Chemours™

# Chemours – EPA Meeting: C3 Dimer Acid (GenX) and Other Perfluorinated and Polyfluorinated Alkyl Substances

February 8, 2018

# Chemours' Objectives in Requesting Meeting

- Chemours is:
  - committed to ensuring that its operations are compliant with all federal and state environmental requirements.
  - focused on enhancing its operations to continue to manufacture highly valued products while protecting public health and the environment.
- Chemours requested to meet with EPA across its interested offices to:
  - begin a dialogue of how we can work together to meet mutual objectives in a constructive and transparent manner. We welcome the participation of the states, given their central roles to achieving those objectives.
  - tell you about the proactive actions we have already taken and are planning.

# Agenda

- Background on Chemours
- Background on C3 Dimer Acid
- C3 Dimer Acid Risk Assessment
- Cooperation with EPA on Analytical Chemistry Developments
- Fayetteville Facility, including:
  - Process Wastewater
  - Air
  - Groundwater
- Other U.S. Locations that Use C3 Dimer Acid: Washington Works and Chambers Works

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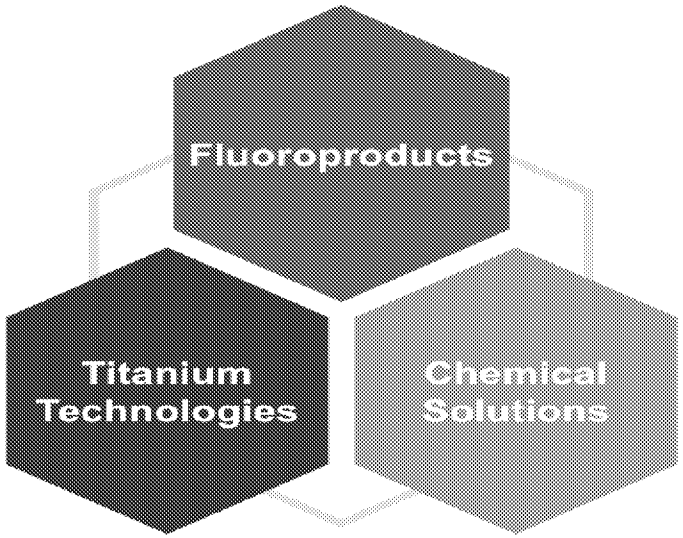
# Who is Chemours?

- Who is Chemours?
  - a new independent publically traded company
  - spun off by DuPont in July 2015
  - operates what had been DuPont's performance chemicals businesses

- Chemours
  - faced very substantial financial challenges during its infancy
  - has emerged as a stronger company dedicated to being an industry leader with a corporate culture built on integrity and good corporate citizenship

- Chemours and its management are committed to environmental stewardship and sustainability as core goals in all aspects of its operations

# Who is Chemours?




CATION
OPMENT

INVESTOR RELATIONS

**TITANIUM TECHNOLOGIES**

Chemours is the world's largest producer of titanium dioxide.

TI-PURE™ ONE COAT SYSTEMS
COATINGS APPLICATIONS
TI-PURE™ SELECT TS-6300
TI-PURE™ SELECT TS-6200
TI-PURE™ R-902+ FOR VERSATILITY
TI-PURE™ R-706 FOR FLEXIBILITY

**FLUOROPRODUCTS**

Chemours is a leading producer of fluoroproducts.

OPTEON™ YF MOBILE REFRIGERANT
OPTEON™ STATIONARY REFRIGERANTS
TEFLON ECOELITE™ FOR FABRICS
TEFLON™ BRAND CONSUMER APPLICATIONS
KRYTOX™ LUBRICANTS
NAFION™ MEMBRANES AND DISPERSIONS
VITON™ FLUOROELASTOMERS

**CHEMICAL SOLUTIONS**

Chemours is a leader in safe, efficient industrial chemicals production.

MINING SOLUTIONS
GLYPURE™ GLYCOLIC ACID
VAZO™ CHEMICAL INITIATORS
METHYLAMINE CHEMICAL INTERMEDIATES
ANILINE INDUSTRIAL CHEMICALS
GLYCLEAN™ FOR SEMICONDUCTORS

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# C3 Dimer Acid Developed as a Substitute for PFOA

- Under EPA's PFOA Stewardship Program, DuPont and seven other companies worked to reduce PFOA use by 2010 and eliminate it by 2015.
- DuPont developed C3 Dimer Acid and its ammonium salt as its PFOA substitute.
    - Extensive health and safety testing conducted on C3 Dimer Acid was favorable, including rapid elimination from mammalian systems.
- In 2008, DuPont submitted a PMN under TSCA to begin commercial manufacture of C3 Dimer Acid at DuPont's Fayetteville Works.
- In 2009, EPA and DuPont entered into a TSCA Section 5(e) Consent Order, which currently applies to Chemours, that contains a range of requirements including:
    - Completing additional studies
    - Recovering/capturing 99% of the substances.

# C3 Dimer Acid/GenX Terminology

- GenX: Commercial name for two chemical substances manufactured by Chemours:
  - HFPO Dimer Acid (CAS # 13252-13-6); also known as C3 Dimer Acid, P-08-508, FRD903, GX903, or C3DA
  - HFPO Dimer Acid Ammonium Salt (CAS # 62037-80-3); also known as ammonium salt of C3 Dimer Acid, P-08-509, FRD902, or GX902
- As a product, it is manufactured in only one location, at the Fayetteville Works.
- It is used for its intended purpose as a polymerization processing aid at the Washington Works and the Chambers Works.
- C3 Dimer Acid also is formed as an unintentional byproduct or impurity from other (vinyl ether) manufacturing operations at the Fayetteville Works.
  - Chemours has been working with EPA to provide information for a revised risk assessment.
  - Chemours has taken extensive measures to address and abate this byproduct or impurity in close coordination with NC DEQ.

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# Setting Health Advisory for C3 Dimer Acid

- Conceptual model for C3 Dimer Acid Health Advisory (sources-exposure route-receptors-endpoints)
- What are the most appropriate available data to identify key adverse effects and set point of departure (POD) to derive health advisory?
- Other issues

# North Carolina Risk Assessment to Date

- **Original NC Provisional Health Goal based on full 2-Year Chronic Toxicity/Carcinogenicity Study** (OECD 453, Rae *et al.* 2015)
  - Liver effects and equivocal tumors
  - NOAEL = 1.0 mg/kg/day
- **Revised NC Provisional Health Goal based on 28-Day Oral Subchronic Toxicity Study** (OECD 407)
  - Liver effects (single cell necrosis of hepatocytes and increased liver enzymes)
  - NOAEL = 0.1 mg/kg/day (intermediate dose was 3.0 mg/kg/day)
  - Note that these ***effects were not observed*** at 0.1 or 1.0 mg/kg/day dose in the 2-year chronic study
  - 10-fold decrease in NOAEL and 10-fold UF for subchronic-to-chronic, results in 100-fold decrease in health goal, when chronic study is already available to set health goal

# Issues for Discussion

- ***Choice of Study*** -- Using a 28-day subchronic study for point of departure (POD) rather than the full 2-year chronic study (with the same toxicity endpoints)

- ***Point of Departure*** -- PPARα-dependent effects found in rodents not relevant to humans

# Point of Departure (POD) should not be based on *PPARα-dependent* effects

- Peroxisome proliferator-activated receptor alpha (***PPARα***)
- Overwhelming evidence (from EPA and others) that ***PPARα-dependent*** effects are not relevant to humans due to established differences between humans and rodents regarding ***PPARα***
  - Lai DY. 2004. Rodent Carcinogenicity of Peroxisome Proliferators and Issues on Human Relevance. Journal of Environmental Science and Health, Part C, 22:37-552004
  - Corton C, Peters JM, Klauning JE. 2017. The PPARα dependent rodent liver tumor response is not relevant to humans: addressing misconceptions. Archives of Toxicology.
- Both the 28-day subchronic and 2-year chronic study reported ***PPARα-dependent*** effects

# Issues for Discussion

- ***Choice of Study*** -- Using a 28-day subchronic study for point of departure (POD) rather than the full 2-year chronic study (with the same toxicity endpoints)
- ***Point of Departure*** -- PPARα-dependent effects found in rodents not relevant to humans
- ***Source attribution*** -- Source and exposure pathway is dominated by drinking water
- ***Bioaccumulation*** -- High water solubility and lack of bioaccumulation from water, sediment or soil
- ***Biological half life*** -- Very short in animals and extremely low to no detectable levels in humans
- ***Receptor*** -- Appropriate subpopulation for lifetime exposure
- ***Uncertainty*** -- Which safety factors apply and magnitude

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# Analytical Chemistry Developments

**Late June 2017**

**C3 Dimer Acid Screening Method Established**

**Mid July 2017**

**Created and executed plan to improve analytical capability (~$2.3M investment); corresponding with EPA on methodology**

**Late August 2017**

**Continued stream-by-stream analysis; installation of instrumentation at 3 sites**

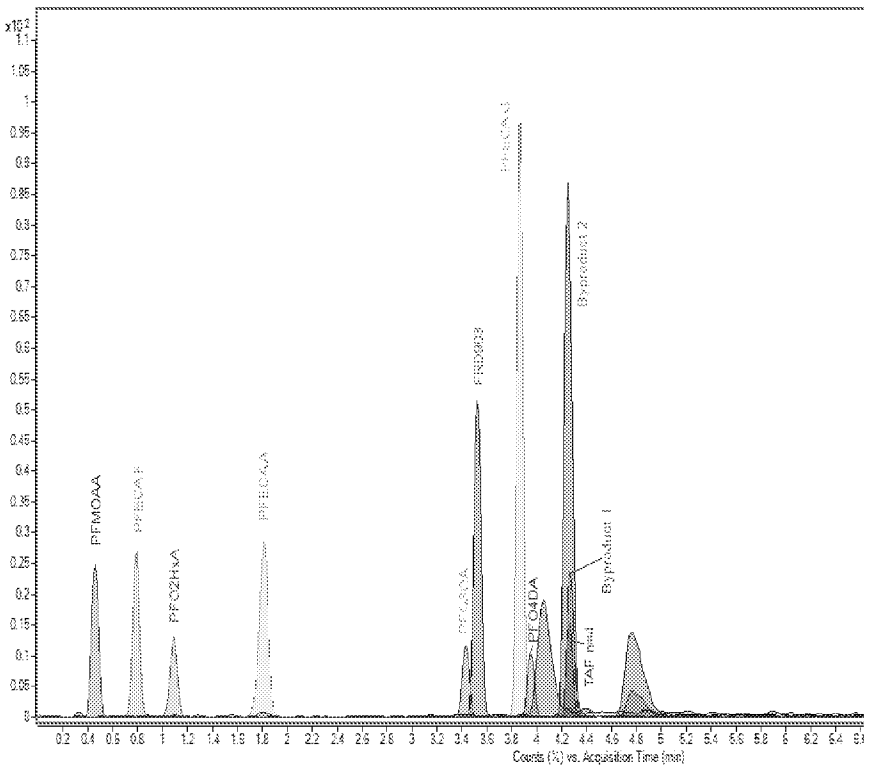
**Early 2018**

**Developing methodology* to quantitate PFAS in aqueous streams and rapidly deploying to sites / sharing methodology and authentic standards with EPA**

***3 FTE in leveraged analytical supporting; 10 total involved**

# Analytical Chemistry Developments

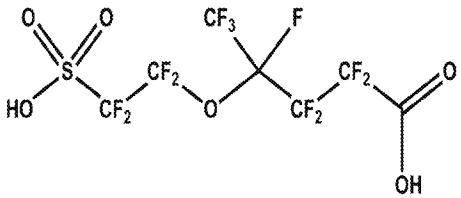
- Developed method to accurately quantify 10 site-specific PFAS (in addition to C3 Dimer Acid)
- 7 compounds were synthesized or purified by Chemours chemists to support method optimization and quantitation
- 2 compounds (Byproducts 1 and 2) were shared with EPA in November 2017
  - Important to optimize method conditions specific to each compound using authentic standards
  - Lack of a relevant standard could result in over- or under-estimation




- **ppt level quantitation**
- **compound specific optimization**

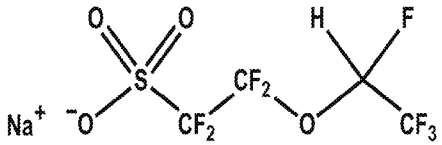
# Analytical Chemistry Developments

- December 2017 - Chemours discovered two additional PFAS. A quantitative method was quickly developed. EPA and NC DEQ were notified, and Chemours has offered to share the authentic standard (Byproduct 4).




