |
| 15:00 | 20.7 | 0.0 |
| 15:01 | 20.7 | 0.0 |
| 15:02 | 20.7 | 0.0 |
| 15:03 | 20.7 | 0.0 |
| 15:04 | 20.7 | 0.0 |
| **Avgs** | **20.7** | **0.0** |

# RUN SUMMARY

Number 2

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

| | $O_2$ | $CO_2$ |
|---|---|---|
| **Method** | EPA 3A | EPA 3A |
| **Conc. Units** | % | % |

Time: 13:00 to 15:04

**Run Averages**

| | | |
|---|---|---|
| | 20.7 | 0.0 |

**Pre-run Bias at 07:34**

| | | |
|---|---|---|
| **Zero Bias** | 0.1 | 0.1 |
| **Span Bias** | 12.0 | 9.1 |
| **Span Gas** | 12.0 | 8.9 |

**Post-run Bias at 15:37**

| | | |
|---|---|---|
| **Zero Bias** | -0.2 | 0.1 |
| **Span Bias** | 11.8 | 9.1 |
| **Span Gas** | 12.0 | 8.9 |

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

| | | |
|---|---|---|
| | 20.8 | 0.0 |

# BIAS AND CALIBRATION DRIFT

Number 3

Client: **Chemours** Project Number: **15418.002.006.0001**
Location: **Fayetteville, NC** Operator: **SR**
Source: **DIVISION STACK RUNS 2+3** Calibration **1** Date: **20 Jul 2018**

Start Time: 15:37

**$O_2$**
Method: EPA 3A
Span Conc. 20.9 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| Zero | 0.0 | -0.2 | -0.2 | -1.0 | Pass |
| Span | 12.0 | 11.8 | -0.2 | -1.0 | Pass |

**Calibration Drift**

| Standard Gas | Initial* % | Final % | Difference % | Drift % | Status |
|---|---|---|---|---|---|
| Zero | 0.1 | -0.2 | -0.3 | -1.4 | Pass |
| Span | 12.0 | 11.8 | -0.2 | -1.0 | Pass |

*Bias No. 2

**$CO_2$**
Method: EPA 3A
Span Conc. 16.3 %

**Bias Results**

| Standard Gas | Cal. % | Bias % | Difference % | Error % | Status |
|---|---|---|---|---|---|
| Zero | 0.0 | 0.1 | 0.1 | 0.6 | Pass |
| Span | 9.1 | 9.1 | 0.0 | 0.0 | Pass |

**Calibration Drift**

| Standard Gas | Initial* % | Final % | Difference % | Drift % | Status |
|---|---|---|---|---|---|
| Zero | 0.1 | 0.1 | 0.0 | 0.0 | Pass |
| Span | 9.1 | 9.1 | 0.0 | 0.0 | Pass |

*Bias No. 2

# APPENDIX C
# LABORATORY ANALYTICAL DESCRIPTION AND ANALYTICAL REPORT

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

# Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: PPA Carbon Bed Inlet Dip Tube In

TestAmerica Job ID: 140-12236-1

## Client Sample ID: K-2640,2641 PPA CARBON BED INLET R1 M0010 FH COMPOSITE

**Lab Sample ID: 140-12236-1**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 146 | | 1.25 | 1.25 | ug/Sample | | 07/31/18 07:50 | 08/14/18 10:53 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *102* | *D* | *50 - 200* | *07/31/18 07:50* | *08/14/18 10:53* | *10* |

## Client Sample ID: K-2642,2643,2645 PPA CARBON BED INLET R1 M0010 BH COMPOSITE

**Lab Sample ID: 140-12236-2**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 7.17 | | 0.250 | 0.250 | ug/Sample | | 08/01/18 11:44 | 08/09/18 10:15 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *95* | | *50 - 200* | *08/01/18 11:44* | *08/09/18 10:15* | *1* |

## Client Sample ID: K-2644 PPA CARBON BED INLET R1 M0010 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12236-3**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 12.1 | | 0.101 | 0.00515 | ug/Sample | | 07/31/18 10:24 | 08/06/18 13:46 | 2 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *64* | *D* | *50 - 200* | *07/31/18 10:24* | *08/06/18 13:46* | *2* |

## Client Sample ID: K-2646 PPA CARBON BED INLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12236-4**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 08/01/18 11:44 | 08/09/18 10:18 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *93* | | *50 - 200* | *08/01/18 11:44* | *08/09/18 10:18* | *1* |

## Client Sample ID: K-2647,2648 PPA CARBON BED INLET R2 M0010 FH COMPOSITE

**Lab Sample ID: 140-12236-5**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 90.4 | | 1.25 | 1.25 | ug/Sample | | 07/31/18 07:50 | 08/14/18 10:56 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *110* | *D* | *50 - 200* | *07/31/18 07:50* | *08/14/18 10:56* | *10* |

## Client Sample ID: K-2649,2650,2652 PPA CARBON BED INLET R2 M0010 BH COMPOSITE

**Lab Sample ID: 140-12236-6**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 3.72 | | 0.250 | 0.250 | ug/Sample | | 08/01/18 11:44 | 08/09/18 10:21 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *91* | | *50 - 200* | *08/01/18 11:44* | *08/09/18 10:21* | *1* |

## Client Sample ID: K-2651 PPA CARBON BED INLET R2 M0010 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12236-7**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 3.41 | | 0.0500 | 0.00255 | ug/Sample | | 07/31/18 10:24 | 08/06/18 13:49 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *66* | | *50 - 200* | *07/31/18 10:24* | *08/06/18 13:49* | *1* |

## Client Sample ID: K-2653 PPA CARBON BED INLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12236-8**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 08/01/18 11:44 | 08/09/18 10:25 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *96* | | *50 - 200* | *08/01/18 11:44* | *08/09/18 10:25* | *1* |

## Client Sample ID: E-1642,1643 PPA CARBON BED OUTLET R1 M0010 FH COMPOSITE

**Lab Sample ID: 140-12234-1**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 1.59 | | 0.100 | 0.100 | ug/Sample | | 07/31/18 07:50 | 08/14/18 10:33 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *108* | | *50 - 200* | *07/31/18 07:50* | *08/14/18 10:33* | *1* |

## Client Sample ID: E-1644,1645,1647 PPA CARBON BED OUTLET R1 M0010 BH COMPOSITE

**Lab Sample ID: 140-12234-2**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.250 | 0.250 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:09 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *91* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:09* | *1* |

## Client Sample ID: E-1646 PPA CARBON BED OUTLET R1 M0010 IMPINGER 1,2&3 CONDENSATE

**Lab Sample ID: 140-12234-3**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 1.39 | J | 2.48 | 0.126 | ug/Sample | | 07/31/18 10:24 | 08/06/18 11:42 | 50 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *90* | *D* | *50 - 200* | *07/31/18 10:24* | *08/06/18 11:42* | *50* |
| *13C3 HFPO-DA* | *69* | | *50 - 200* | *07/31/18 10:24* | *08/06/18 13:33* | *1* |

## Client Sample ID: E-1648 PPA CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12234-4**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:13 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *88* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:13* | *1* |

# Client Sample Results

Client: Chemours Company FC, LLC The
Project/Site: PPA Carbon Bed Outlet Dip Tube In

TestAmerica Job ID: 140-12234-1

## Client Sample ID: E-1649,1650 PPA CARBON BED OUTLET R2 M0010 FH COMPOSITE

**Lab Sample ID: 140-12234-5**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 1.05 | | 0.100 | 0.100 | ug/Sample | | 07/31/18 07:50 | 08/14/18 10:37 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *109* | | *50 - 200* | *07/31/18 07:50* | *08/14/18 10:37* | *1* |

## Client Sample ID: E-1651,1652,1654 PPA CARBON BED OUTLET R2 M0010 BH COMPOSITE

**Lab Sample ID: 140-12234-6**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.292 | | 0.250 | 0.250 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:16 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *95* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:16* | *1* |

