

Division of Air Quality

January 9, 2019

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. 03735T43
Performance Testing for HFPO Dimer Acid (GenX) Conducted on March 19 –
March 23, 2018 at Vinyl Ethers North (VEN), and Polymers Production, and Semi-Works
Stacks by Weston Solutions, Inc.
Tracking No. 2018-085ST

Summary of GenX Test Program

Sources Tested

During the week of March 19 – March 23, 2018, 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). However, there were process issues during Runs 2 and 3 (March 20, 2018). There was a process shutdown of the VEN process that was not communicated to the test team and on-site DAQ personnel at the time of the testing. Hence, only the first run was conducted during normal operation of VEN during the production of the 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 produced for use as polymerization initiator in the Polymers Area. 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. Based upon previous experience with the method it has been modified to accommodate the anticipated concentration of the GenX emissions. A sampling time of 90-minutes per run was set as a way to assure that certain batch cycle characteristics were sampled in each process area while reducing the amount of sample dilution required for subsequent analytical techniques. The test results discussed in this review reflect the 90-minute sampling run time.

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 DAQ required split samples after extraction to be submitted to the DAQ for independent analysis. The split samples were sent to the EPA laboratory in Athens, Georgia. 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 March 19 and 20, 2018 while producing PSEPVE. Test Run 1 on March 19 was carried out under normal operation. Test Run 2 began on the morning of March 20, 2018 with only part of the VEN process running. During Run 2, only part of the process was in operation and that operation experienced a shutdown. The shutdown condition was not communicated during the testing and was discovered after all the testing was completed. Testing also continued through the third run without knowledge of the shutdown. Runs 2 and 3 are not representative of the operation while producing PSEPVE and only Run 1 meets the definition of "normal" production. Although a comparison of a single run to a test average from another test for a different product, the DAQ notes that the HFPO C3 Dimer Acid emission rate for that single run is approximately half of the VEN emission rate during the production of PPVE measured during a previous test (See 2018-083ST). The individual test runs and the average as reported by Weston is displayed in Table 1.

Each sampling run was 90 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 March 19-20, 2018

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1	1.03 E-01	1.30 E-02
	2	2.09 E-02	2.63 E-03
	3	1.24 E-02	1.56 E-03
	Average	4.54 E-02	5.73 E-03

Polymerization Area Test Results

GenX emissions testing of the Polymers Area Stack was conducted on March 21 (Runs 1 and 2) and March 22 (Runs 3 and 4), 2018. Two distinct process operation cycles were tested to determine the nature of the variability between process operations. Each sampling run was 90 minutes in length. The per run emission rate and average for the two runs during each process cycle is displayed in the table below.

Table 2. Summary of Polymers Area Test Results on March 21 –22, 2018

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1-Recycle Still and Polymerization	6.63 E-04	8.35 E-05
	2- Recycle Still and Polymerization	2.90 E-04	3.65 E-05
	Recycle Still and Polymerization Average	4.77E-04	6.00 E-05
	3-Polymerization and Line 4 Extrusion	4.93 E-04	6.21 E-05
	4- Polymerization and Line 4 Extrusion	5.21 E-04	6.56 E-05
	Polymerization and Line 4 Extrusion Average	5.07 E-04	6.38 E-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 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. Three test runs were conducted to capture the emissions during three batch cycles. Process operations were considered to be normal during the testing. The emission test results are presented in Table 3 below.

Table 3. 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	7.32 E-04	9.22 E-05
	2	9.60 E-04	1.21 E-04
	3	2.96 E-03	3.72 E-04
	Average	1.55 E-03	1.95 E-04

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. The test methodology is still under review for accuracy and appropriateness at all Chemours sources. 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. As noted above, the testing of VEN does not represent the emissions profile for the production of PSEPVE as only Run 1 represented normal operation.

Cc: Central Files – Bladen County
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