**Byproduct 4**

- January 2018 - Following discussion with Dr. Strynar, Chemours identified another PFAS in certain waste streams (NVHOS) and rapidly developed a method for quantifying. Again, Chemours has offered to share the authentic standard.




**NVHOS**

- January 2018 - Chemours began work to qualify external lab for analysis of additional compounds.

- **Future coordination** – options for continued collaboration with EPA to further develop analytical capabilities in this space.

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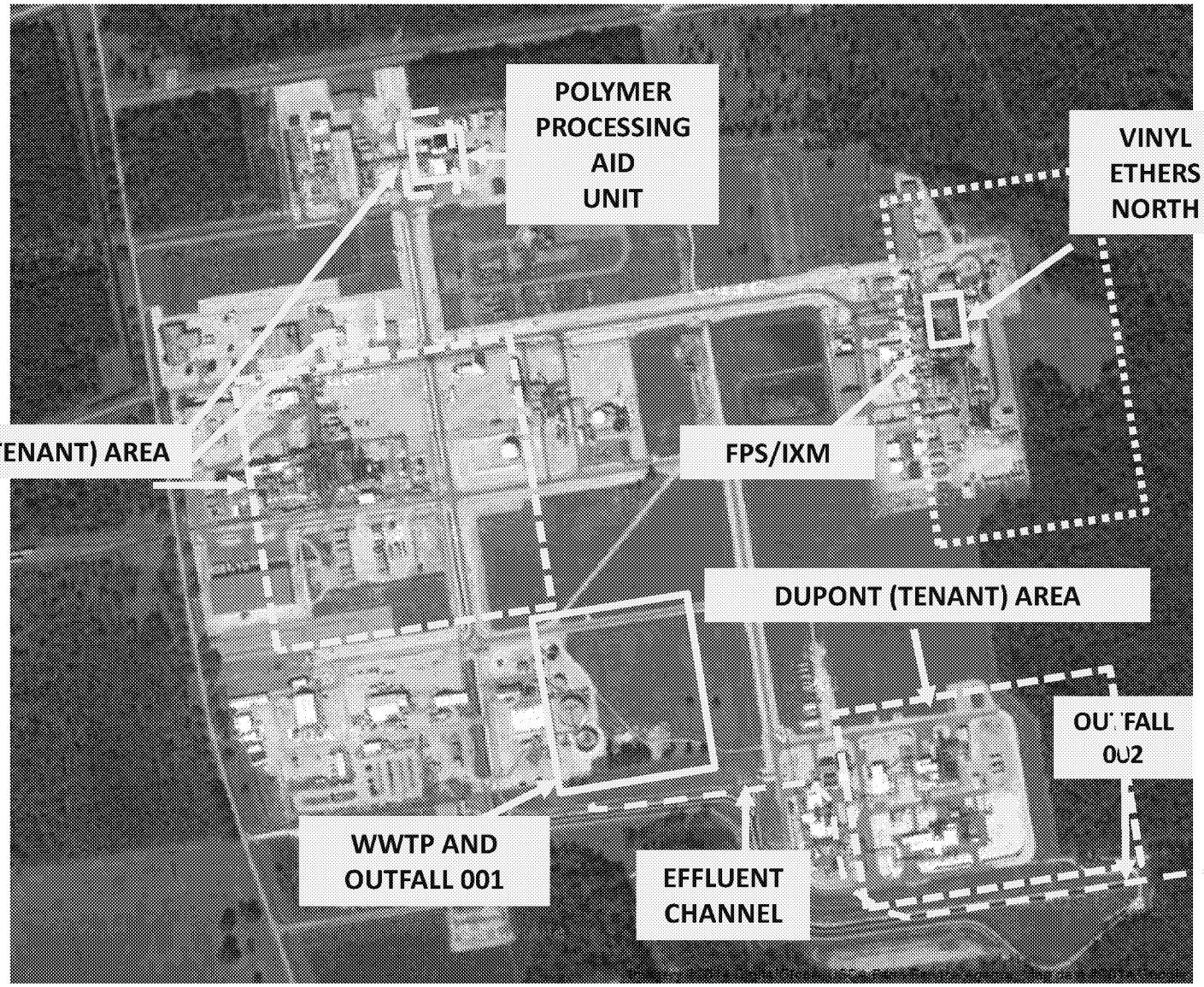
# Overview of Fayetteville, Washington and Chambers Works

- What is manufactured at each facility? How are the processes and chemistries similar? How are they different?
  - **Chemours-Fayetteville Works** manufactures:
    - Nafion® membranes, which are used in:
      - Chloralkali production, various medical devices such as oxygen-humidifiers for newborns, fuel cells and other energy-storage devices.
    - Fluoromonomers and other materials used at our other production sites.
- **Chemours-Washington Works** manufactures:
  - Fluoromonomers used to make Teflon™ fluoropolymers
  - Teflon™ fluoropolymer products which are used in a wide-variety of applications including:
    - Nonstick consumer and industrial coatings, semiconductors, wire and cabling.
- **Chemours-Chambers Works** manufactures:
  - Krytox™ high-performance synthetic lubricants for a broad variety of industrial applications
  - Viton™ fluoroelastomers for automotive and aerospace applications
  - Capstone™ repellents and surfactants for coatings, textiles and fire fighting foams.

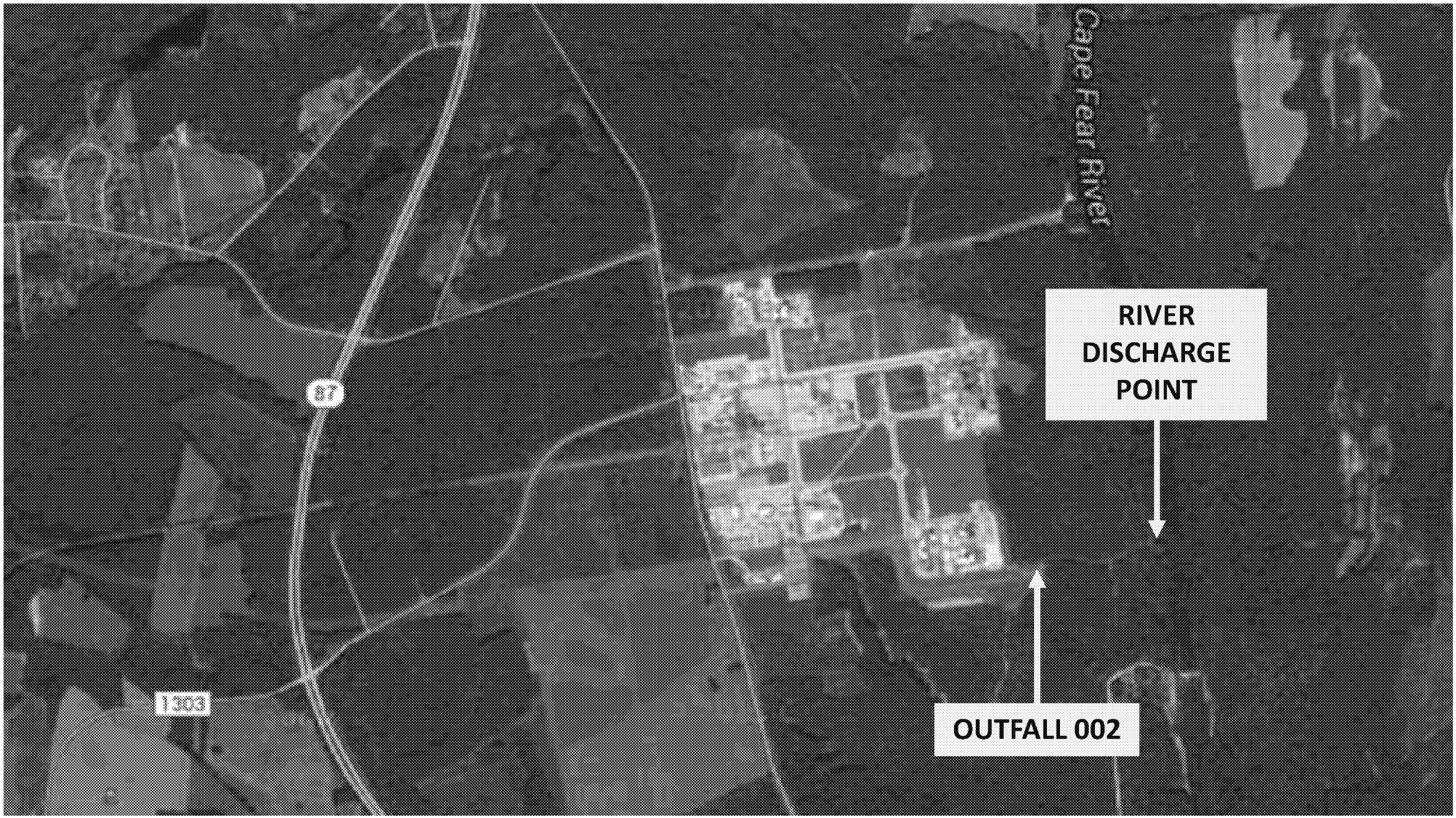
# Fayetteville Works Facility




C3 Dimer Acid is manufactured at the Polymer Processing Aid ("PPA") unit, only.

Process wastewater generated from the PPA unit has always been captured for off-site disposal. There has never been a pipe connection between the PPA unit and Outfall 002 or the Cape Fear River.