## Client Sample ID: E-1653 PPA CARBON BED OUTLET R2 M0010 IMPINGER 1,2&3 CONDENSATE

**Lab Sample ID: 140-12234-7**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.387 | | 0.0495 | 0.00253 | ug/Sample | | 07/31/18 10:24 | 08/06/18 13:36 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *72* | | *50 - 200* | *07/31/18 10:24* | *08/06/18 13:36* | *1* |

## Client Sample ID: E-1655 PPA CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12234-8**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:19 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *91* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:19* | *1* |

## Client Sample ID: C-1408 PPA CARBON BED QC M0010 DI WATER RB

**Lab Sample ID: 140-12234-13**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.00250 | 0.000128 | ug/Sample | | 07/31/18 10:24 | 08/06/18 13:43 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *70* | | *50 - 200* | *07/31/18 10:24* | *08/06/18 13:43* | *1* |

## Client Sample ID: C-1409 PPA CARBON BED QC M0010 MEOH WITH 5% NH4OH RB

**Lab Sample ID: 140-12234-14**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:29 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *105* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:29* | *1* |

## Client Sample ID: C-1410 PPA CARBON BED QC M0010 XAD-2 RESIN TUBE RB

**Lab Sample ID: 140-12234-15**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:32 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *93* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:32* | *1* |

## Client Sample ID: C-1411 PPA CARBON BED QC M0010 MEOH WITH 5% NH4OH TB

**Lab Sample ID: 140-12234-16**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:39 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *92* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:39* | *1* |

## Client Sample ID: C-1412 PPA CARBON BED QC M0010 XAD-2 RESIN TUBE TB

**Lab Sample ID: 140-12234-17**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:42 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *91* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:42* | *1* |

## Client Sample ID: C-1413 PPA CARBON BED QC M0010 COMBINED GLASSWARE RINSES (MEOH/5% HN4OH) PB

**Lab Sample ID: 140-12234-18**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:45 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *104* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:45* | *1* |

## Client Sample ID: A-6504 MEDIA CHECK XAD

**Lab Sample ID: 140-12234-19**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:49 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *82* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:49* | *1* |

## Client Sample ID: A-6505 MEDIA CHECK FILTER

**Lab Sample ID: 140-12234-20**

**Date Collected: 07/25/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/31/18 07:50 | 08/14/18 10:43 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *89* | | *50 - 200* | *07/31/18 07:50* | *08/14/18 10:43* | *1* |

## Client Sample ID: C-1401,1402 PPA CARBON BED QC M0010 FH COMPOSITE BT

**Lab Sample ID: 140-12234-9**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 39.9 | | 0.250 | 0.250 | ug/Sample | | 07/31/18 07:50 | 08/14/18 10:40 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *93* | *D* | *50 - 200* | *07/31/18 07:50* | *08/14/18 10:40* | *10* |

## Client Sample ID: C-1403,1404,1406 PPA CARBON BED QC M0010 BH COMPOSITE BT

**Lab Sample ID: 140-12234-10**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.255 | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:23 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *87* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:23* | *1* |

## Client Sample ID: C-1405 PPA CARBON BED QC M0010 IMPINGERS 1,2&3 CONDENSATE BT

**Lab Sample ID: 140-12234-11**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.00250 | 0.000128 | ug/Sample | | 07/31/18 10:24 | 08/06/18 13:40 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *71* | | *50 - 200* | *07/31/18 10:24* | *08/06/18 13:40* | *1* |

## Client Sample ID: C-1407 PPA CARBON BED QC M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT

**Lab Sample ID: 140-12234-12**

**Date Collected: 07/26/18 00:00**
**Date Received: 07/26/18 20:20**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/31/18 07:53 | 08/14/18 11:26 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *94* | | *50 - 200* | *07/31/18 07:53* | *08/14/18 11:26* | *1* |

# Client Sample Results

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

TestAmerica Job ID: 140-12185-1

## Client Sample ID: G-2247,2248 DIV VEN CARBON BED INLET R1 M0010 FH COMPOSITE

**Lab Sample ID: 140-12185-1**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 5.78 | | 0.100 | 0.100 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:45 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *150* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:45* | *1* |

## Client Sample ID: G-2249,2250,2252 DIV VEN CARBON BED INLET R1 M0010 BH COMPOSITE

**Lab Sample ID: 140-12185-2**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 26.5 | | 0.225 | 0.225 | ug/Sample | | 07/26/18 09:52 | 08/02/18 10:09 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *124* | | *50 - 200* | *07/26/18 09:52* | *08/02/18 10:09* | *1* |

## Client Sample ID: G-2251 DIV VEN CARBON BED INLET R1 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12185-3**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 44.8 | | 0.500 | 0.0255 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:37 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *165* | *D* | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:37* | *10* |

## Client Sample ID: G-2253 DIV VEN CARBON BED INLET R1 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12185-4**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/26/18 09:52 | 08/02/18 10:13 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *149* | | *50 - 200* | *07/26/18 09:52* | *08/02/18 10:13* | *1* |

## Client Sample ID: G-2254,2255 DIV VEN CARBON BED INLET R2 M0010 FH COMPOSITE

**Lab Sample ID: 140-12185-5**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 8.21 | | 0.100 | 0.100 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:48 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *152* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:48* | *1* |

## Client Sample ID: G-2256,2257,2259 DIV VEN CARBON BED INLET R2 M0010 BH COMPOSITE

**Lab Sample ID: 140-12185-6**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 14.8 | | 0.225 | 0.225 | ug/Sample | | 07/26/18 09:52 | 08/02/18 10:16 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *146* | | *50 - 200* | *07/26/18 09:52* | *08/02/18 10:16* | *1* |

## Client Sample ID: G-2258 DIV VEN CARBON BED INLET R2 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12185-7**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 46.2 | | 0.500 | 0.0255 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:41 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *178* | *D* | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:41* | *10* |

## Client Sample ID: G-2260 DIV VEN CARBON BED INLET R2 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12185-8**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/26/18 09:52 | 08/02/18 10:19 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *150* | | *50 - 200* | *07/26/18 09:52* | *08/02/18 10:19* | *1* |

**Client Sample ID: G-2261,2262 DIV VEN CARBON BED INLET R3 M0010 FH COMPOSITE** — **Lab Sample ID: 140-12185-9**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

Matrix: Air

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 8.99 | | 0.100 | 0.100 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:51 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *155* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:51* | *1* |

**Client Sample ID: G-2263,2264,2266 DIV VEN CARBON BED INLET R3 M0010 BH COMPOSITE** — **Lab Sample ID: 140-12185-10**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

Matrix: Air

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 33.7 | | 0.275 | 0.275 | ug/Sample | | 07/26/18 09:52 | 08/02/18 10:22 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *155* | | *50 - 200* | *07/26/18 09:52* | *08/02/18 10:22* | *1* |

**Client Sample ID: G-2265 DIV VEN CARBON BED INLET R3 IMPINGERS 1,2&3 CONDENSATE** — **Lab Sample ID: 140-12185-11**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

Matrix: Air

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 62.4 | | 0.500 | 0.0255 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:44 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *172* | *D* | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:44* | *10* |

**Client Sample ID: G-2267 DIV VEN CARBON BED INLET R3 BREAKTHROUGH XAD-2 RESIN TUBE** — **Lab Sample ID: 140-12185-12**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

Matrix: Air

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/26/18 09:52 | 08/02/18 10:26 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *155* | | *50 - 200* | *07/26/18 09:52* | *08/02/18 10:26* | *1* |

# Client Sample Results

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

TestAmerica Job ID: 140-12183-1

## Client Sample ID: R-2077,2078 DIV VEN CARBON BED OUTLET R1 M0010 FH COMPOSITE

**Lab Sample ID: 140-12183-1**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 3.14 | | 0.100 | 0.100 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:15 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *150* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:15* | *1* |

