


Division of Air Quality

March 10, 2020

MEMORANDUM

To: Heather Carter, Fayetteville Regional Supervisor

From: Gary L. Saunders, Stationary Source Compliance Branch 

Subject: The Chemours Company – Fayetteville Works
Fayetteville, Bladen County, North Carolina
Facility ID. No. 0900009, Permit No. 03735T47
Performance Testing for HFPO Dimer Acid (GenX) Conducted at Vinyl Ethers North (VEN), and Polymers Production, and Semi-Works Stacks by Weston Solutions, Inc.
Tracking No. 2019-014ST

Summary of GenX Test Program

Sources Tested

During the week of January 16 – 19, 2019, emissions testing was conducted on three process area stacks. The first series of test runs was conducted on the Division Stack located at the Vinyl Ethers North (VEN) process area. The Division Stack is a common stack through which emissions from VEN Waste Gas Scrubber (WGS) are combined with fugitive emissions collected from the enclosed areas of VEN (sometimes referred to as “room air”). Gases from various reaction vessels and unit operations in the hexafluoropropylene oxide (HFPO) and VEN processes are vented through the WGS, a caustic scrubber which reduces emissions of GenX (HFPO Dimer Acid) and its precursors (HFPO Dimer Acid Fluoride). During the testing, the HFPO process was operating and the VEN process was producing perfluoro-sulfonylethoxy-propyl vinyl ether (PSEPVE).

The second process area tested was the Polymers Area. Two different production sequences were tested over two days. There are no controls associated with this stack.

The third area tested was the Semi-Works area where Dimer Peroxide is typically produced for use as polymerization initiator in the Polymers Area. During this test series it was producing another product designated as EW. There are no controls associated with this stack.

Sampling Method

Testing was conducted using a modified EPA Method 0010 found in the SW-846 compendium of *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*. This sampling train is a variation of the EPA Reference Method 5 found in 40 CFR 60, Appendix A. The Method 0010 train extracts a sample isokinetically from the gas stream, passes the sample through a temperature-controlled filter, through a temperature-controlled condenser and into a series of XAD-2 resin “traps” and impingers to capture and collect the materials that passed through the filter. The test method is designed to capture certain particulate and condensable materials for later recovery and analysis.

After sample recovery, the samples were sent to Chemours' contractor, Test America's laboratory in Denver, Colorado. GenX was extracted from the resin traps. The NC DAQ required split samples after extraction to be submitted for independent analysis. This summary of results only addresses the results provided by Test America for Chemours. Laboratory analysis and quantification was performed using a liquid chromatography column and a dual mass spectrometer (LC/MS/MS).

Test Results

The reported GenX test results reflect corrected emission rates accounting for dilution and spike recovery values.

Vinyl Ethers North Test Results

GenX emissions testing of the VEN Division Waste Gas Scrubber Stack was conducted on January 16 and 17, 2019 while producing PSEPVE. Test Runs 1 and 2 on January 16, 2019, were carried out under normal operation. Test Run 3 began on the morning of January 17, 2019. The individual test runs and the average as reported by Weston is displayed in Table 1 for the stack and Table 2 for VEN carbon bed adsorber.

Each sampling run was 96 minutes in length. The emission rate is the combination of the process gases through the scrubber and the room air emissions because of the current stack configuration. The sample analysis data indicated the sampling train captured most of GenX before the second XAD-2 trap. The per run emission rate and average is displayed in the table below.

Table 1. Summary of Stack Test Results for VEN on January 16-17, 2019

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1	4.70E-03	5.92E-04
	2	4.90E-03	6.17E-04
	3	4.45E-03	5.6E-04
	Average	4.68E-03	5.73 E-03

Table 2. Summary of VEN Carbon Bed Test Results HFPO C3 Dimer Acid, January 16-17, 2019

Runs	Inlet		Outlet		Removal Efficiency
	g/sec	Lb/h	g/sec	Lb/h	%
R1	1.69E-03	1.34E-02	1.27E-04	1.01E-03	92.5
R2	3.03E-03	2.04E-02	1.40E-04	1.11E-03	95.4
R3	2.92E-03	2.32E-02	1.75E-04	1.39E-03	94.0
Average	2.54E-03	2.02E-02	1.47E-04	1.17E-03	93.9

It should be noted that the emissions testing of the carbon bed and the stack showed a significant difference between the gas volume passing through the carbon bed and the gas volume exiting the Division WGS stack. In addition, the emissions at the stack were significantly higher than at the exit of the carbon bed. This indicated that a source of additional gas volume containing additional HFPO C3 dimer acid was likely entering the stack system untreated, causing the apparent emissions to be higher and the apparent removal efficiency to be lower than the inlet/outlet coupled data indicated.

Polymerization Area Test Results

GenX emissions testing of the Polymers Area Stack was conducted on January 17 and January 18, 2019. Each sampling run was 96 minutes in length. The per run emission rate and average for the three runs is displayed in Table 3 below. During the testing, the SR polymer product was being produced and extruded. Unlike previous testing conducted at polymers, the runs constituted an aggregate of various batch and continuous polymerization and production steps associated with the SR polymer production.

Table 3. Summary of Stack Test Results for Polymers Stack on January 17-18, 2019

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1	1.81E-04	2.28E-05
	2	1.51E-04	1.90E-05
	3	1.55E-04	1.95E-05
	Average	1.62E-04	2.04E-05

Since the process cycles are defined by distinct operations and the overall process operation may be determined, the data from this testing may be used to estimate emissions from distinct processing cycles in the Polymers process area.

Semi-Works Process Area

The Semi-Works process area typically produces Dimer Peroxide through a batch process. The product is used as a polymerization initiator in the polymers area and uses the C3 Dimer Acid Fluoride from VEN as part of the feed for Semi-Works. However, during this production cycle it was producing a high

equivalent weight (EW) product through a continuous process. Three test runs were conducted to capture the emissions during the continuous production cycle. Process operations were considered to be normal during the testing. The emission test results are presented in Table 4 below for use in emissions estimates when this high EW product is produced.

Table 4. Summary of Stack Test Results for Semi-Works on March 23, 2018

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1	8.11E-04	1.02E-04
	2	4.30E-04	5.41E-05
	3	2.69E-04	3.39E-05
	Average	5.03E-04	6.34E-05

Summary and Conclusions

NC DAQ staff members were on site during each day that source testing occurred. DAQ staff observed the source test teams, the sample recovery and the process operations. Based upon the onsite observation of the testing and review of the test report, NC DAQ concludes that the testing was conducted in accordance to the modified testing protocol submitted by Chemours and that the analytical results appear representative of the stack conditions and process operations during the testing.

Cc: Central Files – Bladen County
 IBEAM Documents - 0900009