Chemours

Fayetteville Works Meeting with NCDEQ Division of Air Quality

November 7, 2017

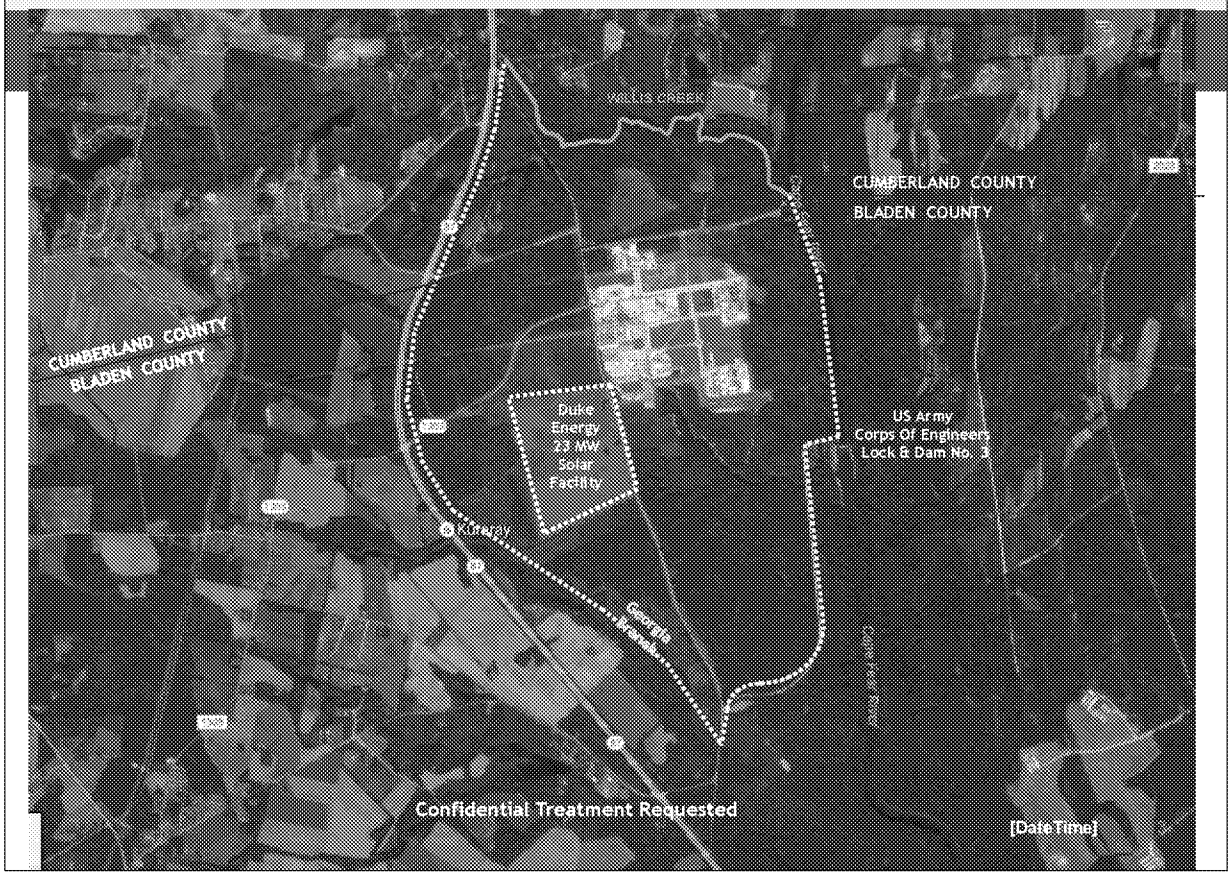
Note time!

Confidential Treatment Requested

Agenda

- Air Emissions Reduction Efforts Already Undertaken
- Process Chemistry
- Emissions Chemistry
- Source Testing
- Air Emissions

CHEMOURS COMPANY – FAYETTEVILLE WORKS



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Air Emissions Reductions Already Undertaken

- Placed demister pad on the Division Stack to increase scrubber efficiency
- Raised pressure of ABR Feed Tank to reduce/eliminate venting
- Increased pressure of DAF ISO to reduce/eliminate venting
- Implemented LDAR program on AF lines that are not regulated to reduced leaks
- Upgraded tubing in Vinyl Ethers to reduce connections
- Replaced tubing with pipe in Vinyl Ethers to reduce potential for leaks
- Implemented process to isolate, investigate and correct when leaks are detected
- Implemented more sensitive helium leak detection program in HFPO
- Added lined pipe and low emission valves to HFP

Process Chemistry

- Discussion of process chemistry and various products/campaigns raw materials, intermediates, and final products.