## Client Sample ID: R-2079,2080,2082 DIV VEN CARBON BED OUTLET R1 M0010 BH COMPOSITE

**Lab Sample ID: 140-12183-2**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.250 | 0.250 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:04 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *129* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:04* | *1* |

## Client Sample ID: R-2081 DIV VEN CARBON BED OUTLET R1 M0010 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12183-3**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.0285 | J | 0.0500 | 0.00255 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:08 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *170* | | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:08* | *1* |

## Client Sample ID: R-2083 DIV VEN CARBON BED OUTLET R1 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12183-4**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.714 | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:08 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *131* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:08* | *1* |

## Client Sample ID: R-2084,2085 DIV VEN CARBON BED OUTLET R2 M0010 FH COMPOSITE

**Lab Sample ID: 140-12183-5**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 2.74 | | 0.100 | 0.100 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:19 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *150* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:19* | *1* |

## Client Sample ID: R-2086,2087,2089 DIV VEN CARBON BED OUTLET R2 M0010 BH COMPOSITE

**Lab Sample ID: 140-12183-6**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 1.53 | | 0.250 | 0.250 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:11 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *127* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:11* | *1* |

## Client Sample ID: R-2088 DIV VEN CARBON BED OUTLET R2 M0010 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12183-7**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 1.00 | | 0.0500 | 0.00255 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:11 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *157* | | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:11* | *1* |

## Client Sample ID: R-2090 DIV VEN CARBON BED OUTLET R2 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12183-8**

Date Collected: 07/20/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:14 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *130* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:14* | *1* |

## Client Sample ID: R-2091,2092 DIV VEN CARBON BED OUTLET R3 M0010 FH COMPOSITE

**Lab Sample ID: 140-12183-9**

**Date Collected: 07/20/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 3.08 | | 0.100 | 0.100 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:22 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *153* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:22* | *1* |

## Client Sample ID: R-2093,2094,2096 DIV VEN CARBON BED OUTLET R3 M0010 BH COMPOSITE

**Lab Sample ID: 140-12183-10**

**Date Collected: 07/20/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.454 | | 0.250 | 0.250 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:17 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *140* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:17* | *1* |

## Client Sample ID: R-2095 DIV VEN CARBON BED OUTLET R3 M0010 IMPINGERS 1,2&3 CONDENSATE

**Lab Sample ID: 140-12183-11**

**Date Collected: 07/20/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.0735 | | 0.0500 | 0.00255 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:14 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *160* | | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:14* | *1* |

## Client Sample ID: R-2097 DIV VEN CARBON BED OUTLET R3 M0010 BREAKTHROUGH XAD-2 RESIN TUBE

**Lab Sample ID: 140-12183-12**

**Date Collected: 07/20/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:20 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *130* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:20* | *1* |

## Client Sample ID: T-1396,1397 DIV QC CARBON BED M0010 FH COMPOSITE BT

**Lab Sample ID: 140-12183-13**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 6.38 | | 0.0500 | 0.0500 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:25 | 2 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *136* | *D* | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:25* | *2* |

## Client Sample ID: T-1398,1399,1401 DIV QC CARBON BED M0010 BH COMPOSITE BT

**Lab Sample ID: 140-12183-14**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:24 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *123* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:24* | *1* |

## Client Sample ID: T-1400 DIV QC CARBON BED M0010 IMPINGERS 1,2&3 CONDENSATE BT

**Lab Sample ID: 140-12183-15**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.00779 | | 0.00250 | 0.000128 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:18 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *132* | | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:18* | *1* |

## Client Sample ID: T-1402 DIV QC CARBON BED M0010 BREAKTHROUGH XAD-2 RESIN TUBE BT

**Lab Sample ID: 140-12183-16**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:27 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *143* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:27* | *1* |

**Client Sample ID: T-1403 DIV QC CARBON BED M0010 DI WATER RB** — **Lab Sample ID: 140-12183-17**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - HFPO-DA**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.00250 | 0.000128 | ug/Sample | | 07/31/18 15:11 | 08/02/18 11:21 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *160* | | *50 - 200* | *07/31/18 15:11* | *08/02/18 11:21* | *1* |

**Client Sample ID: T-1404 DIV QC CARBON BED M0010 MEOH WITH 5% NH4OH RB** — **Lab Sample ID: 140-12183-18**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:33 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *162* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:33* | *1* |

**Client Sample ID: T-1405 DIV QC CARBON BED M0010 XAD-2 RESIN TUBE RB** — **Lab Sample ID: 140-12183-19**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:37 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *126* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:37* | *1* |

**Client Sample ID: T-1406 DIV QC CARBON BED M0010 MEOH WITH 5% NH4OH TB** — **Lab Sample ID: 140-12183-20**

**Date Collected: 07/19/18 00:00**
**Date Received: 07/21/18 12:12**
**Sample Container: Air Train**

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:40 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *171* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:40* | *1* |

## Client Sample ID: T-1407 DIV QC CARBON BED M0010 XAD-2 RESIN TUBE TB

**Lab Sample ID: 140-12183-21**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:43 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *122* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:43* | *1* |

## Client Sample ID: T-1408 DIV QC CARBON BED M0010 COMBINED GLASSWARE RINSES (MEOH/5% NH4OH) PB

**Lab Sample ID: 140-12183-22**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | 0.0627 | | 0.0250 | 0.0250 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:46 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *166* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:46* | *1* |

## Client Sample ID: A-6451 MEDIA CHECK XAD

**Lab Sample ID: 140-12183-23**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.200 | 0.200 | ug/Sample | | 07/24/18 06:19 | 07/31/18 15:50 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *131* | | *50 - 200* | *07/24/18 06:19* | *07/31/18 15:50* | *1* |

## Client Sample ID: A-6452 MEDIA CHECK FILTER

**Lab Sample ID: 140-12183-24**

Date Collected: 07/19/18 00:00
Date Received: 07/21/18 12:12
Sample Container: Air Train

**Matrix: Air**

**Method: 8321A - PFOA and PFOS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| HFPO-DA | ND | | 0.0250 | 0.0250 | ug/Sample | | 07/24/18 06:16 | 07/31/18 14:29 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C3 HFPO-DA* | *136* | | *50 - 200* | *07/24/18 06:16* | *07/31/18 14:29* | *1* |

# APPENDIX D
# SAMPLE CALCULATIONS

## EXAMPLE CALCULATIONS FOR VOLUMETRIC FLOW AND MOISTURE AND ISOKINETICS

| | |
|---|---|
| Client: Chemours | Facility: Fayetteville, NC |
| Test Number: Run 1 | Test Date: 7/19/2018 |
| Test Location: VE North Carbon Bed Inlet | Test Period: 0952 -1428 |

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

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

$$Vm(std) = \frac{17.64 \times 0.9860 \times 66.613 \times \left( 30.05 + \frac{1.323}{13.6} \right)}{93.58 + 460} = 63.096$$

Where:

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

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

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

$$Vw(std) = ( 0.04707 \times 26.2 ) + ( 0.04715 \times 21.8 ) = 2.26$$

Where:

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

**3. Moisture content**

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

$$bws = \frac{2.26}{2.26 + 63.096} = 0.035$$

Where:

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

**4. Mole fraction of dry gas.**

$$Md = 1 - bws$$

$$Md = 1 - 0.035 = 0.965$$

Where:

Md = Mole fraction of dry gas, dimensionless.

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

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

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

$$MWd = 28.84$$

Where:

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

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

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

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

Where:

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

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

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

$$Vs = 85.49 \times 0.84 \times 0.79491 \times \left(\frac{553}{29.74 \times 28.46}\right)\text{^}1/2 = 46.1$$

Where:

Vs = Average gas stream velocity, ft/sec.

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

Cp = Pitot tube coefficient, dimensionless.

