

Division of Air Quality

January 10, 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 Monomer Conducted on April 3-4, 2018 –
at Vinyl Ethers South (VES) and April 5, 25-26, 2018 at Vinyl Ethers North (VEN) Division
Stacks by Weston Solutions, Inc.
Tracking No. 2018-109ST & 2018-135ST

Summary of HFPO Monomer Test Program

Sources Tested

During April 2018, emissions testing was conducted on two process area stacks. The first series of test runs were conducted on April 3-4, 2018 at 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 HFPO monomer escaping from the process is not expected to be captured by the existing scrubber.

The second process area tested (April 5 and April 25-26, 2018) was 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). The HFPO monomer escaping from the process is not expected to be captured by the existing scrubber.

Sampling Method

Testing was conducted using a modified EPA Method 18. For the test series conducted in early April, six midget impinger were each filled with 20 ml of methanol and set into a dry ice methanol bath to maintain the impinger temperature of approximately -100°F. At this temperature the HFPO would condense to a liquid and be captured in the midget impingers. After sampling is completed and the sample is gradually warmed, the HFPO reacts with the methanol to form methyl trifluoropyruvate (2-MTP). It is this derivative compound from the reaction with methanol that was measured by laboratory analysis and then used to calculate HFPO emission rates. A sampling time of 60-minutes per run was set. The test results discussed in this review reflect the -minute sampling run time. During subsequent testing conducted later in April, the train was modified to eight midget impingers

After sample recovery, the samples were sent to Chemours' contractor, Test America's laboratory in Denver, Colorado. The HFPO derivative was extracted from each impinger and analyzed to determine the total HFPO. 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 HFPO test results reflect corrected emission rates accounting for dilution and spike recovery values.

Vinyl Ethers South Test Results

HFPO emissions testing of the VES scrubber was conducted on April 3-4, 2018 while producing PMVE and PEVE. Three runs were conducted during the test. Each sampling run was 60 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 per run emission rate and average is displayed in the table below. This testing was conducted under 2018-109ST.

Table 1. Summary of Stack Test Results for VES on April 3-4, 2018

Test Method	Run Number	HFPO Emission Rate	
		lb/hr	g/sec
Modified Method 18	1	0.0178	0.0022
	2	0.0245	0.0031
	3	0.0237	0.0030
	Average	0.0220	0.0028

Vinyl Ethers North Area Test Results

HFPO monomer emissions testing of the VEN scrubber was conducted on April 5, 2018 while producing PPVE. Three runs were conducted during the test. Each sampling run was 60 minutes in length. The emission rate is the combination of the process gases through the scrubber from the VEN and HFPO processes and the room air emissions because of the current stack configuration. The per run emission rate and average is displayed in the table below. The emission data was based upon operating conditions designated as "Stripper Column Vent On."

Table 2. Summary of Stack Test Results for VEN on April 5, 2018

Test Method	Run Number	HFPO Emission Rate	
		lb/hr	g/sec
Modified Method 18	1	14.67	1.85
	2	22.97	2.89
	3	18.31	2.31
	Average	18.65	2.35

Subsequent to the testing conducted in early April, addition testing was conducted on the VEN Division Gas Scrubber under different operating scenarios to determine the effect of different process operations (2018-135ST) while producing PPVE. Test were designated as the Stripper Column Vent On and Vent Off. Each test consisted of two runs, each 60 minutes in length using the Modified Method 18 midjet impinger train. Table 3 below summarizes the emissions estimated for the two operating scenarios.

Table 3. Summary VEN Area Test Results on April 25-26, 2018

Test Method	Run Number	HFPO Emission Rate	
		lb/hr	g/sec
Modified Method 18	1-Stripper Column Vent Off	6.30	0.79
	2-Stripper Column Vent Off	3.03	0.38
	Stripper Column Vent Off Average	4.67	0.59
	1-Stripper Column Vent On	8.53	1.07
	2-Stripper Column Vent On	12.36	1.56
	Stripper Column Vent On Average	10.44	1.32

As shown in Table 3, the reported emissions from the VEN stack are higher when the Stripper Column Vent is *ON* compared to the condition when it is *OFF*. 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 VEN 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.

Cc: Central Files – Bladen County
 IBEAM Documents - 0900009