


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 February 26 –
March 2, 2018 at Vinyl Ethers South (VES) and Polymer Processing Aid (PPA) Stacks by
Weston Solutions, Inc.
Tracking No. 2018-084ST

Summary of GenX Test Program

Sources Tested

During the week of February 26 – March 2, 2018, emissions testing was conducted on two process area stacks. The first series of test runs were conducted on the Vinyl Ethers Scrubber Stack located at the Vinyl Ethers South (VES) process area. The VES Stack is a common stack through which emissions from VES Scrubber are combined with fugitive emissions collected from the enclosed areas of VES (sometimes referred to as “room air”). Gases from various reaction vessels and unit operations in the VES process area are vented through the caustic scrubber which reduces emissions of GenX (HFPO Dimer Acid) and its precursors (HFPO Dimer Acid Fluoride). Although the VES can produce perfluoropropyl vinyl ether (PPVE), the VES area will be used to produce perfluoromethyl vinyl ether (PMVE) and perfluoroethyl vinyl ether (PEVE) for the remainder of calendar year 2018. During the testing, the HFPO process was operating and the VES process was producing PMVE and PEVE.

The second process area tested was the Polymer Processing Aid (PPA) area. HFPO Dimer Acid Fluoride (HFPO DAF) produced in the VEN process is used to produce HFPO dimer acid (also known as GenX). There are a number of products that may be produced at PPA depending upon the raw materials and the final product needs. Process gases pass through the PPA scrubber which is a pH controlled packed bed scrubber. Fugitive emissions from enclosed areas of the PPA process (i.e., room air) are also vented through the PPA stack though, similar to the VES scrubber stack, it does not pass through the scrubber.

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 South Test Results

GenX emissions testing of the VES scrubber was conducted on February 26 and 27, 2018 while producing PMVE and PEVE. Test Run 1 on February 26 was classified as aborted due to sampling (leak check) issues and the process shutting down with eight minutes remaining in the test run. The sample from this run was processed for GenX but the Run 1 data is not included in the average emissions from VES. Testing was resumed on February 27, 2018 with two valid test runs. A third test run was planned for VES on March 2, 2018 but was cancelled due to safety considerations associated with high winds in the region of the facility.

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 VES on February 27, 2018

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1	3.94 E-04	4.96 E-05
	2	1.48 E-03	1.87 E-04
	Average	9.37 E-04	1.18 E-04

PPA Area Test Results

Based upon the GenX emissions testing of the PPA Area Stack conducted on January 24 (Runs 1 and 2) and 25 (Run 3), 2018, sampling was conducted on March 1 and 2, 2018 to capture two distinct process cycles during PPA operation to determine the nature of the run-to-run variability observed in the January 2018 testing. 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 PPA Area Test Results on March 1 – 2, 2018

Test Method	Run Number	GenX Emission Rate	
		lb/hr	g/sec
Modified Method 0010	1-Vaporization	2.79 E-02	3.51 E-03
	2-Vaporization	1.87E-02	2.36 E-03
	Vaporization Average	2.33 E-02	2.94 E-03
	1-Hydrolysis	1.31	1.65 E-01
	2-Hydrolysis	1.84	2.31 E-01
	Hydrolysis Average	1.58	1.98 E-01

As shown in Table 2, the reported emissions from the hydrolysis step are higher than the emissions from the vaporization step. This is consistent with the test results from the January 2018 testing at PPA (Test Report 2018-083ST). Since the process cycles are defined and distinct operations during the overall process operation may be determined, the data from this testing may be used to estimate emissions from distinct processing cycles in the PPA process. In addition, this data may be used to evaluate future process operation modifications against this baseline value.

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. The test results at PPA indicate that it may be appropriate to modify emissions estimates of GenX based upon the hours of operation of specific process cycles since the emission rate between vaporization and hydrolysis differ by approximately two orders of magnitude.

Cc: Central Files – Bladen County
IBEAM Documents - 0900009