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

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

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

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

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

$$Qs(act) = 60 \times 46.1 \times 6.31 = 17456$$

Where:

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

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

60 = Conversion factor from seconds to minutes.

**9. Average gas stream dry volumetric flow rate at standard conditions, dscf/min.**

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

$$Qs(std) = 17.64 \times 0.965 \times \frac{29.74}{553.1} \times 17456$$

$$Qs(std) = 15985$$

Where:

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

**10. Isokinetic variation calculated from intermediate values, percent.**

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

$$I = \frac{17.327 \times 553 \times 63.096}{46.1 \times 96 \times 29.74 \times 0.965 \times (0.218)^{\wedge}2} = 100.0$$

Where:

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

## SAMPLE CALCULATIONS FOR HFPO DIMER ACID (METHOD 0010)

**Client: Chemours**
**Test Number: Run 1**
**Test Location: VEN-CBed IN**

**Plant: Fayetteville, NC**
**Test Date: 7/19/2018**
**Test Period: 0952 -1428**

**1. HFPO Dimer Acid concentration, lbs/dscf.**

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

$$Conc1 = \frac{77.1 \times 2.2046 \times 10\text{-}9}{63.096}$$

Conc1 = 2.69E-09

Where:

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

Conc1 = HFPO Dimer Acid concentration, lbs/dscf.

$2.2046 \times 10^{-9}$ = Conversion factor from ug to lbs.

**2. HFPO Dimer Acid concentration, ug/dscm.**

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

Conc2 = 77.1 / ( 63.096 x 0.02832 )

Conc2 = 43.1

Where:

Conc2 = HFPO Dimer Acid concentration, ug/dscm.

0.02832 = Conversion factor from cubic feet to cubic meters.

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

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

$MR1_{(Inlet)}$ = 2.69E-09 x 15985 x 60

$MR1_{(Inlet)}$ = 2.58E-03

Where:

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

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

$MR2_{(Inlet)}$ = $MR1_{(Inlet)}$ x 453.59 / 3600

$MR2_{(Inlet)}$ = 2.58E-03 x 453.59 /3600

$MR2_{(Inlet)}$ = 3.25E-04

Where:

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

453.59 = Conversion factor from pounds to grams.

3600 = Conversion factor from hours to seconds.

**5. HFPO Dimer Acid Removal Efficiency, %**

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

$$RE = \frac{(2.58E\text{-}3) - (1.36E\text{-}4)}{2.58E\text{-}03}$$

RE = 94.73

Where:

RE = Carbon Bed Removal Efficiency.

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

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

# APPENDIX E
# EQUIPMENT CALIBRATION RECORDS

## METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Integrated Air Services

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

DATE: 5/8/18
METER PART #: AO20
METER SERIAL #: 1858006
CRITICAL ORIFICE SET SERIAL #: 1331s & 1825
BAROMETRIC PRESSURE (in Hg): INITIAL 29.17, FINAL 29.20, AVG ($P_{bar}$) 29.19
Calibrated by: ST

| ORIFICE # | RUN # | K' FACTOR (AVG) | TESTED VACUUM (in Hg) | DGM READINGS ($FT^3$) INITIAL | DGM READINGS ($FT^3$) FINAL | DGM READINGS ($FT^3$) NET ($V_m$) | AMBIENT F° | DGM F° INITIAL | DGM F° FINAL | Avg DGM F° $T_m$ | ELAPSED TIME (MIN) θ | DGM ΔH (in $H_2O$) | (1) $V_m$ (STD) | (2) $V_{cr}$ (STD) | (3) Y | (4) $\Delta H_@$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 1 | 0.2313 | 24 | 641.513 | 647.003 | 5.490 | 85 | 81 | 82 | 82 | 18 | 0.25 | 5.226 | 5.206 | 0.996 | 1.602 |
| 12 | 2 | 0.3277 | 22 | 603.200 | 610.237 | 7.037 | 77 | 73 | 74 | 74 | 17 | 0.52 | 6.804 | 7.018 | 1.032 | 1.662 |
| 16 | 3 | 0.4349 | 21 | 634.719 | 641.484 | 6.765 | 84 | 80 | 80 | 80 | 12 | 0.93 | 6.468 | 6.532 | 1.010 | 1.693 |
| 19 | 4 | 0.5142 | 20 | 610.237 | 616.119 | 5.882 | 78 | 74 | 75 | 75 | 9 | 1.30 | 5.687 | 5.825 | 1.024 | 1.694 |
| 24 | 5 | 0.6742 | 18 | 626.465 | 632.518 | 6.053 | 79 | 76 | 77 | 77 | 7 | 2.30 | 5.845 | 5.934 | 1.015 | 1.749 |
| 30 | 6 | 0.8108 | 15 | 616.119 | 626.465 | 10.346 | 79 | 75 | 76 | 76 | 10 | 3.50 | 10.040 | 10.195 | 1.015 | 1.855 |
| | | | | | | | | | | | | | | AVG = | 1.015 | 1.709 |

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

Individual Y's .02 from average? **PASS**
Individual $\Delta H_@$ values 0.15 from average? **PASS**
Average Y value +/-.02 of 1.000? **PASS**

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

$K_1$ = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
$T_m$ = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

$T_{amb}$ = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

| Next Calibration Due By: | 5/8/2019 |
|---|---|

(4) $\Delta H_@ = \frac{\Delta H\, 0.0319\, T_m\, \theta^2}{P_{bar}\, Y^2\, V_m^2}$

# Y Factor Calibration Check Calculation

**METHOD 0010 TEST TRAIN-PPA CARBON BED INLET**
**METER BOX NO.AO 20**
**RUN NO. 2 7/26/18**

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

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

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

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

**MWd = 28.84**

| | |
|---|---|
| Tma = Source Temperature, absolute(°R) | |
| Tm = Average dry gas meter temperature , deg F. | 77.7 |

$$Tma = Ts + 460$$

$$Tma = 77.7 + 460$$

**Tma = 537.71**

| | |
|---|---|
| Ps = Absolute meter pressure, inches Hg. | |
| 13.6 = Specific gravity of mercury. | |
| delta H = Avg pressure drop across the orifice meter during sampling, in H2O | 0.84 |
| Pb = Barometric Pressure, in Hg. | 29.95 |

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

$$Pm = 29.95 + ( 0.8379 / 13.6)$$

**Pm = 30.01**

| | |
|---|---|
| Yqa = dry gas meter calibration check value, dimensionless. | |
| 0.0319 = (29.92/528)(0.75)2 (in. Hg/°R) cfm2. | |
| 29 = dry molecular weight of air, lb/lb-mole. | |
| Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf. | 51.232 |
| Y = Dry gas meter calibration factor (based on full calibration) | 1.015 |
| Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O. | 1.7090 |
| avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. $H_2O$ | 0.9050 |
| O = Total sampling time, minutes. | 96 |

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

$$Yqa = ( 96.00 / 51.23 ) * SQRT[ ( 0.0319 * 537.71 * 29 ) / ( 1.71 * 30.01 * 28.84 ) ] * 0.91$$

$$Yqa = 1.874 * SQRT[ 497.434 / 1,478.915] * 0.91$$

**Yqa = 0.984**

| | |
|---|---|
| Diff = Absolute difference between Yqa and Y | |

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

$$Diff = (( 1.015 - 0.984 ) / 1.015 ) * 100$$

**Diff = 3.05**

# Y Factor Calibration Check Calculation

**METHOD 0010 TEST TRAIN VE NORTH CARBON BED OUTLET**
**METER BOX NO. AO 20**
**RUN NO. 3 7/20/18**

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

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

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

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

**MWd = 28.84**

| | |
|---|---|
| Tma = Source Temperature, absolute($^{\circ}$R) | |
| Tm = Average dry gas meter temperature , deg F. | 84.5 |

$$Tma = Ts + 460$$

$$Tma = 84.5 + 460$$

**Tma = 544.46**

| | |
|---|---|
| Ps = Absolute meter pressure, inches Hg. | |
| 13.6 = Specific gravity of mercury. | |
| delta H = Avg pressure drop across the orifice meter during sampling, in H2O | 1.33 |
| Pb = Barometric Pressure, in Hg. | 30.04 |