# Wastewater Discharge Points

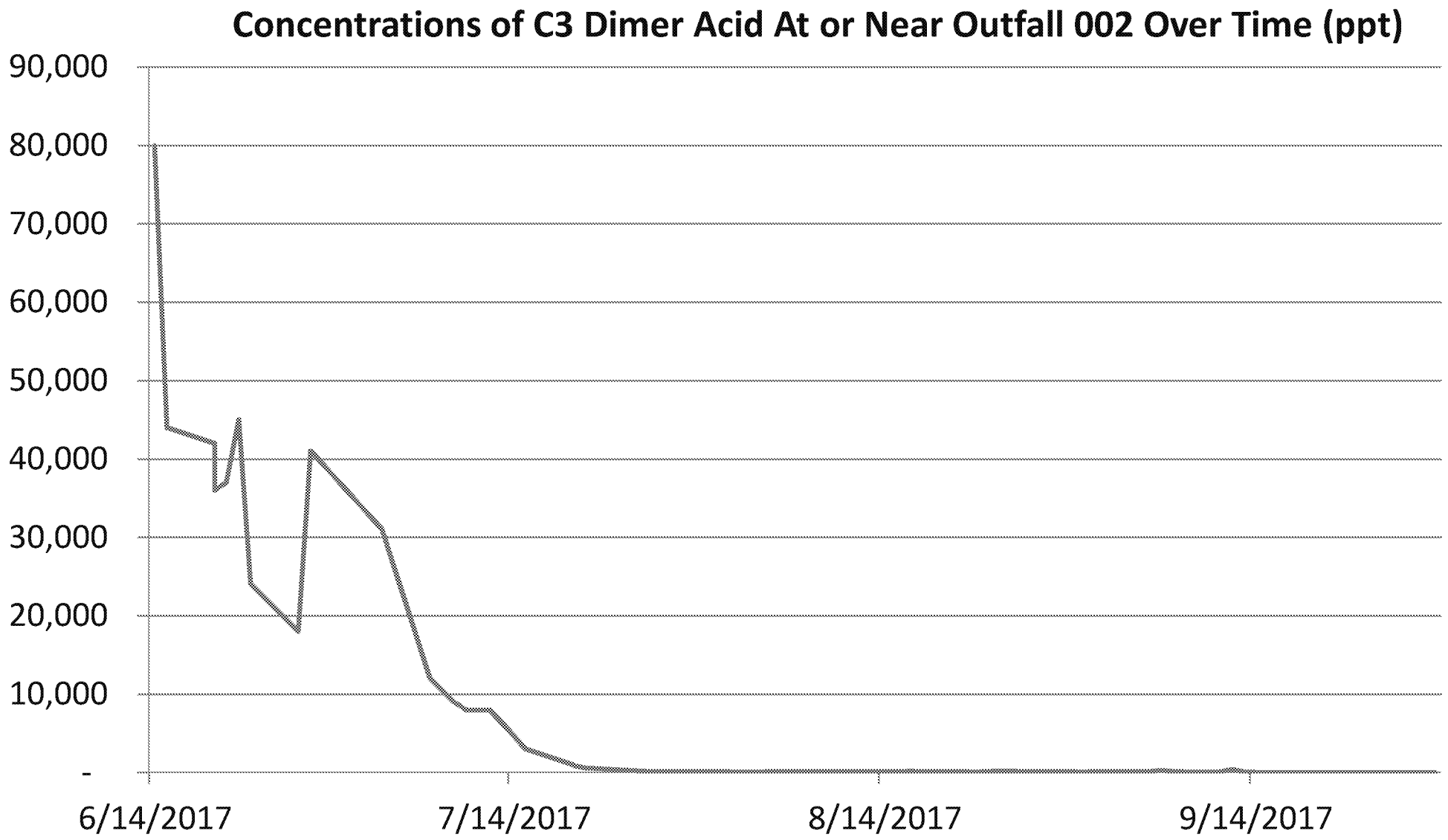


# Wastewater Abatement Measures

# Chemours' Abatement Measures—Process Wastewater

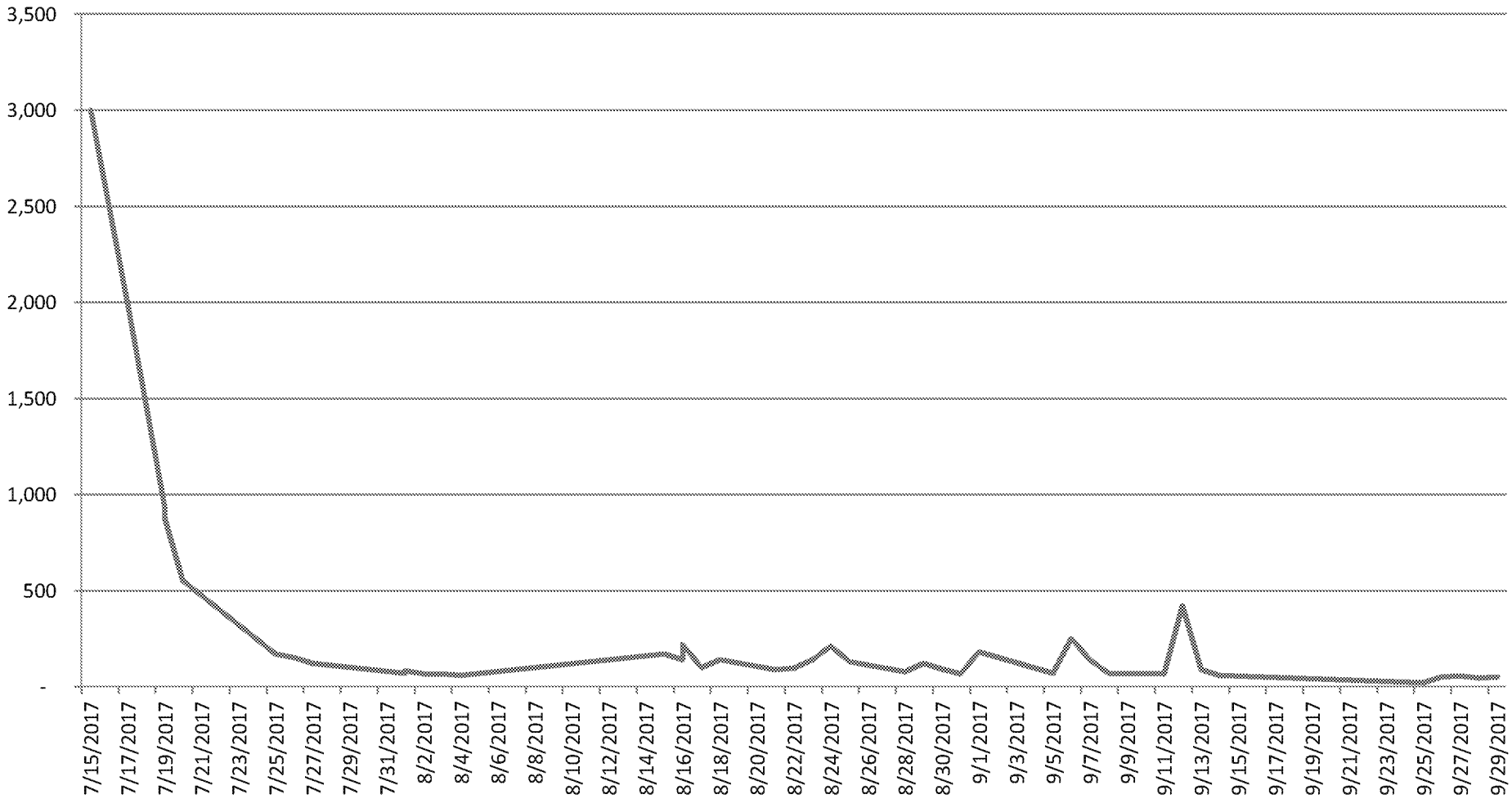
- June 12, 2017: NC DHHS announces a provisional health goal of 71,000 ppt for C3 Dimer Acid.
- June 20: Chemours begins voluntarily capturing for disposal certain scrubber wastewater believed at the time to be the likely source of the C3 Dimer Acid in Outfall 002.
- July 13: In light of continuing levels of C3 Dimer Acid detected at Outfall 002 even after the voluntary capture program, Chemours met with EPA and NC DEQ to explain its commencement of additional, equipment-by-equipment testing, cleaning, and segregation to further reduce C3 Dimer Acid concentrations.
- July 14: NC DHHS issues a revised provisional health goal of 140 ppt.
- July 13 to Nov. 29: Chemours conducts stream-by-stream analysis and removes all additional process streams from being discharged to Outfall 002.
- Nov. 29 to Currently: No Chemours process wastewater sent to Outfall 002. Occasional exceedances of the 140 ppt provisional health goal have been detected at Outfall 002, particularly after rain events, and Chemours is investigating possible sources and abatement options.

# Chemours' Abatement Efforts Reduced C3 Dimer Acid Concentrations by Over 99.9%

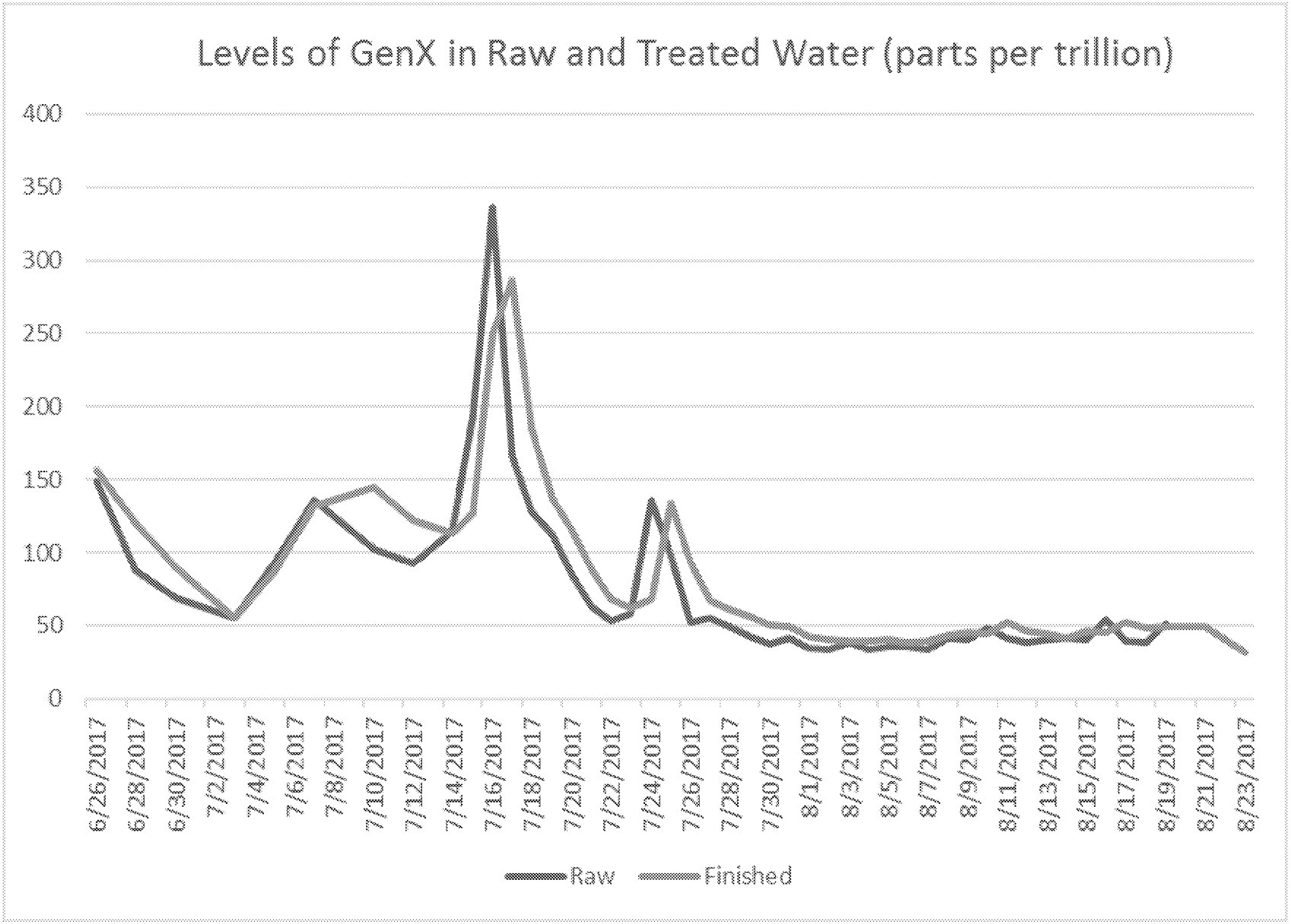


# Impact of Chemours' Stream Segregation After July 13 Meeting with NC DEQ and EPA

- After the July 13 meeting with NC DEQ and EPA, Chemours captured additional streams from the IXM area, which led to further substantial reductions of C3 Dimer Acid levels:



# Downstream Concentrations of C3 Dimer Acid Also Reduced (CFPUA Data)

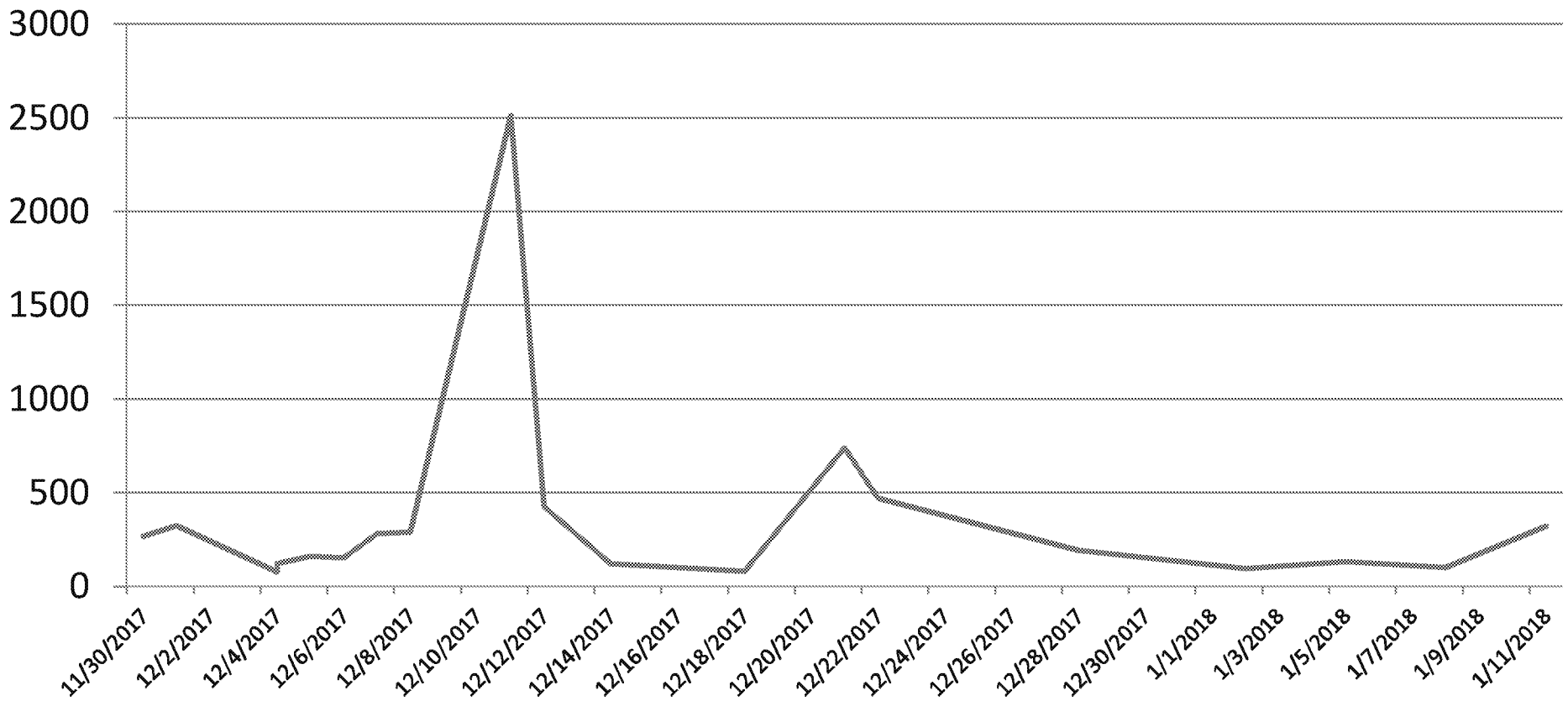



Chemours

Subject to FRE 408 and state law equivalents

# November 30, 2017 to the Present— Chemours Is Investigating Non-Process Water Sources of Remaining Trace Levels

**Concentrations of C3 Dimer At or Near Outfall 002 Over Time (ppt)**




- Possible reasons for occasional low level spikes include: remnants of an October 6th spill event; infiltration of contaminated storm water and groundwater contributed to by air deposition