03-07-06

Fluoromonomers (FPS) / Nafion™ Membrane (IXM) Process Flow

CBI Redacted

03-07-06

Process Streams to be Tested

The following process streams are vented to the Division Waste Gas Scrubber (NCD-Hdrl):

- HFPO Refining
- VEN Crude Ether Process
- VEN Condensation
- Refined VE Process

The following processes are vented to the VE South Waste Gas Scrubber (NCD-Hdr2):

- Refining
- Condensation
- Agitated Bed Reactor

The following processes are vented to the PPA Waste Gas Scrubber (ACD-A1):

- AF Column Reboiler
- Purification
- 902 and 903/905 Processes

(Note that other emissions sources include process stack and fugitive emissions)

Emissions Chemistry

- DAQ Question: Based on the expected chemicals emitted, what occurs in the atmosphere? Convert to other compounds?
  - Acid Fluoride, in general, when exposed to moisture in the atmosphere or sampling train, will be hydrolyzed and converted to the corresponding carboxylic acid
  - Current LC/MS/MS analysis will detect and quantify dimer acid (dimer acid fluoride, dimer acid salt will be converted to dimer acid in the stack sampling train)
  - The above will also apply to most other organic acid fluoride or acid salt

Source Testing for C3 Dimer Acid

- Current Status
  - New sample nozzles and platforms installed on two of the stacks during plant annual shut down to prepare for stack testing – 3rd stack has existing nozzles
  - Draft protocol developed and sent to DAQ on October 31
- Chemours and its consultants have developed analytical methods to sample and test for C3 Dimer Acid
- The sampling and testing are intended to quantify C3 Dimer Acid emissions from the three stacks to the atmosphere
  - Will also include Dimer Acid Fluoride as transformed to C3 Dimer Acid
  - Reasons for initial focus on C3 Dimer Acid include
    - Industrial hygiene method already developed for extracting from air
    - Detections in on-site and off-site groundwater
- The total air flow measured will not differentiate between building exhaust and scrubber exhaust

Source Testing

- Protocol
  - Test locations:
    - Division Waste Gas Scrubber Stack (NEP-Hdr1)
    - VE South Waste Gas Scrubber Stack (NEP-Hdr2)
    - PPA Waste Gas Scrubber Stack (AEP-A1)
  - Method: Modified Method 0010 sampling, LC/MS/MS analysis following sample prep
  - Test Lab: Test America

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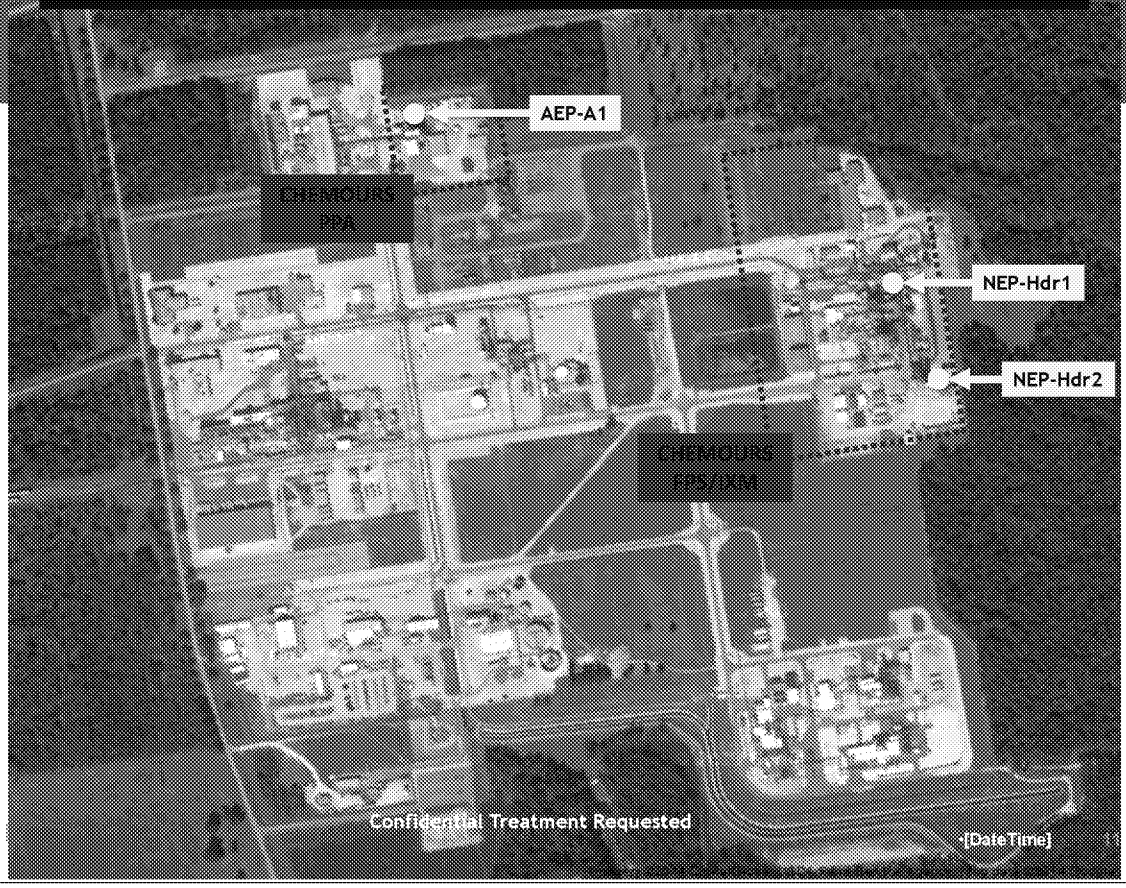
AEP-A1
CHEMOURS
PPA
NEP-Hdr1
NEP-Hdr2
CHEMOURS
EPS/DXM
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Source Testing