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

$$Pm = 30.04 + ( 1.3303 / 13.6)$$

**Pm = 30.14**

| | |
|---|---|
| Yqa = dry gas meter calibration check value, dimensionless. | |
| 0.0319 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2. | |
| 29 = dry molecular weight of air, lb/lb-mole. | |
| Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf. | 64.865 |
| Y = Dry gas meter calibration factor (based on full calibration) | 1.015 |
| Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O. | 1.709 |
| avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. $H_2O$ | 1.13697 |
| O = Total sampling time, minutes. | 96 |

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

$$Yqa = ( 96.00 / 64.87 ) * SQRT[ ( 0.0319 * 544.46 * 29 ) / ( 1.71 * 30.14 * 28.84 ) ] * 1.14$$

$$Yqa = 1.480 * SQRT[ 503.678 / 1,485.321] * 1.14$$

**Yqa = 0.980**

| | |
|---|---|
| Diff = Absolute difference between Yqa and Y | |

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

$$Diff = (( 1.015 - 0.980 ) / 1.015 ) * 100$$

**Diff = 3.45**

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Integrated Air Services

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

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE: | 3/1/18 | METER SERIAL #: | 27142 | BAROMETRIC PRESSURE (in Hg): | 28.96 | 28.96 |
| METER PART #: | AO26 | CRITICAL ORIFICE SET SERIAL #: | 1515s & 1651 | Calibrated by: | JAW | |

| | | | | DGM READINGS ($FT^3$) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ORIFICE # | RUN # | K' FACTOR (AVG) | TESTED VACUUM (in Hg) | INITIAL | FINAL | NET ($V_m$) | AMBIENT F° | DGM F° INITIAL | DGM F° FINAL | Avg DGM F° $T_m$ | ELAPSED TIME (MIN) θ | DGM ΔH (in $H_2O$) | (1) $V_m$ (STD) | (2) $V_{cr}$ (STD) | (3) Y | (4) $\Delta H_@$ |
| 8 | 1 | 0.2142 | 23.5 | 447.695 | 456.326 | 8.631 | 73 | 74 | 74 | 74 | 30 | 0.22 | 8.266 | 8.063 | 0.975 | 1.642 |
| 11 | 2 | 0.2869 | 22.5 | 434.703 | 447.695 | 12.992 | 72 | 74 | 74 | 74 | 34 | 0.40 | 12.449 | 12.251 | 0.984 | 1.663 |
| 15 | 3 | 0.4199 | 21 | 425.811 | 434.703 | 8.892 | 72 | 73 | 74 | 74 | 16 | 0.86 | 8.538 | 8.438 | 0.988 | 1.674 |
| 21 | 4 | 0.5677 | 19 | 416.790 | 425.811 | 9.021 | 71 | 72 | 73 | 73 | 12 | 1.60 | 8.695 | 8.564 | 0.985 | 1.711 |
| 26 | 5 | 0.7089 | 18 | 394.530 | 416.790 | 22.260 | 71 | 69 | 72 | 71 | 24 | 2.40 | 21.579 | 21.388 | 0.991 | 1.659 |
| 31 | 6 | 0.8627 | 16.5 | 382.200 | 394.530 | 12.330 | 71 | 67 | 69 | 68 | 11 | 3.60 | 12.046 | 11.93 | 0.990 | 1.698 |
| | | | | | | | | | | | | | | AVG = | 0.986 | 1.674 |

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

| | |
|---|---|
| Individual Y's .02 from average? | **PASS** |
| Individual $\Delta H_@$ values 0.15 from average? | **PASS** |
| Average Y value +/-.02 of 1.000? | **PASS** |

(1) $V_m\,(std) = K_1\, V_m \dfrac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

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

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

(2) $V_{cr}\,(std) = K' \sqrt{\dfrac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

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

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \dfrac{V_{cr}\,(std)}{V_m\,(std)}$ = DGM calibration factor

| | |
|---|---|
| Next Calibration Due By: | **3/1/2019** |

(4) $\Delta H_@ = \dfrac{\Delta H\, 0.0319\, T_m\, \theta^2}{P_{bar}\, Y^2\, V_m^2}$

# Y Factor Calibration Check Calculation

**METHOD 0010 TEST TRAIN VE NORTH CARBON BED INLET**
**METER BOX NO. AO 26**
**RUN NO. 3 7/20/18**

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

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

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

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

**MWd = 28.84**

| | |
|---|---|
| Tma = Source Temperature, absolute(°R) | |
| Tm = Average dry gas meter temperature , deg F. | 87.5 |

$$Tma = Ts + 460$$

$$Tma = 87.5 + 460$$

**Tma = 547.46**

| | |
|---|---|
| Ps = Absolute meter pressure, inches Hg. | |
| 13.6 = Specific gravity of mercury. | |
| delta H = Avg pressure drop across the orifice meter during sampling, in H2O | 1.23 |
| Pb = Barometric Pressure, in Hg. | 30.04 |

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

$$Pm = 30.04 + ( 1.2342 / 13.6)$$

**Pm = 30.13**

| | |
|---|---|
| Yqa = dry gas meter calibration check value, dimensionless. | |
| 0.0319 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2. | |
| 29 = dry molecular weight of air, lb/lb-mole. | |
| Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf. | 64.187 |
| Y = Dry gas meter calibration factor (based on full calibration) | 0.986 |
| Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O. | 1.674 |
| avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. $H_2O$ | 1.1059 |
| O = Total sampling time, minutes. | 96 |

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

$$Yqa = ( 96.00 / 64.19 ) * SQRT[ ( 0.0319 * 547.46 * 29 ) / ( 1.67 * 30.13 * 28.84 ) ] * 1.11$$

$$Yqa = 1.496 * SQRT[ 506.454 / 1,454.419] * 1.11$$

**Yqa = 0.976**

| | |
|---|---|
| Diff = Absolute difference between Yqa and Y | |

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

$$Diff = (( 0.986 - 0.976 ) / 0.986 ) * 100$$

**Diff = 1.01**

# Y Factor Calibration Check Calculation

**METHOD 0010 TEST TRAIN PPA CARBON BED OUTLET**
**METER BOX NO. A26**
**RUN NO. 1 7/25/18**

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

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

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

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

**MWd = 28.84**

| | |
|---|---|
| Tma = Source Temperature, absolute($^0$R) | |
| Tm = Average dry gas meter temperature , deg F. | 85.3 |

$$Tma = Ts + 460$$

$$Tma = 85.3 + 460$$

**Tma = 545.33**

| | |
|---|---|
| Ps = Absolute meter pressure, inches Hg. | |
| 13.6 = Specific gravity of mercury. | |
| delta H = Avg pressure drop across the orifice meter during sampling, in H2O | 0.56 |
| Pb = Barometric Pressure, in Hg. | 29.93 |

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

$$Pm = 29.93 + ( 0.5600 / 13.6)$$

**Pm = 29.97**

| | |
|---|---|
| Yqa = dry gas meter calibration check value, dimensionless. | |
| 0.0319 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2. | |
| 29 = dry molecular weight of air, lb/lb-mole. | |
| Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf. | 43.430 |
| Y = Dry gas meter calibration factor (based on full calibration) | 0.986 |
| Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O. | 1.674 |
| avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. $H_2O$ | 0.7460 |
| O = Total sampling time, minutes. | 96 |