# Long Term Wastewater Abatement Solution

# Status of Technology Solutions

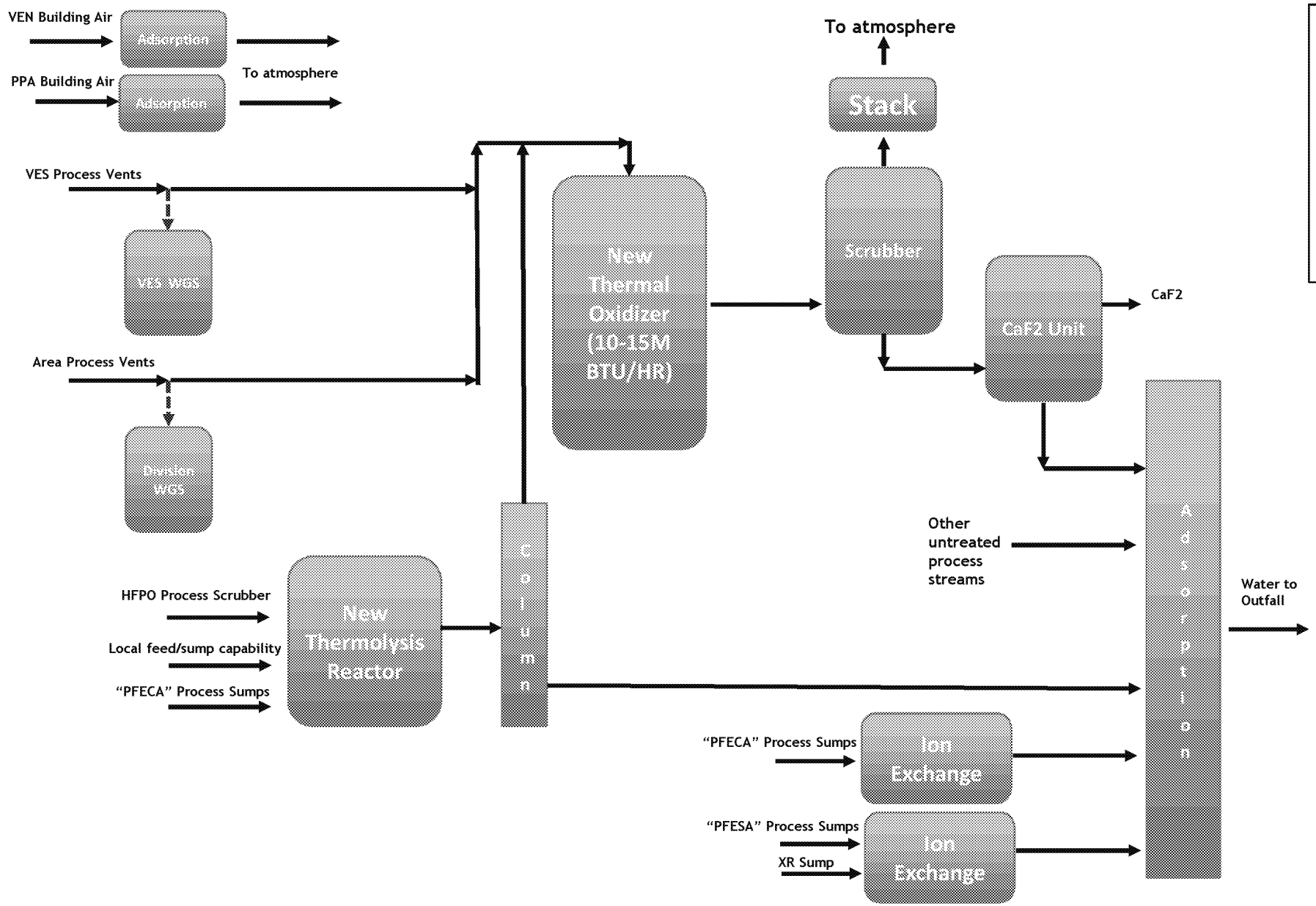
- Present process of capturing all process wastewater for off-site disposal is not a viable long term solution -- costs (up to $3 million a month) are not sustainable.

- Since October 2017, Chemours has been in discussions with NC DEQ regarding Chemours' proposed long term, state of the art technology solutions, including:
  - Their efficacy;
  - The timing of installation;
  - Whether interim measures can be implemented in advance; and
  - How the technology fits into a new NPDES permit.

- Chemours is confident and will commit that, once installed, the combination of these technologies will maintain C3 Dimer Acid levels in discharges at Outfall 002 at or below a 140 PPT monthly average.

- Projected capital costs to Chemours are $50-75 million (operating costs currently unknown).

# Preliminary Technology Schematic




Plan to implement abatement technology for all process streams.

Chemours

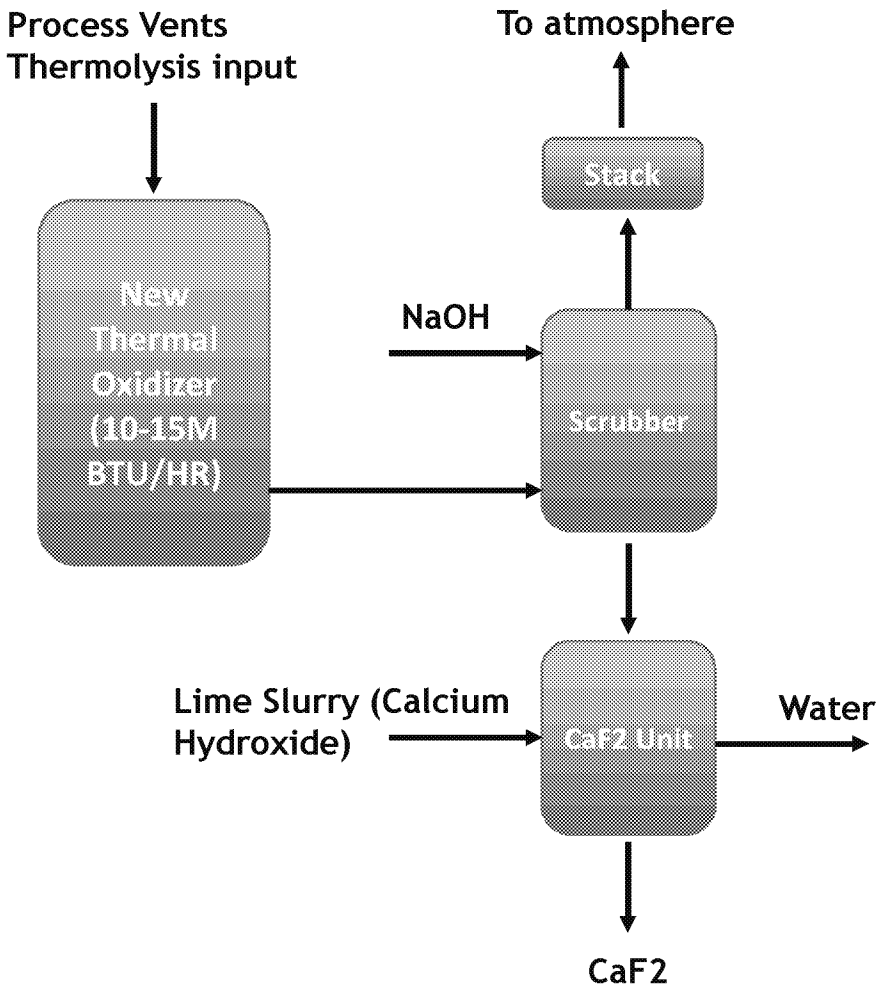
Subject to FRE 408 and state law equivalents

# Thermal Oxidizer

## Thermal Oxidizer

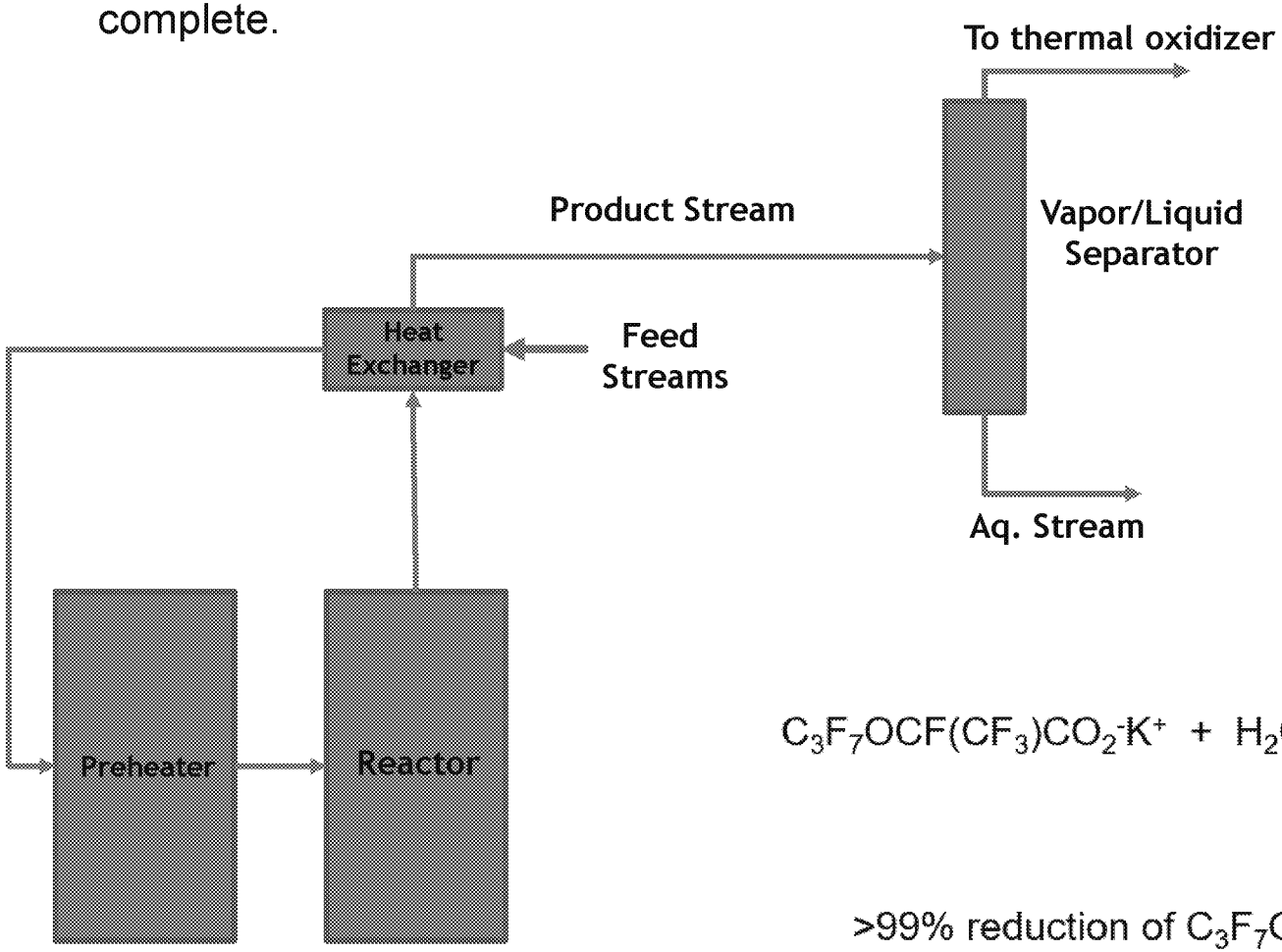
- Inputs are mixed with oxygen at high temperatures to oxidize the C3 Dimer Acid and other constituents with anticipated 99.99% destruction capability.
- Based on proven technology at other facilities.
- Status
  - Preliminary design and specification for the Thermal Oxidizer is complete.
  - Design firm is fully engaged.

- **Timing:** Being discussed with NC DEQ (est. 18 – 24 months once approved).