- Path Forward
  - Develop final approved protocol with DAQ – November
  - Test America to finish developing procedures for sample extraction and analysis - November
  - Schedule and perform stack tests
    - Shakedown test – limited runs, PPA stack – November/December
    - Actual Stack Tests
      - PPA Waste Gas Scrubber Stack - December or after shakedown data received
      - Division Stack - January 2018 – PPVE campaign ends January 31
      - VE South Waste Gas Scrubber Stack - Next scheduled PPVE campaign will be mid-2018
  - Review results – draft report
  - Final Report

Stack Sampling and Analysis for Other Compounds

- Testing for further compounds would require method development, for which accepted sampling methods do not yet exist
  - Any such methodological development will be coordinated with DAQ and with information being obtained from other media.
  - Any protocol will involve the following participants:
    - Stack Sample Collection – Chemours, Weston and Test America
    - Laboratory Analysis – Test America

Air emissions

- Emissions data
  - Discussion on the compounds that are reported in AEI reports

Emissions Table

CALENDAR YEAR: 2016

FW Compound	Requested Compound	Requested CASRN	Emitted Compound	Emitted CASRN	lb/year	lb/day	lb/hr
TAF 0	$C_3HF_5O_3$	674-13-5	$C_3F_6O_2$	690-43-7	24	0	0
MTFE	$C_4HF_7O_3$	377-73-1	$C_4F_8O_2$	425-38-7	5	0	0
	$C_5HF_9O_3$	863090-89-5	$C_5F_{10}O_2$	863008-50-8	Not believed this was an air emission		
C3 Dimer Acid Fluoride	$C_6HF_{11}O_3$	13252-13-6	$C_6F_{12}O_2$	2062-98-8	591	5	0
C3 Dimer Acid	$C_6HF_{11}O_3$	13252-13-6	$C_6HF_{11}O_3$	13252-13-6	3	0	0
C3 Dimer Acid NH4	$C_6HF_{11}O_3$	13252-13-6	$C_6F_{11}O_3$ NH_4	62037-80-3	2	0	0
	$C_7HF_{13}O_3$	174767-10-3	n/a	n/a	Not believed this was an air emission		
	$C_8HF_{15}O_3$	174767-06-7	$C_8HF_{16}O_2$	38012-77-0	Not believed this was an air emission		
TAF 4	$C_7HF_{13}O_7$	39492-91-6	$C_7F_{14}O_6$	21703-49-1	74	0	0
TAF 3	$C_6HF_{13}O_6$	39492-90-5	$C_6F_{14}O_5$	21703-47-9	269	1	0
TAF 2	$C_5HF_9O_5$	39492-89-2	$C_5F_{10}O_4$	21703-45-7	594	2	0
TAF 1	$C_4HF_7O_4$	39492-88-1	$C_4F_8O_3$	21703-43-5	912	3	0
PSEPVE	$C_7HF_{13}O_5S$	29311-67-9	$C_7HF_{14}O_4S$	16090-14-5	6,096	39	2
Hydro-PSEPVE	$C_7H_2F_{14}O_5S$	749836-20-2	$C_7HF_{15}O_4S$	75549-02-9	0	0	0
E-1	$C_3HF_{11}O$	3330-15-2	$C_3HF_{11}O$	3330-15-2	0	0	0
COF2	CF_2O	353-50-4	CF_2O	353-50-4	3,316	12	1
	CF_2	n/a	n/a	n/a	Not believed this was an air emission		
PFOS	$C_8HF_{17}O_3S$	1763-23-1	n/a	n/a	Not believed this was an air emission		
PFOA	$C_8HF_{15}O_2$	335-67-1	n/a	n/a	Not believed this was an air emission		
MMF	$C_4H_3F_3O_3$	69116-71-8	$C_4H_3F_3O_3$	69116-71-8	29	1	0
PEVE	C_4F_8O	10493-43-3	C_4F_8O	10493-43-3	1,273	66	3
PMVE	C_3F_6O	1187-93-5	C_3F_6O	1187-93-5	14,188	5,481	228
PPVE	$C_5F_{10}O$	1623-05-8	$C_5F_{10}O$	1623-05-8	2,229	36	2
RSU	$C_2F_4O_2S$	677-67-8	$C_2F_4O_2S$	677-67-8	6	0	0
E-2	$C_8HF_{17}O_2$	3330-14-1	$C_8HF_{17}O_2$	3330-14-1	12,141	76	3
EVE	$C_9H_3F_{13}O_4$	63863-43-4	$C_9H_3F_{13}O_4$	63863-43-4	1,579	12	1
HFPO	C_3F_6O	428-59-1	C_3F_6O	428-59-1	45,607	156	7
	$C_6F_{11}O_3K$	67118-55-2	$C_6F_{11}O_3K$	67118-55-2	Not believed this was an air emission		

Conclusion

- Questions
- Next Steps