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

$$Yqa = ( 96.00 / 43.43 ) * SQRT[ ( 0.0319 * 545.33 * 29 ) / ( 1.67 * 29.97 * 28.84 ) ] * 0.75$$

$$Yqa = 2.210 * SQRT[ 504.488 / 1,446.696] * 0.75$$

**Yqa = 0.974**

| | |
|---|---|
| Diff = Absolute difference between Yqa and Y | |

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

$$Diff = (( 0.986 - 0.974 ) / 0.986 ) * 100$$

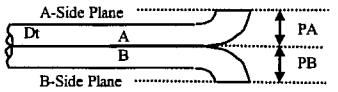
**Diff = 1.22**

# Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-709**

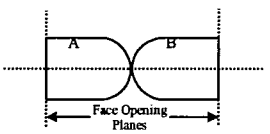
Inspection Date 6/15/18 Individual Conducting Inspection KS

If all Criteria PASS Cp is equal to 0.84

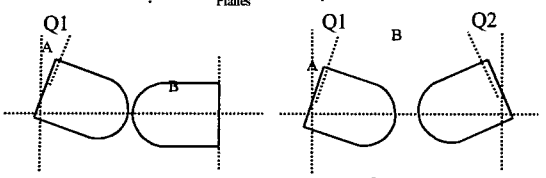



| | | PASS/FAIL |
|---|---|---|
| Distance to A Plane (PA) - inches | 0.443 | PASS |
| Distance to B Plane (PB) - inches | 0.443 | PASS |
| Pitot OD ($D_t$) - inches | 0.375 | |

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

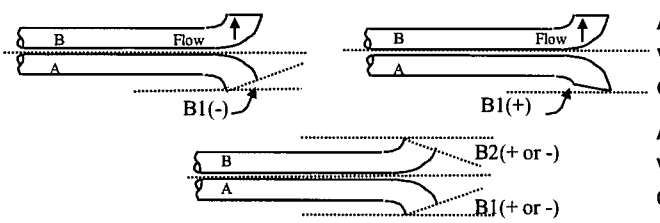



Are Open Faces Aligned Perpendicular to the Tube Axis ◉ YES ○ NO PASS



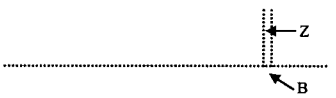

| | | |
|---|---|---|
| Angle of Q1 from vertical A Tube- degrees (absolute) | 0 | PASS |
| Angle of Q2 from vertical B Tube- degrees (absolute) | 0 | PASS |

Q1 and Q2 must be ≤ 10°



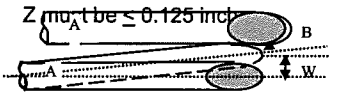

| | | |
|---|---|---|
| Angle of B1 from vertical A Tube- degrees (absolute) | 0 | PASS |
| Angle of B1 from vertical B Tube- degrees (absolute) | 0 | PASS |

B1 or B2 must be ≤ 5°



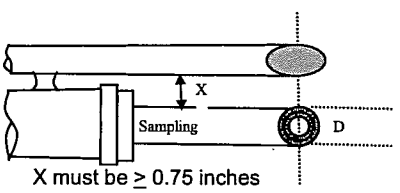

| | | |
|---|---|---|
| Horizontal offset between A and B Tubes (Z) - inches | 0.008 | PASS |

Z must be ≤ 0.125 inch



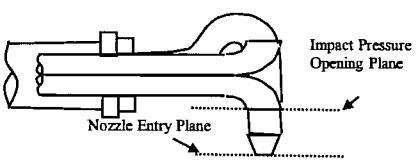

| | | |
|---|---|---|
| Vertical offset between A and B Tubes (W) - inches | 0.024 | PASS |

W must be ≤ 0.03125 inches

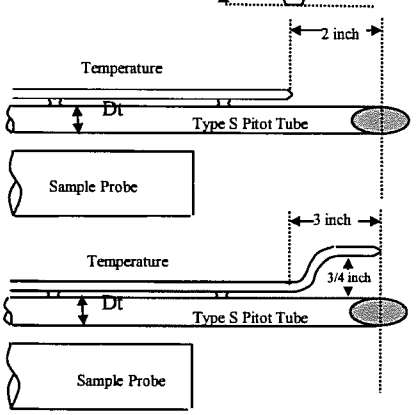



| | | |
|---|---|---|
| Distance between Sample Nozzle and Pitot (X) - inches | 0.86 | PASS |

X must be ≥ 0.75 inches




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




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

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

## METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Integrated Air Services

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DATE: | 5/8/18 | METER SERIAL #: | 14244720 | BAROMETRIC PRESSURE (in Hg): | INITIAL 29.17 | FINAL 29.20 | AVG ($P_{bar}$) 29.19 |
| METER PART #: | AO4 | CRITICAL ORIFICE SET SERIAL #: | 1331s & 1825 | Calibrated by: | ST | | |

| ORIFICE # | RUN # | K' FACTOR (AVG) | TESTED VACUUM (in Hg) | DGM READINGS ($FT^3$) INITIAL | DGM READINGS ($FT^3$) FINAL | DGM READINGS ($FT^3$) NET ($V_m$) | AMBIENT F° | DGM F° INITIAL | DGM F° FINAL | Avg DGM F° $T_m$ | ELAPSED TIME (MIN) θ | DGM ΔH (in $H_2O$) | (1) $V_m$ (STD) | (2) $V_{cr}$ (STD) | (3) Y | (4) $\Delta H_@$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 1 | 0.2313 | 25 | 816.198 | 822.313 | 6.115 | 76 | 76 | 76 | 76 | 20 | 0.28 | 5.881 | 5.833 | 0.992 | 1.783 |
| 12 | 2 | 0.3277 | 23 | 807.956 | 816.196 | 8.240 | 75 | 75 | 76 | 76 | 19 | 0.57 | 7.938 | 7.858 | 0.990 | 1.809 |
| 16 | 3 | 0.4349 | 22 | 822.313 | 830.915 | 8.602 | 78 | 78 | 79 | 79 | 15 | 1.00 | 8.249 | 8.211 | 0.995 | 1.806 |
| 19 | 4 | 0.5142 | 20 | 838.931 | 846.425 | 7.494 | 79 | 80 | 80 | 80 | 11 | 1.50 | 7.176 | 7.112 | 0.991 | 1.941 |
| 24 | 5 | 0.6742 | 17 | 830.915 | 838.931 | 8.016 | 78 | 79 | 80 | 80 | 9 | 2.60 | 7.704 | 7.637 | 0.991 | 1.966 |
| 30 | 6 | 0.8108 | 15 | 846.425 | 852.847 | 6.422 | 80 | 80 | 81 | 81 | 6 | 3.80 | 6.179 | 6.112 | 0.989 | 2.002 |
| | | | | | | | | | | | | | | AVG = | **0.991** | **1.884** |

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

Individual Y's .02 from average? **PASS**

Individual $\Delta H_@$ values 0.15 from average? **PASS**

Average Y value +/-.02 of 1.000? **PASS**

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

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

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

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

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

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

| Next Calibration Due By: | 5/8/2019 |
|---|---|

(4) $\Delta H_@ = \frac{\Delta H\, 0.0319\, T_m\, \theta^2}{P_{bar}\, Y^2\, V_m^2}$

# Y Factor Calibration Check Calculation

**METHOD 0010 TEST TRAIN PPA CARBON BED OUTLET**
**METER BOX NO. AO4**
**RUN NO. 2 7/26/18**

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

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

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

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

**MWd = 28.84**

| | |
|---|---|
| Tma = Source Temperature, absolute($^{o}$R) | |
| Tm = Average dry gas meter temperature , deg F. | 83.8 |

$$Tma = Ts + 460$$

$$Tma = 83.8 + 460$$

**Tma = 543.75**

| | |
|---|---|
| Ps = Absolute meter pressure, inches Hg. | |
| 13.6 = Specific gravity of mercury. | |
| delta H = Avg pressure drop across the orifice meter during sampling, in H2O | 0.63 |
| Pb = Barometric Pressure, in Hg. | 29.85 |