# Thermolysis

- Heating PFECA's in water at temperatures of 150°C-250°C results in decarboxylation and/or mineralization.
- Have selected design conditions based on research results, and preliminary design is nearly complete.




$$C_3F_7OCF(CF_3)CO_2^-K^+ + H_2O \rightarrow \overbrace{C_3F_7OCHFCF_3}^{\text{To Thermal Oxidizer}} + CO_2 + KOH$$

*b.p. 40°C*

>99% reduction of $C_3F_7OCF(CF_3)CO_2^-K^+$

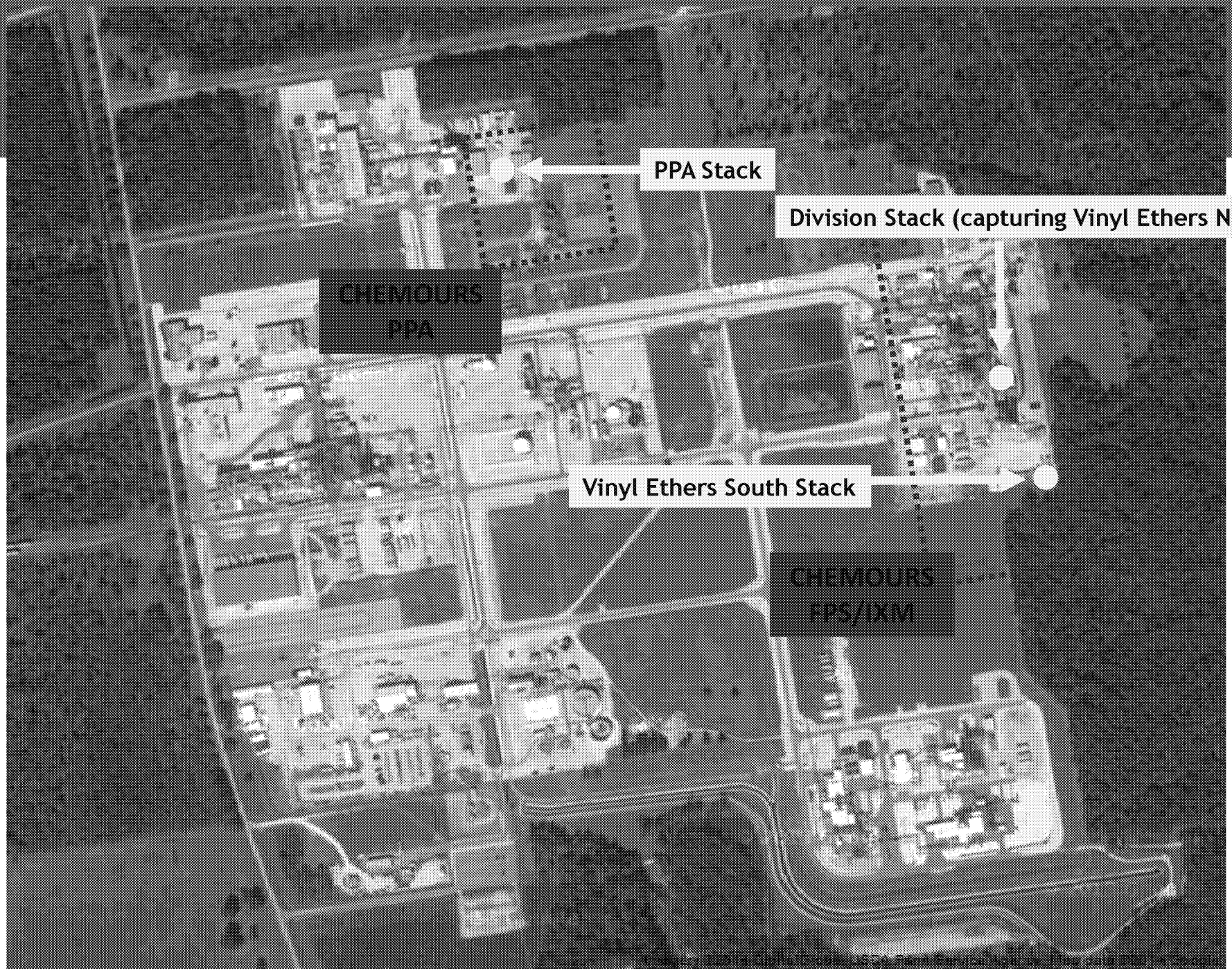
# Ion Exchange and Aqueous Adsorption

- Ion Exchange
  - Would be used to treat PFESA containing process sumps
  - Uses an insoluble anion exchange resin to capture/trap the ionic PFECAs and PFESAs
  - Research to define and quantify effectiveness for PFECAs and PFESAs is in progress
- Aqueous Adsorption
  - Would be used for untreated process wastewater streams, ion exchange water effluent and other streams
  - Uses granular activated carbon to remove soluble substances from water
  - Following a similar research protocol as ion exchange

# Air Emissions

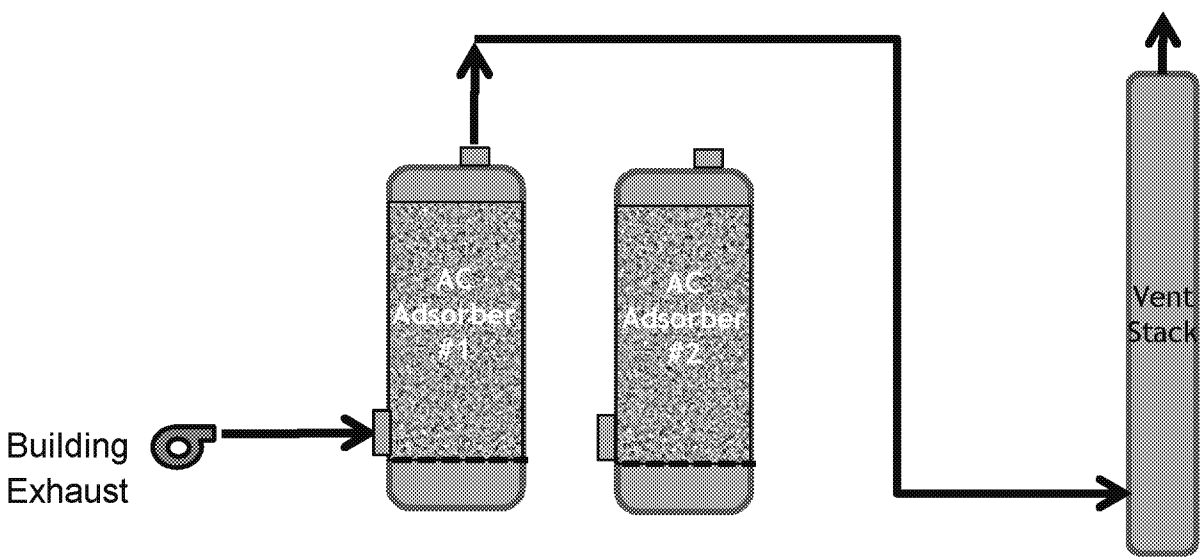
# Summary of Air Emissions Status

- Fayetteville Works **Title V air permit** does not contain limits for C3 Dimer Acid.
  - C3 Dimer Acid is regulated as a VOC, and Dimer Acid Fluoride as a Fluoride.
- Neither DuPont nor Chemours had done **stack testing** for C3 Dimer Acid on the PPA unit; instead utilized a model based on a stack test done in 2006 on PFOA.
- Groundwater levels were detected in upgradient locations, suggesting **air deposition** as a source.
- Chemours performed **stack testing** for C3 Dimer Acid in January 2018 at both the PPA unit and the vinyl ethers units. This required the development of new sampling and extraction protocols.
- At NC DEQ's request, Chemours is also developing stack testing protocols for **other compounds and stacks.**
- Also at NC DEQ's request, Chemours is developing short-term and long-term plans to **abate air emissions** of C3 Dimer Acid and other PFAS.


PPA Stack
Division Stack (capturing Vinyl Ethers North streams)
CHEMOURS PPA
Vinyl Ethers South Stack
CHEMOURS FPS/IXM

# Adsorption

- Dry System Technology – GAC Adsorption
  - Designing systems for VE-North and PPA indoor air emissions control
    - Have found a rental solution that is being confirmed, while also pursuing a long term design
    - Timing: 3-6 months after regulatory approval, which is expected shortly



# Air Emissions Abatement Plan

| Source | Current status | Short-term plan | Long-term plan |
|---|---|---|---|
| PPA unit process emissions | Vented to scrubber; awaiting results of stack test | After receipt of test results, consider possibility of add on GAC system. | After receipt of stack test results, consider appropriate control options. |
| Vinyl Ethers North unit process emissions | Vented to scrubber; awaiting results of stack test | | Control with thermal oxidizer (estimate 99.99%) |
| Indoor air emissions at both PPA and VEN | Uncontrolled; robust LDAR program | Installation (possibly by rental unit) of a GAC adsorption system | Same as short-term plan |
| Outdoor fugitives | Robust LDAR program | Enhanced LDAR program based on third party evaluation | Further enhancements |

# Groundwater

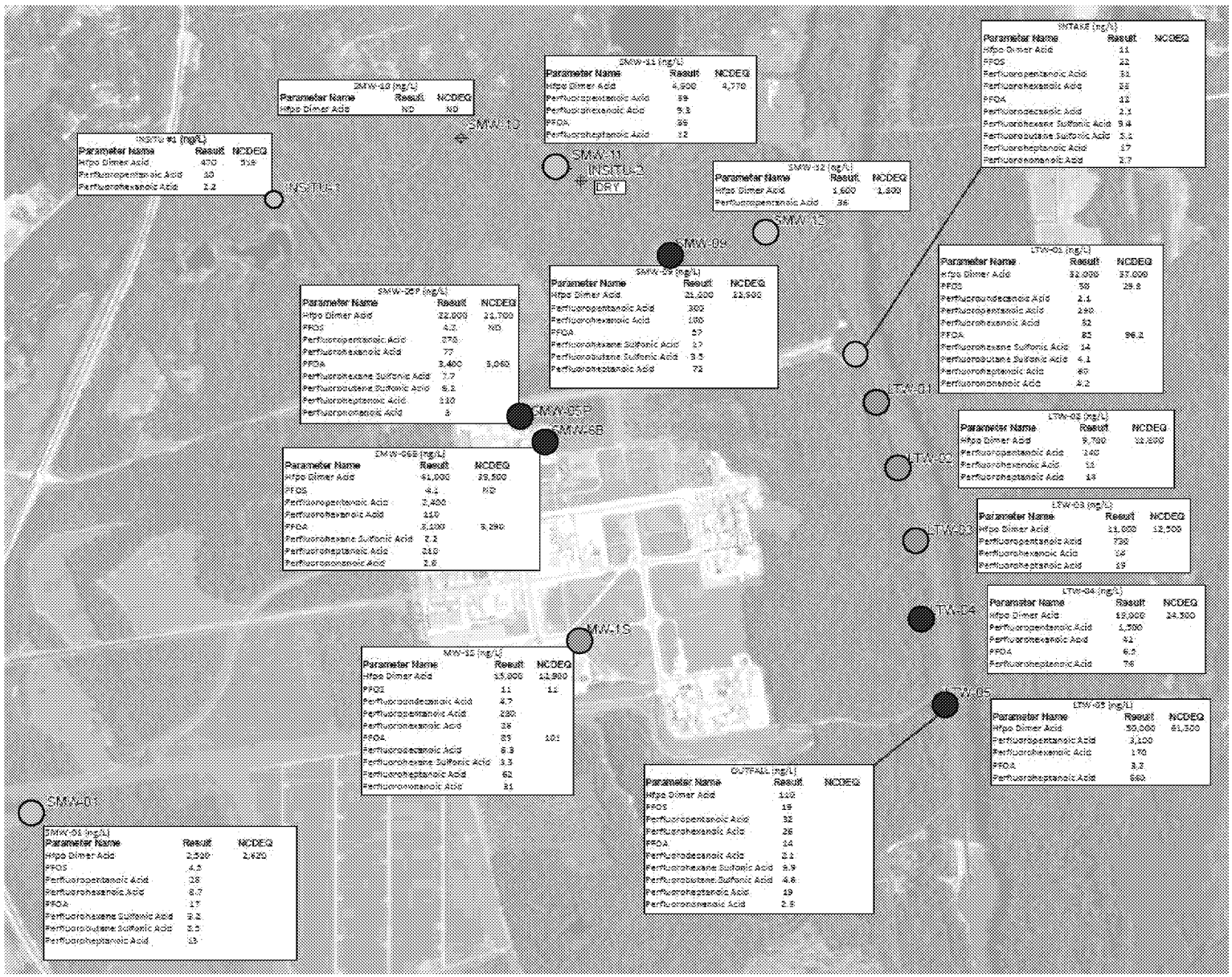
# On-Site Groundwater

- Since 1996, several RCRA investigations undertaken under NC DEQ's oversight.
- June 21, 2017: NC DEQ requested supplementing existing on-site groundwater sampling activities to include C3 Dimer Acid.
- Sept. 6: NC DEQ issued a NOV
  - on-site groundwater sampling of C3 Dimer Acid above practical quantification limit of 10 ppt (as high as 61ppb)
- Oct. 31: Chemours submitted additional on-site soil and groundwater sampling plan, including analyzing 97 groundwater and soil samples for C3 Dimer Acid and 25 other PFAS. Proposed (and current) schedule:
  - January 31, 2018: Submit data evaluation and technical memorandum (submitted)
  - February 28, 2018: Submit feasibility study of technical remedial options
  - March 31, 2018: Submit remedial plan (with timetable for completion)