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

$$Pm = 29.85 + ( 0.6333 / 13.6)$$

**Pm = 29.90**

| | |
|---|---|
| Yqa = dry gas meter calibration check value, dimensionless. | |
| 0.0319 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2. | |
| 29 = dry molecular weight of air, lb/lb-mole. | |
| Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf. | 42.835 |
| Y = Dry gas meter calibration factor (based on full calibration) | 0.991 |
| Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O. | 1.884 |
| avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. $H_2O$ | 0.7944 |
| O = Total sampling time, minutes. | 96 |

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

$$Yqa = ( 96.00 / 42.83 ) * SQRT[ ( 0.0319 * 543.75 * 29 ) / ( 1.88 * 29.90 * 28.84 ) ] * 0.79$$

$$Yqa = 2.241 * SQRT[ 503.023 / 1,624.378] * 0.79$$

**Yqa = 0.991**

| | |
|---|---|
| Diff = Absolute difference between Yqa and Y | |

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

$$Diff = (( 0.991 - 0.991 ) / 0.991 ) * 100$$

**Diff = 0**

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

**Calibrator** PM **Meter Box Number** 21 **Ambient Temp** 71

**Date** 12-Feb-18 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

**Dry Gas Meter Number** 17485140

| Baro Press, in Hg ( Pb) | 29.64 |
|---|---|

| Setting | Gas Volume | | Temperatures | | | | | Calibration Results | |
|---|---|---|---|---|---|---|---|---|---|
| Orifice Manometer | Wet Test Meter | Dry gas Meter | Wet Test Meter | Dry Gas Meter | | | | | |
| in $H_2O$ ($\Delta H$) | $ft^3$ (Vw) | $ft^3$ (Vd) | °F (Tw) | Outlet, °F ($Td_o$) | Inlet, °F ($Td_i$) | Average, °F (Td) | Time, min (O) | Y | $\Delta H$ |
| 0.5 | 5.0 | 570.015 | 70.0 | 69.00 | 69.00 | 70.0 | 13.00 | 0.9948 | 1.9159 |
| | | 575.035 | | 71.00 | 71.00 | | | | |
| | | 5.020 | | 70.00 | 70.00 | | | | |
| 1.0 | 5.0 | 575.035 | 70.0 | 71.00 | 71.00 | 71.5 | 9.3 | 0.9910 | 1.9555 |
| | | 580.082 | | 72.00 | 72.00 | | | | |
| | | 5.047 | | 71.50 | 71.50 | | | | |
| 1.5 | 10.0 | 580.082 | 70.0 | 72.00 | 72.00 | 73.0 | 15.6 | 0.9898 | 2.0575 |
| | | 590.205 | | 74.00 | 74.00 | | | | |
| | | 10.123 | | 73.00 | 73.00 | | | | |
| 2.0 | 10.0 | 590.205 | 70.0 | 74.00 | 74.00 | 74.5 | 13.6 | 0.9945 | 2.0792 |
| | | 600.296 | | 75.00 | 75.00 | | | | |
| | | 10.091 | | 74.50 | 74.50 | | | | |
| 3.0 | 10.0 | 600.296 | 70.0 | 75.00 | 75.00 | 75.5 | 11.0 | 0.9873 | 2.0365 |
| | | 610.454 | | 76.00 | 76.00 | | | | |
| | | 10.158 | | 75.50 | 75.50 | | | | |
| | | | | | | | **Average** | **0.9915** | **2.0089** |

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
$\Delta H$ - Pressure differential across orifice
Y - Ratio of accuracy of wet test meter to dry gas meter

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

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

| Reference Temperature | Temperature Reading from Individual Thermocouple Input [1] | | | | | | Average Temperature Reading | Temp Difference [2] (%) |
|---|---|---|---|---|---|---|---|---|
| Select Temperature ○ °C ◉ °F | Channel Number | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | | |
| 32 | 32 | 32 | 32 | 32 | 32 | | 32.0 | 0.0% |
| 212 | 212 | 212 | 212 | 212 | 212 | | 212.0 | 0.0% |
| 932 | 932 | 932 | 932 | 932 | 932 | | 932.0 | 0.0% |
| 1832 | 1830 | 1830 | 1830 | 1830 | 1830 | | 1830.0 | 0.1% |

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

2 - Acceptable Temperature Difference less than 1.5 %

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

# Y Factor Calibration Check Calculation

**METHOD 0010 TEST TRAIN VE NORTH CARBON BED OUTLET**
**METER BOX NO. WC21**
**RUN NO. 1 7/19/18**

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

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

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

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

**MWd = 28.84**

| | |
|---|---|
| Tma = Source Temperature, absolute($^{\circ}$R) | |
| Tm = Average dry gas meter temperature , deg F. | 93.5 |

Tma = Ts + 460

Tma = 93.5 + 460

**Tma = 553.5**

| | |
|---|---|
| Ps = Absolute meter pressure, inches Hg. | |
| 13.6 = Specific gravity of mercury. | |
| delta H = Avg pressure drop across the orifice meter during sampling, in H2O | 1.64 |
| Pb = Barometric Pressure, in Hg. | 30.05 |

Pm = Pb + (delta H / 13.6)

Pm = 30.05 + ( 1.6417 / 13.6)

**Pm = 30.17**

| | |
|---|---|
| Yqa = dry gas meter calibration check value, dimensionless. | |
| 0.0319 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2. | |
| 29 = dry molecular weight of air, lb/lb-mole. | |
| Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf. | 65.982 |
| Y = Dry gas meter calibration factor (based on full calibration) | 0.9915 |
| Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O. | 2.0089 |
| avg SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. $H_2O$ | 1.265 |
| O = Total sampling time, minutes. | 96 |

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

Yqa = ( 96.00 / 65.98 ) * SQRT[ ( 0.0319 * 553.50 * 29 ) / ( 2.01 * 30.17 * 28.84 ) ] * 1.26

Yqa = 1.455 * SQRT[ 512.043 / 1,747.707] * 1.26

**Yqa = 0.996**

| | |
|---|---|
| Diff = Absolute difference between Yqa and Y | |

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

Diff = (( 0.9915 - 0.996 ) / 0.9915 ) * 100

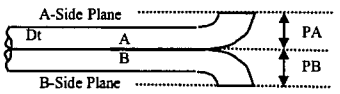
**Diff = 0.45**

# Type S Pitot Tube Inspection Data Form

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

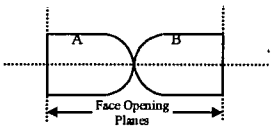
If all Criteria PASS Cp is equal to 0.84

Inspection Date 6/15/18 Individual Conducting Inspection KS

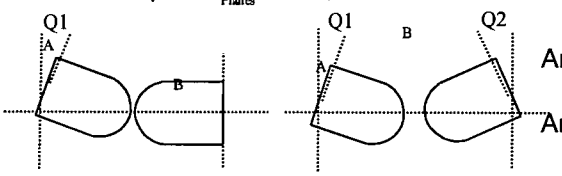



| | | PASS/FAIL |
|---|---|---|
| Distance to A Plane (PA) - inches | 0.44 | PASS |
| Distance to B Plane (PB) - inches | 0.44 | PASS |
| Pitot OD ($D_t$) - inches | 0.375 | |

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

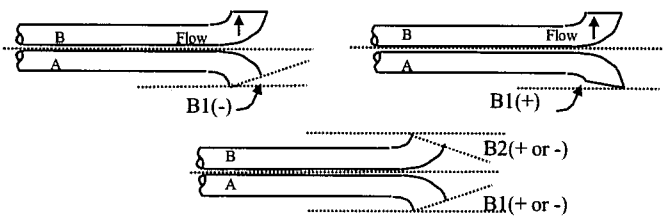



Are Open Faces Aligned Perpendicular to the Tube Axis ◉ YES ○ NO PASS



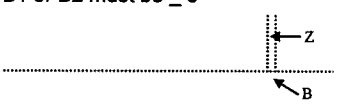

| | | |
|---|---|---|
| Angle of Q1 from vertical A Tube- degrees (absolute) | 0 | PASS |
| Angle of Q2 from vertical B Tube- degrees (absolute) | 0 | PASS |