# On-Site Groundwater Data

**Legend - C3 Dimer Acid Concentration**

- >20,000 ppt
- >10,000 ppt
- >1,000 ppt
- >10 ppt




Chemours

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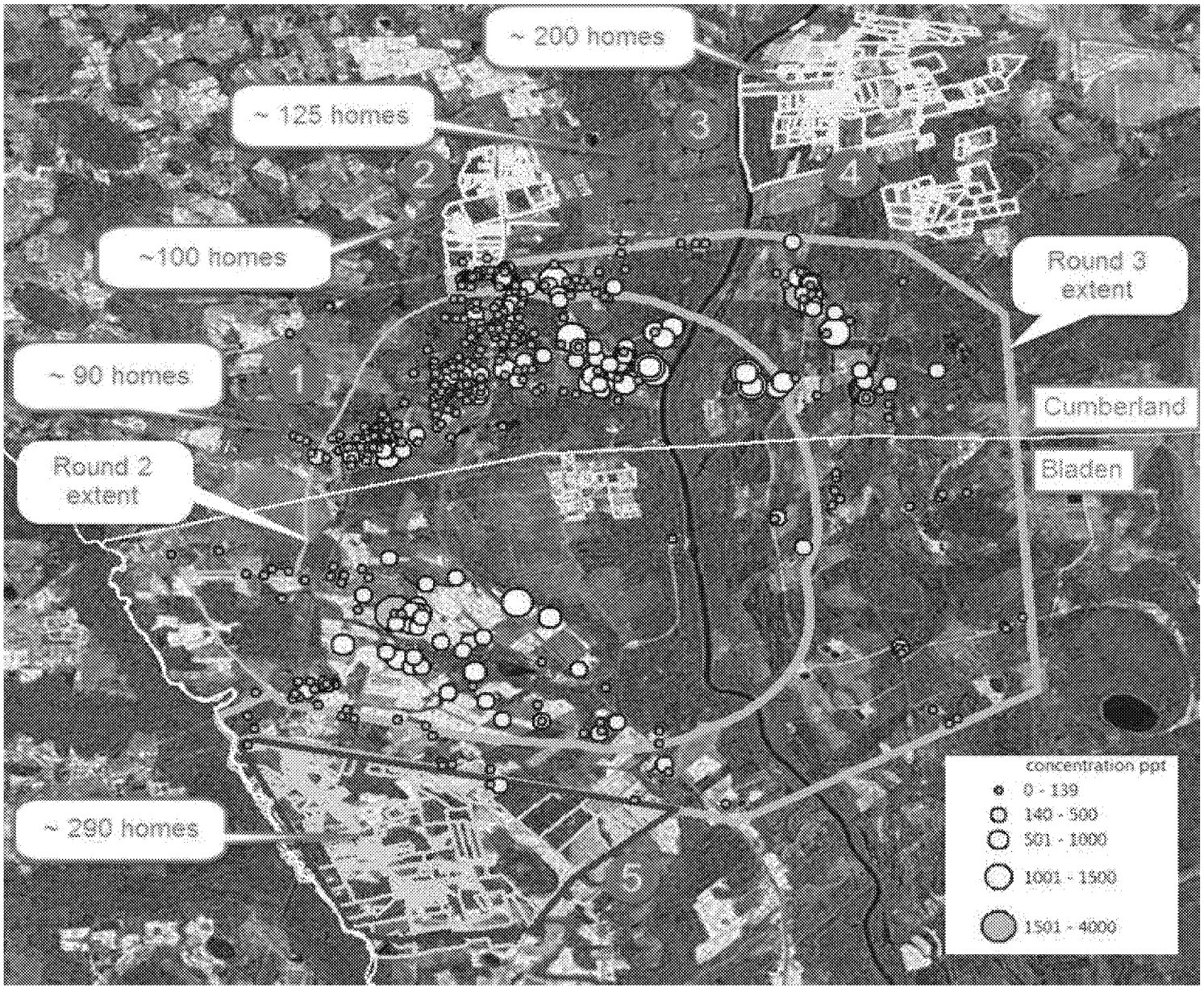
# Off-Site Groundwater

- September 2017: Chemours began sampling off-site residential groundwater wells within a 1-mile radius of the facility.
- Chemours, in consultation with NC DEQ:
  - Expanded the scope of sampling in four phases;
  - Offered free bottled water to residents awaiting test results or whose results are above 140 ppt;
  - Conducted extensive testing that confirm that granulated activated carbon ("GAC") units will effectively treat C3 Dimer Acid and other PFAS detected; and
  - Is prepared to offer to install GAC units at residences above 140 ppt, as soon as additional pilot studies requested by NC DEQ are completed to further confirm GAC effectiveness.

# Off-Site Investigation: Current Scope and Results



# Fayetteville Works – EPA Questions

- Spills & Leaks
- Importing of Spent C3 Dimer Acid Ammonium Salt

# Fayetteville Works – Spills & Leaks

- Legal framework
  - No established reportable quantity for C3 Dimer Acid or Dimer Acid Fluoride
  - Reporting of **all** spills and leaks is not required under any applicable permit or regulation.
- Chemours' procedures for internal reporting, responding and evaluating incidents
- Chemours' efforts to reduce frequency of incidents
- The October 6, 2017 incident and its reporting
- Expanded reporting to NC DEQ and remediation of any spills and leaks potentially involving C3 Dimer Acid or Dimer Acid Fluoride

# Importing of Spent C3 Dimer Acid Ammonium Salt

- On February 2, 2018, Chemours responded to EPA's and NC DEQ's questions regarding the reclamation of spent FRD-902 (C3 Dimer Acid ammonium salt) at the Fayetteville Works

- In brief:
  - Spent FRD-902 is RCRA non-hazardous.
  - Spent FRD-902 has been reclaimed at the Fayetteville Works only in the PPA area, from which all process wastewater is sent offsite for incineration.
  - In 2012, DuPont notified EPA of its intention to reclaim at Fayetteville spent FRD-902 generated at Washington Works.
  - In 2014 (and each year thereafter), DuPont (and then Chemours) notified EPA in advance of its intent to import spent FRD-902 from Dordrecht Works to Fayetteville for reclamation. **EPA consented to these imports**.
  - Chemours accounts for the quantities imported for the purposes of TSCA requirements.

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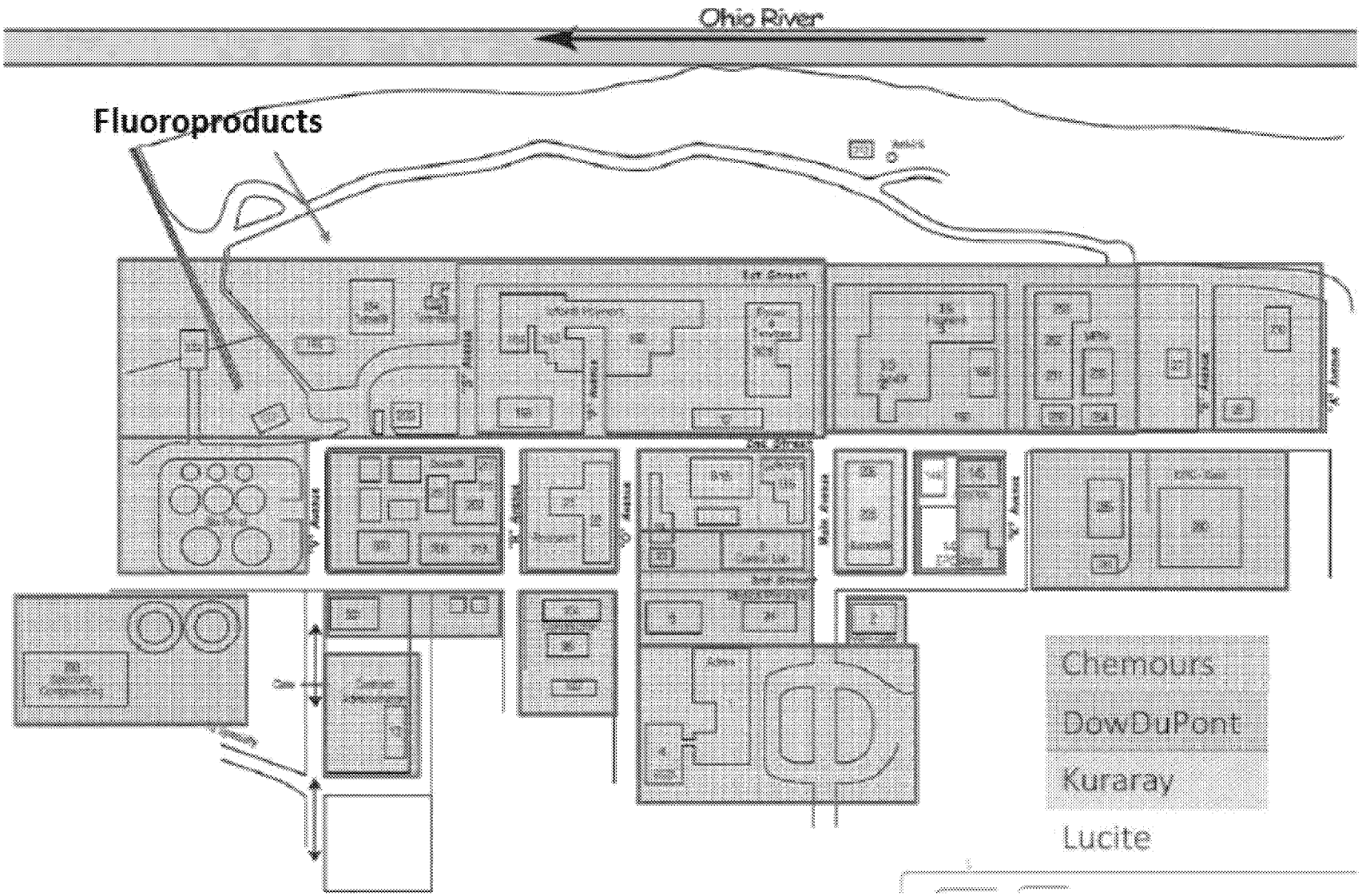
# Washington Works Manufacturing Areas



# Washington Works - Permitting

- WW C3 Dimer Acid use, discharges, and emissions are regulated by:
  - January 26, 2009 EPA TSCA Consent Order for P-08-508 and 509.
  - Wastewater: WV DEP Consent Order, January 31, 2012 – establishes limitations for Outfalls 002 and 005 based on a WV DEP Water Quality value of 17.5 µg/L (ppb) in the receiving stream outside of the mixing zone.
  - Air Emissions: 2016 Title V Operating Permit establishes limit on VOC emissions, and emissions of C3 Dimer Acid are counted under that limit.

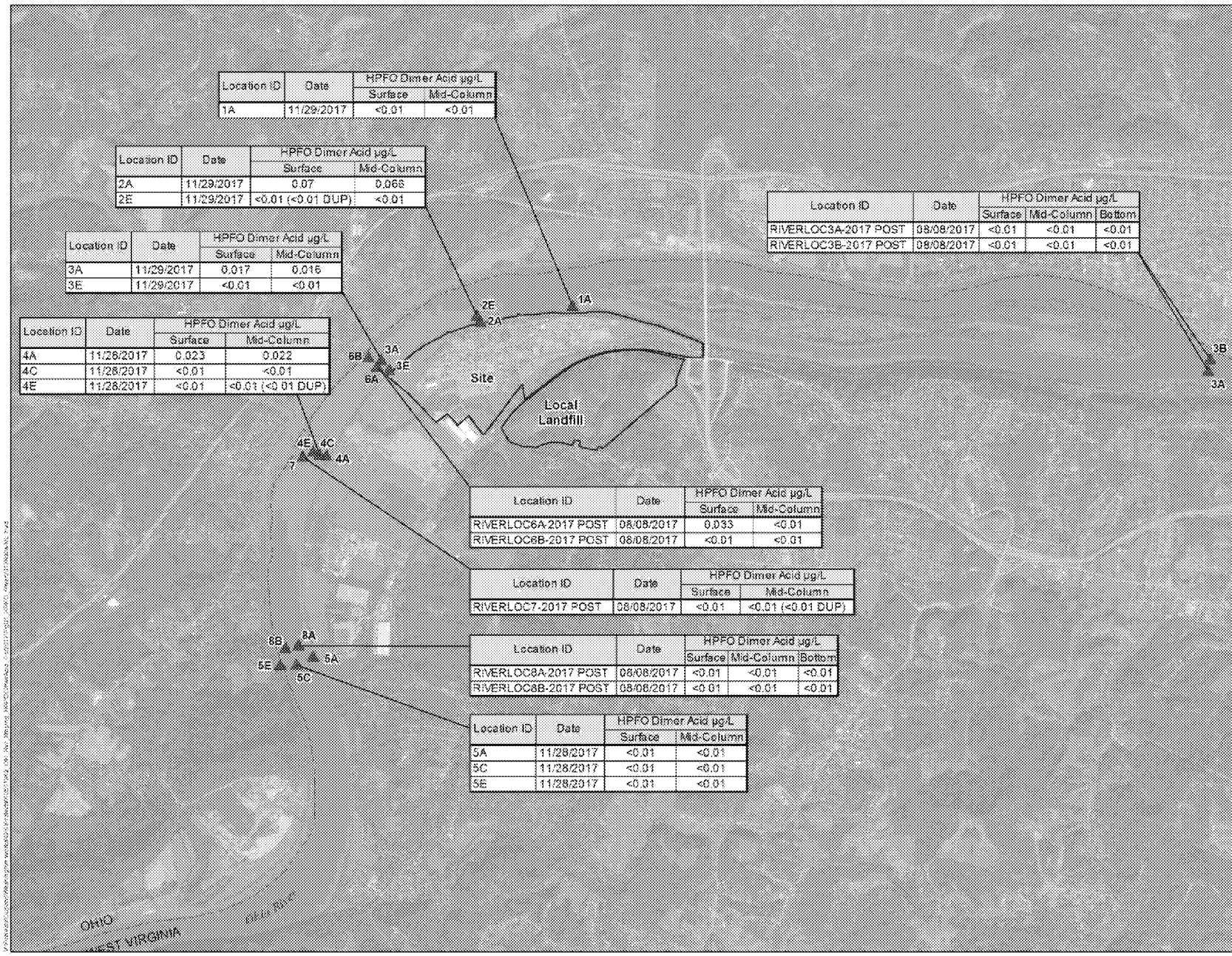
# C3 Dimer Acid Monitoring at Washington Works

- C3 Dimer Acid is analyzed and reported as “HFPO Dimer Acid”
- Outfalls (002 & 005 analyzed weekly under NPDES Permit / Consent Order) since 2013
  - All other outfalls since Aug. 2017
- Production Wells: Aug. 2017
- Ohio River: Aug. and Nov. 2017
  - Almost all river samples showed non-detect
- On-site Potable Water / GAC Treatment: Aug. 2017 to present
- Additional sampling to be conducted as requested by EPA Region 3
- Planning for stack testing is underway



Subject to FRE 408 and state law equivalents

# Washington Works
# Ohio River Sampling for C3 Dimer Acid
# August and November 2017




| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| 1A | 11/29/2017 | <0.01 | <0.01 |

| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| 2A | 11/29/2017 | 0.07 | 0.068 |
| 2E | 11/29/2017 | <0.01 (<0.01 DUP) | <0.01 |

| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| 3A | 11/29/2017 | 0.017 | 0.016 |
| 3E | 11/29/2017 | <0.01 | <0.01 |

| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| 4A | 11/28/2017 | 0.023 | 0.022 |
| 4C | 11/28/2017 | <0.01 | <0.01 |
| 4E | 11/28/2017 | <0.01 | <0.01 (<0.01 DUP) |

| Location ID | Date | HPFO Dimer Acid µg/L | | |
|---|---|---|---|---|
| | | Surface | Mid-Column | Bottom |
| RIVERLOC3A-2017 POST | 08/08/2017 | <0.01 | <0.01 | <0.01 |
| RIVERLOC3B-2017 POST | 08/08/2017 | <0.01 | <0.01 | <0.01 |

| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| RIVERLOC6A-2017 POST | 08/08/2017 | 0.033 | <0.01 |
| RIVERLOC6B-2017 POST | 08/08/2017 | <0.01 | <0.01 |

| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| RIVERLOC7-2017 POST | 08/08/2017 | <0.01 | <0.01 (<0.01 DUP) |

| Location ID | Date | HPFO Dimer Acid µg/L | | |
|---|---|---|---|---|
| | | Surface | Mid-Column | Bottom |
| RIVERLOC8A-2017 POST | 08/08/2017 | <0.01 | <0.01 | <0.01 |
| RIVERLOC8B-2017 POST | 08/08/2017 | <0.01 | <0.01 | <0.01 |

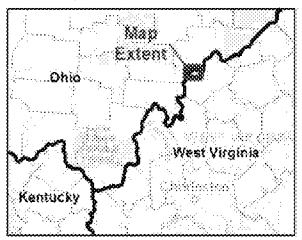
| Location ID | Date | HPFO Dimer Acid µg/L | |
|---|---|---|---|
| | | Surface | Mid-Column |
| 5A | 11/28/2017 | <0.01 | <0.01 |
| 5C | 11/28/2017 | <0.01 | <0.01 |
| 5E | 11/28/2017 | <0.01 | <0.01 |

**Legend**

- Ohio River Sampling Location
- Site Boundary
- State Boundary

µg/L (micrograms/liter)
DUP = Duplicate Sample
< = Not detected at the reporting limit (0.01 µg/L)

Notes:
NAIP 2016 Aerial Information:
Source - USDA FSA
Resolution - 1 Meter, 8 Meter Accuracy
Service Layer Credits - ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.




0 1,500 3,000 6,000
Feet
1 inch = 3,000 feet

AECOM
AECOM
Sabre Building, Suite 300
4051 Ogletown Road
Newark, DE 19713

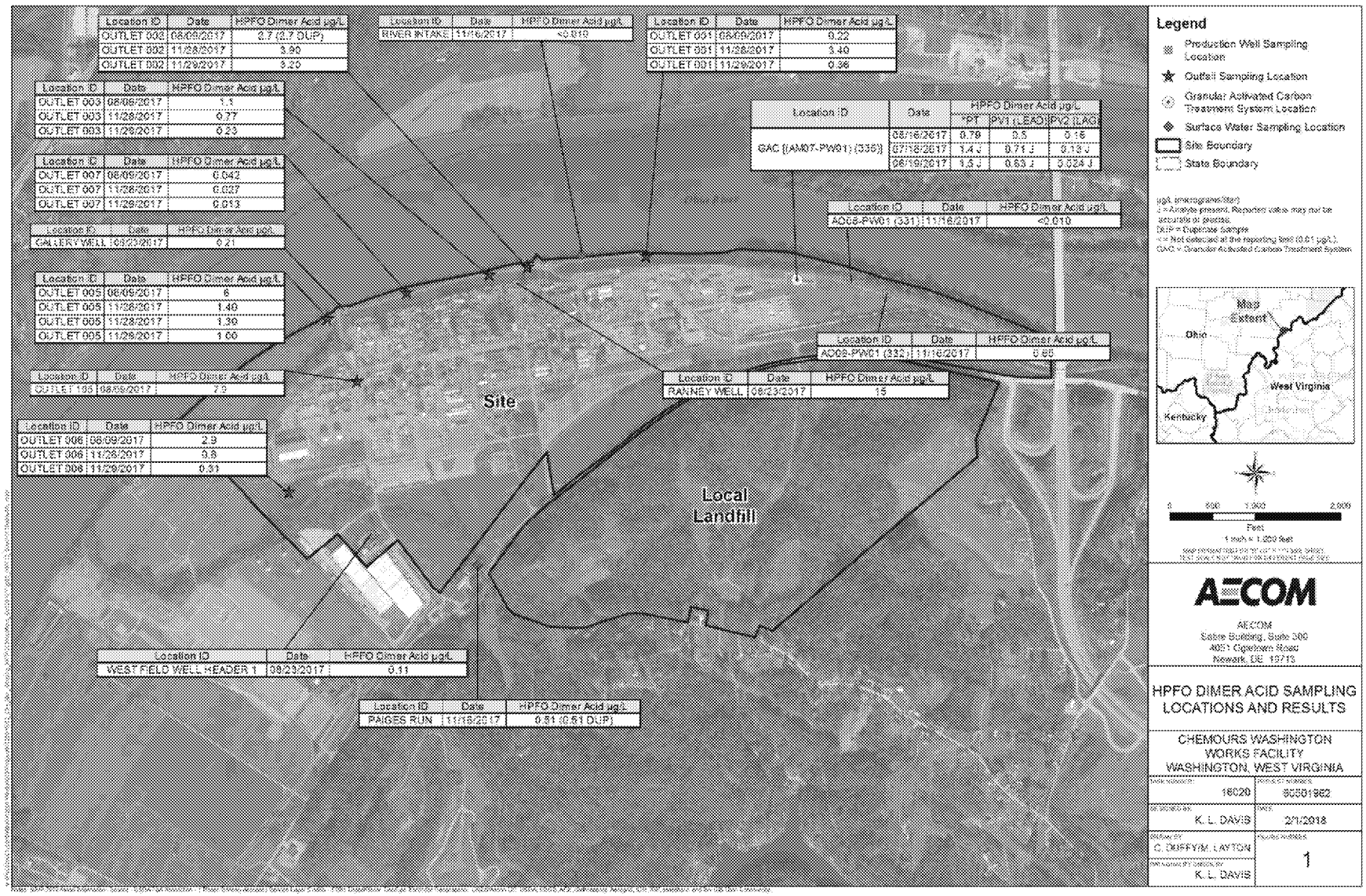
HPFO DIMER ACID RIVER SAMPLING LOCATIONS AND RESULTS

CHEMOURS WASHINGTON WORKS FACILITY
WASHINGTON, WEST VIRGINIA

| | |
|---|---|
| CASE NUMBER: 16020 | PROJECT NUMBER: 60501962 |
| DESIGNED BY: K. L. DAVIS | DATE: 2/1/2018 |
| DRAWN BY: C. DUFFY/M. LAYTON | FIGURE NUMBER: 1 |
| DATA QUALITY CHECK BY: K. L. DAVIS | |

Subject to FRE 408 and state law equivalents

# Washington Works – C3 Dimer Acid in Outfalls / Production Wells




| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 002 | 08/09/2017 | 2.7 (2.7 DUP) |
| OUTLET 002 | 11/28/2017 | 3.90 |
| OUTLET 002 | 11/29/2017 | 3.20 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 003 | 08/09/2017 | 1.1 |
| OUTLET 003 | 11/28/2017 | 0.77 |
| OUTLET 003 | 11/29/2017 | 0.23 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 007 | 08/09/2017 | 0.042 |
| OUTLET 007 | 11/28/2017 | 0.027 |
| OUTLET 007 | 11/29/2017 | 0.013 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| GALLERY WELL | 08/23/2017 | 0.21 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 005 | 08/09/2017 | 6 |
| OUTLET 005 | 11/28/2017 | 1.40 |
| OUTLET 005 | 11/28/2017 | 1.30 |
| OUTLET 005 | 11/29/2017 | 1.00 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 195 | 08/09/2017 | 7.9 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 006 | 08/09/2017 | 2.9 |
| OUTLET 006 | 11/28/2017 | 0.8 |
| OUTLET 006 | 11/29/2017 | 0.31 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| WEST FIELD WELL HEADER 1 | 08/23/2017 | 0.11 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| PAIGES RUN | 11/16/2017 | 0.51 (0.51 DUP) |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| RIVER INTAKE | 11/16/2017 | <0.010 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| OUTLET 001 | 08/09/2017 | 0.22 |
| OUTLET 001 | 11/28/2017 | 3.40 |
| OUTLET 001 | 11/29/2017 | 0.36 |