Q1 and Q2 must be ≤ 10°



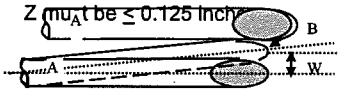

| | | |
|---|---|---|
| Angle of B1 from vertical A Tube- degrees (absolute) | 0 | PASS |
| Angle of B1 from vertical B Tube- degrees (absolute) | 0 | PASS |

B1 or B2 must be ≤ 5°



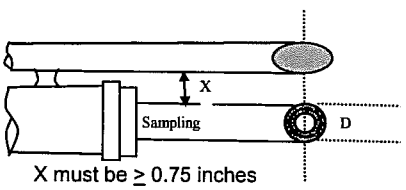

| | | |
|---|---|---|
| Horizontal offset between A and B Tubes (Z) - inches | 0.007 | PASS |

Z must be ≤ 0.125 inch



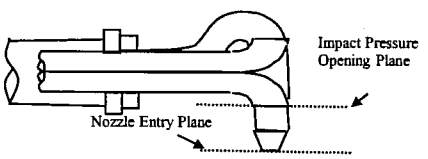

| | | |
|---|---|---|
| Vertical offset between A and B Tubes (W) - inches | 0.018 | PASS |

W must be ≤ 0.03125 inches

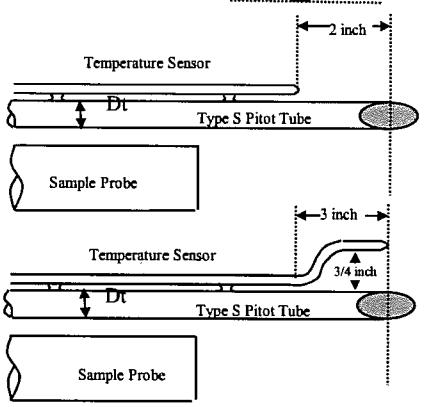



| | | |
|---|---|---|
| Distance between Sample Nozzle and Pitot (X) - inches | 0.86 | PASS |

X must be ≥ 0.75 inches




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




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

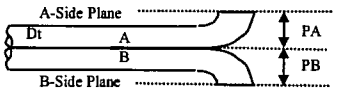
Thermocouple meets the Distance Criteria in the adjacent figure ○ YES ○ NO ◉ NA

# Type S Pitot Tube Inspection Data Form

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

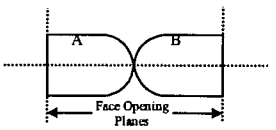
Inspection Date 5/30/18 Individual Conducting Inspection SR

If all Criteria PASS Cp is equal to 0.84

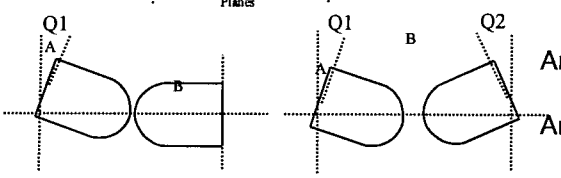



| | | PASS/FAIL |
|---|---|---|
| Distance to A Plane (PA) - inches | 0.458 | PASS |
| Distance to B Plane (PB) - inches | 0.458 | PASS |
| Pitot OD ($D_t$) - inches | 0.375 | |

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



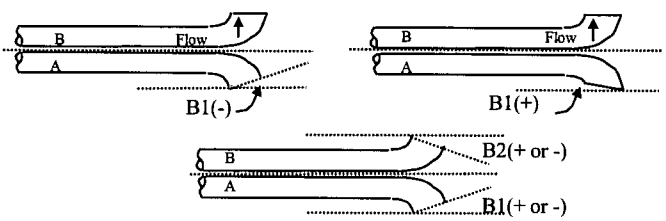

Are Open Faces Aligned Perpendicular to the Tube Axis: ◉ YES ○ NO — PASS




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

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

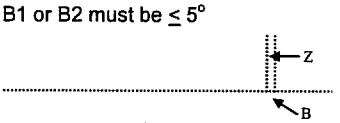
Q1 and Q2 must be ≤ 10°




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

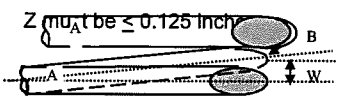
Angle of B1 from vertical B Tube- degrees (absolute) 0 PASS

B1 or B2 must be ≤ 5°



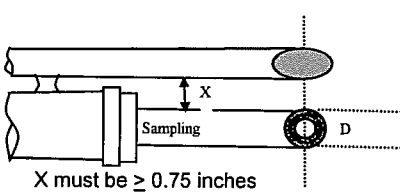

Horizontal offset between A and B Tubes (Z) - inches 0.009 PASS

Z must be ≤ 0.125 inch



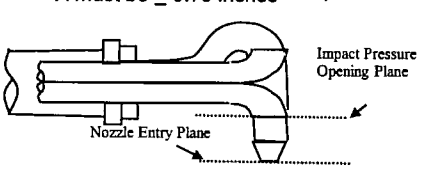

Vertical offset between A and B Tubes (W) - inches 0.026 PASS

W must be ≤ 0.03125 inches

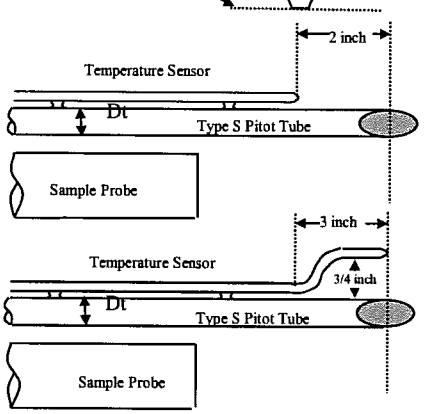



Distance between Sample Nozzle and Pitot (X) - inches 0.87 PASS

X must be ≥ 0.75 inches




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




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

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

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

**Expiration Date: Jul 10, 2025**

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

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

### ANALYTICAL RESULTS

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

### CALIBRATION STANDARDS

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

### ANALYTICAL EQUIPMENT

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

**Triad Data Available Upon Request**

Signature on file
**Approved for Release**

Airgas
an Air Liquide company

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

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

| | | | |
|---|---|---|---|
| Part Number: | E03NI62E15A0224 | Reference Number: | 82-124617628-1A |
| Cylinder Number: | CC72346 | Cylinder Volume: | 157.2 CF |
| Laboratory: | 124 - Riverton (SAP) - NJ | Cylinder Pressure: | 2015 PSIG |
| PGVP Number: | B52017 | Valve Outlet: | 590 |
| Gas Code: | CO2,O2,BALN | Certification Date: | May 15, 2017 |

**Expiration Date: May 15, 2025**

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

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

### ANALYTICAL RESULTS

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

### CALIBRATION STANDARDS

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

### ANALYTICAL EQUIPMENT

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

**Triad Data Available Upon Request**

Signature on file
**Approved for Release**

# APPENDIX F
# LIST OF PROJECT PARTICIPANTS

The following WESTON employees participated in this project.

| | |
|---|---|
| Paul Meeter | Senior Project Manager |
| Jeff O'Neill | Senior Project Manager |
| Steve Rathfon | Team Leader |
| Kyle Schweitzer | Team Member |
| Matt Winkeler | Team Member |
| Jack Mills | Team Member |
| Kris Ansley | Team Member |
| Jacob Little | Team Member |
| Austin Squires | Team Member |
| Steve Dryden | Team Member |
| Robert Scroggins | Team Member |