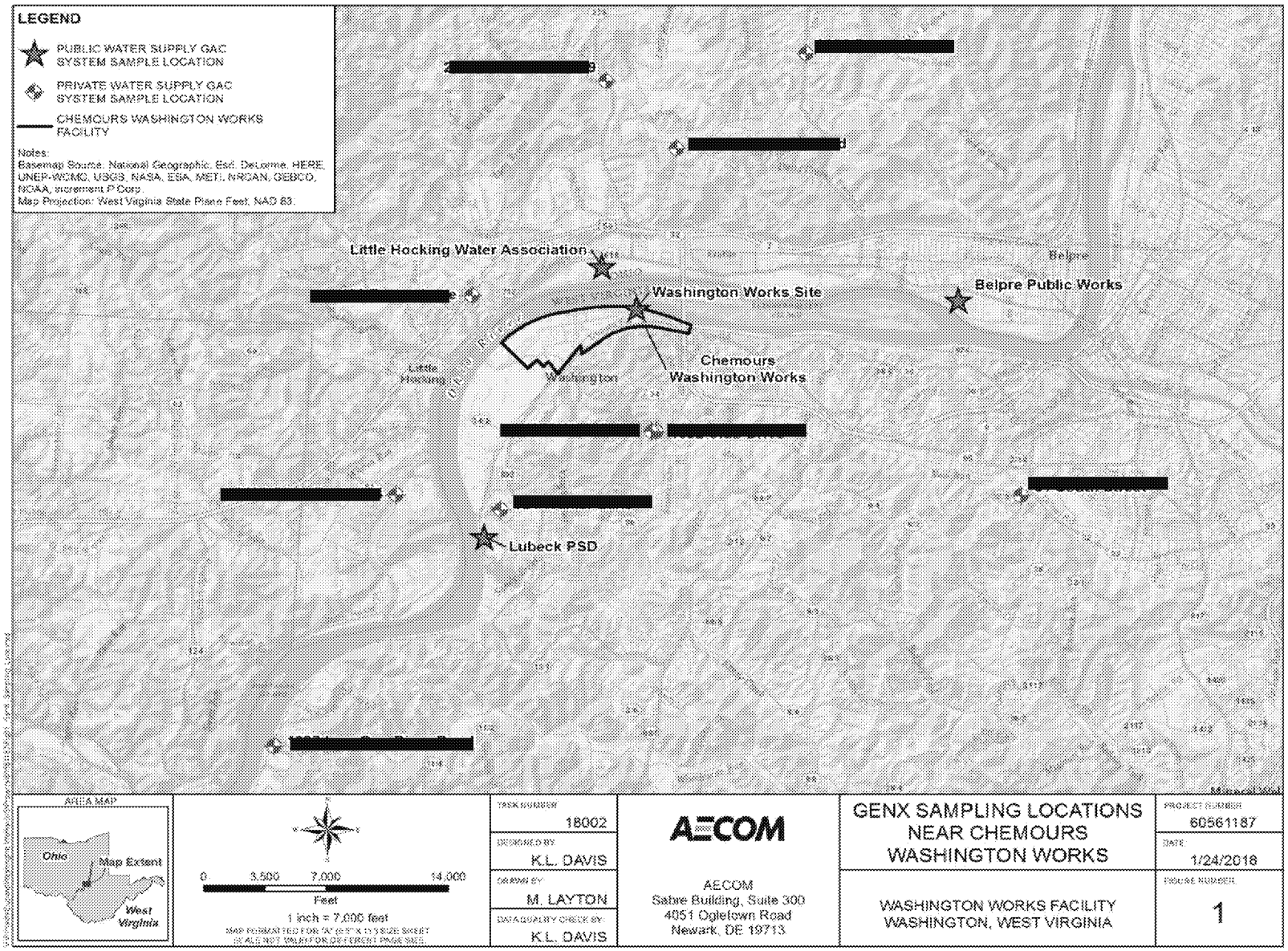
| Location ID | Date | HPFO Dimer Acid µg/L | | |
|---|---|---|---|---|
| | | *RT | PV1 (LEAD) | PV2 (LAG) |
| GAC ((AM07-PW01) (335)) | 06/16/2017 | 0.79 | 0.5 | 0.16 |
| | 07/18/2017 | 1.4 J | 0.71 J | 0.13 J |
| | 08/19/2017 | 1.5 J | 0.63 J | 0.024 J |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| AC08-PW01 (331) | 11/16/2017 | <0.010 |

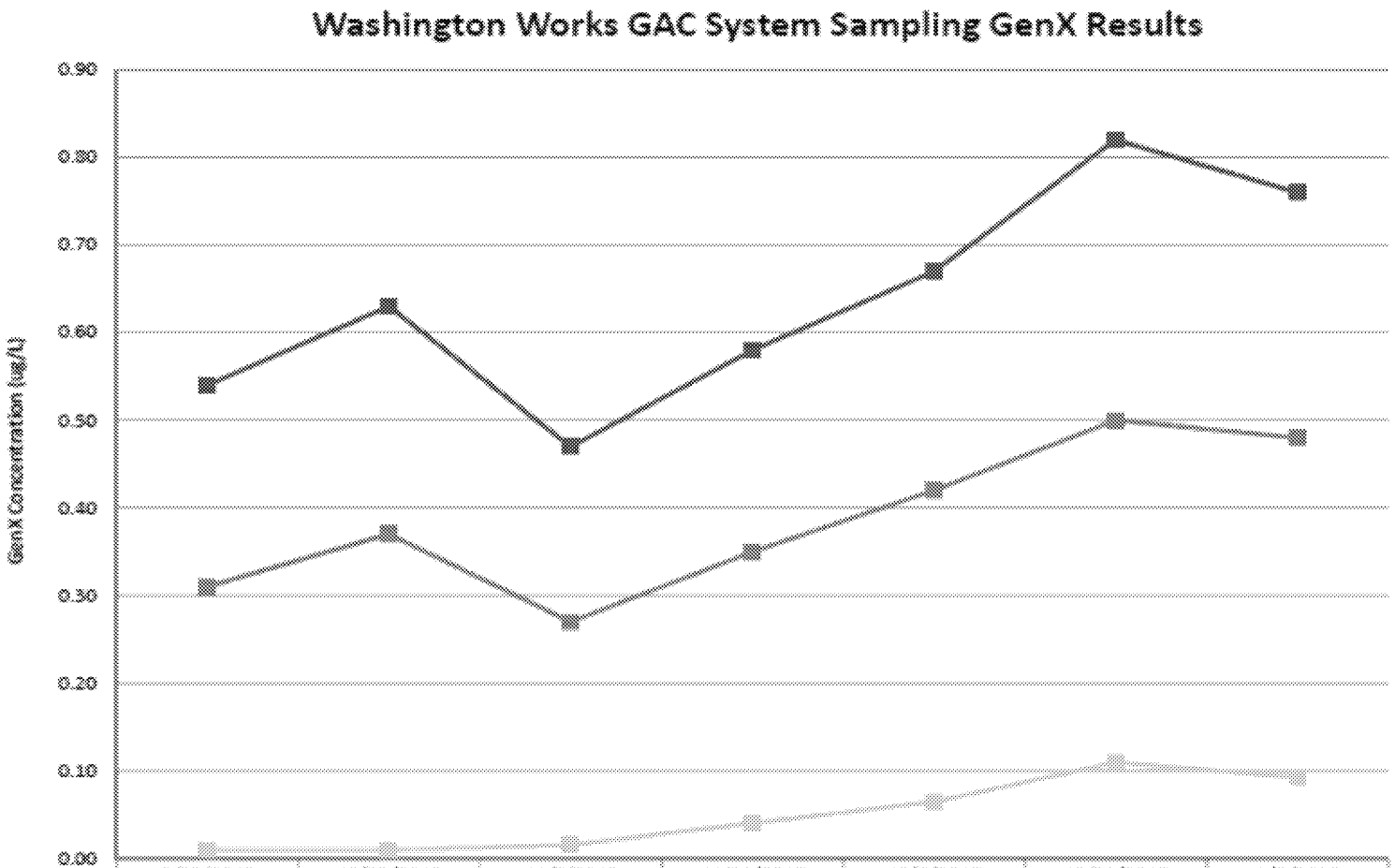
| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| AC09-PW01 (332) | 11/16/2017 | 0.65 |

| Location ID | Date | HPFO Dimer Acid µg/L |
|---|---|---|
| RANNEY WELL | 08/23/2017 | 15 |

# C3 Dimer Acid Sampling - Public & Private Wells With Existing GAC Treatment



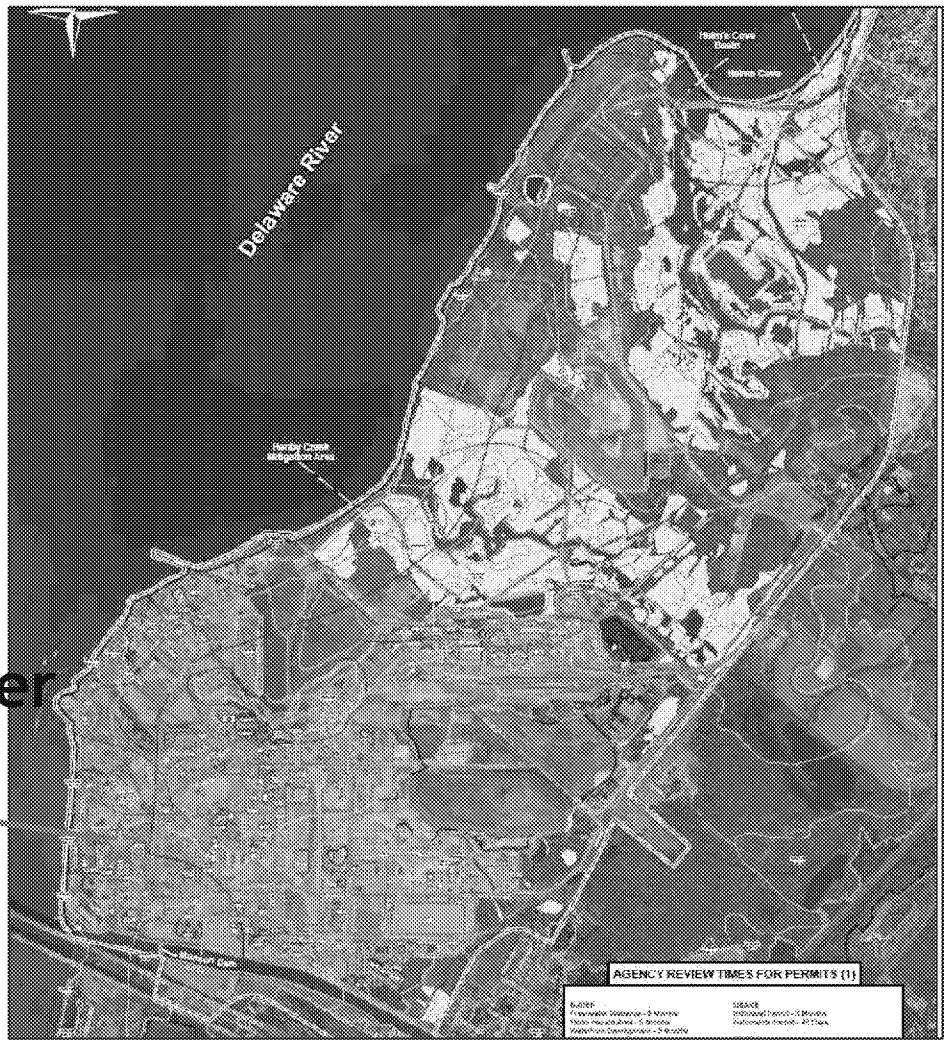
# On-site Potable Water GAC Treatment System – C3 Dimer Acid




| | 9/29/2017 | 10/25/2017 | 11/7/2017 | 11/20/2017 | 12/6/2017 | 12/20/2017 | 1/8/2018 |
|---|---|---|---|---|---|---|---|
| GenX PT | 0.54 | 0.63 | 0.47 | 0.58 | 0.67 | 0.82 | 0.76 |
| GenX Lead | 0.31 | 0.37 | 0.27 | 0.35 | 0.42 | 0.50 | 0.48 |
| GenX Lag | 0.010 | 0.010 | 0.016 | 0.041 | 0.065 | 0.11 | 0.093 |

# Chambers Works

**HFPO Dimer Ester**
**1205 Building**
**PC West**



# Chambers Works

- In July 2017, Chemours provided EPA HQ, Region 2 and Region 4 a narrative and process flow diagram of the use of C3 Dimer Acid at Chambers Works.

- In brief, Chemours uses C3 Dimer Acid to manufacture HFPO Dimer Ester under contract with DuPont and under a March 2015 TSCA Contract Manufacturer Consent Order issued by EPA.

- In January 2018, Chemours offered to Region 2 to conduct an on-site sampling program for C3 Dimer Acid, and will submit a sampling plan for doing so within 30 days.

# Next Steps

- Follow up matters
  - EPA's PFAS Inter-Agency Project
- Further questions
- Ensuring that EPA receives relevant information
- Lines of communication