NC Department of Health and Human Services

GenX and PFAS Updates

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State Epidemiologist and Epidemiology Section Chief

Nov 16, 2021

What are PFAS?

PFAS, or per- and polyfluoroalkyl substances, are a group of human-made chemicals that includes PFOA, GenX, and many other chemicals.

Used since the 1950s to make products to resist stains, grease, and water and in some firefighting foams.

How can I be exposed to PFAS?

PFAS exposure can occur through contaminated drinking water, food, and indoor dust, as well as some consumer products and workplaces.

How can PFAS potentially affect my health?

In adults, children, and pregnant women

- Increased cholesterol levels
- Decreased vaccine response in children
- Changes in liver enzymes
- Increased risk of high blood pressure or pre-eclampsia in pregnant women
- Small decreases in infant birth weights
- Increased risk of kidney or testicular cancer

More research is needed to better understand the health effects associated with PFAS exposure.

PFAS and skin exposure

- Only a small amount of PFAS can get into your body through your skin, such as through bathing, showering and swimming.
- Limited data from animal studies show some PFAS may cause skin irritation at high levels.

Public health role

- Determine whether compounds detected through environmental sampling could pose a risk to human health
- Provide health-based guidance on levels of exposure to such contaminants
- Conduct risk assessments and risk communication

New EPA GenX Toxicity Assessment

- Released October 2021
- A *Toxicity Assessment* is a summary of potential health effects associated with a chemical
- Includes a *Reference Dose* for GenX
  - The *Reference Dose* is a starting point for creating regulatory and health advisory levels
  - EPA GenX *Reference Dose* is lower than the reference dose used in calculating the NCDHHS provisional drinking water health goal

What Does This Mean?

- Based on the lower *Reference Dose,* we expect the EPA national drinking water health advisory for GenX will be lower than current NCDHHS provisional drinking water health goal (140 parts per trillion).

- EPA drinking water health advisory will be used to provide drinking water guidance when available.

Current NCDHHS Actions

- Provide health information to residents concerned about GenX exposure
  - Fact sheet: GenX Toxicity Assessment
  - Fact sheet: Actions to Reduce GenX Exposure
- Continue to coordinate with NCDEQ and EPA ahead of the release of the drinking water health advisory in Spring 2022

Contact Information

NCDHHS Occupational and Environmental Epidemiology Branch

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Chemours Update

North Carolina Department of Environmental Quality

Division of Waste Management

November 16, 2021

Discussion Topics

- PFAS and GenX
- GenX history in NC
- DEQ November 2021 letters
- Groundwater sampling and the Consent Order

Emerging Compounds: GenX and PFAS

- **GenX = HFPO-DA or C3 Dimer Acid = $C_6HF_{11}O_3$**
- **GenX** is a trade name for a manmade, unregulated chemical used in manufacturing nonstick coatings and for other purposes.
  - Is an *emerging compound* in a family of chemicals known as per- and poly- fluorinated alkyl substances (PFAS)
  - Produced and emitted by one company in NC – Chemours (formerly Dupont)
  - Has been discharged into the Cape Fear River for 30+ years.
  - Until the past couple of years, labs couldn't measure it.

Emerging compounds:

- No (or limited) specific limits in environmental regulations.
- Little is known about how they behave in the environment.
- Little known about their effects on human health and environment.
- Presents significant challenge for regulatory agencies.
- DEQ website includes PFAS factsheets and DHHS contact information

Emerging Compounds – GenX Case History

- **Early-mid 2017:** Focus on surface water issues
- **Mid 2017:** Groundwater issues discovered
- **Mid-late 2017:** Air emission contributions
- **Through 2018:** Testing of emissions and drinking wells
- **Feb. 2019:** Consent Order signed
- **Dec. 2019:** Thermal Oxidizer
- **2019-2021:** Ongoing private well testing
- **Currently:** Focus on the residual PFAS

Groundwater Testing

- Found high levels of PFAS compounds in onsite monitoring wells at the Chemours plant in Bladen County
- DEQ tested private wells on properties adjacent to Chemours first and found high levels of PFAS
- DEQ asked Chemours to test additional wells in the area to determine extent of contamination
- In 2017, NC DHHS established a GenX drinking water health goal of 140 ng/L (ppt)
- November 3, 2021: DEQ letter stating that Chemours is responsible for contamination of groundwater monitoring wells and water supply wells in New Hanover County and potentially other counties in the lower Cape Fear

Chemours – Consent Order Feb. 2019

Addressing contamination

- NC DEQ signed a Consent Order with Chemours Feb. 26, 2019: https://deq.nc.gov/news/hot-topics/genx-investigation
- Consent Order included:
  - Requirements to reduce air emissions and to achieve maximum reductions of all remaining PFAS contributions to the Cape Fear River on an accelerated basis, including groundwater.
  - Notify and coordinate with downstream public water utilities when potential discharge of GenX compounds into the Cape Fear River above 140 ppt.
  - Sample wells and provide drinking water
  - Additional penalties will apply if Chemours fails to meet the conditions and deadlines established in the order.

Chemours – Consent Order Feb. 2019

Addressing contamination

- Control technology improvements and emissions reduction milestones
- Determining which PFAS at what amounts are in wastewater and stormwater at the facility (bimonthly for 2 years; then may decrease frequency)
    - Determining which PFAS at what amounts are in river sediment and downstream raw water intakes for drinking water plants
- Fund method development to test for Total Organic Fluorine in air emissions and wastewater
- Drinking Water Compliance Plan (April 2019) for private well sampling and alternate water
- Additional reporting

Chemours – Addressing Contamination

Consent Order Feb 2019 : Groundwater

Sample Wells and Provide Drinking Water:

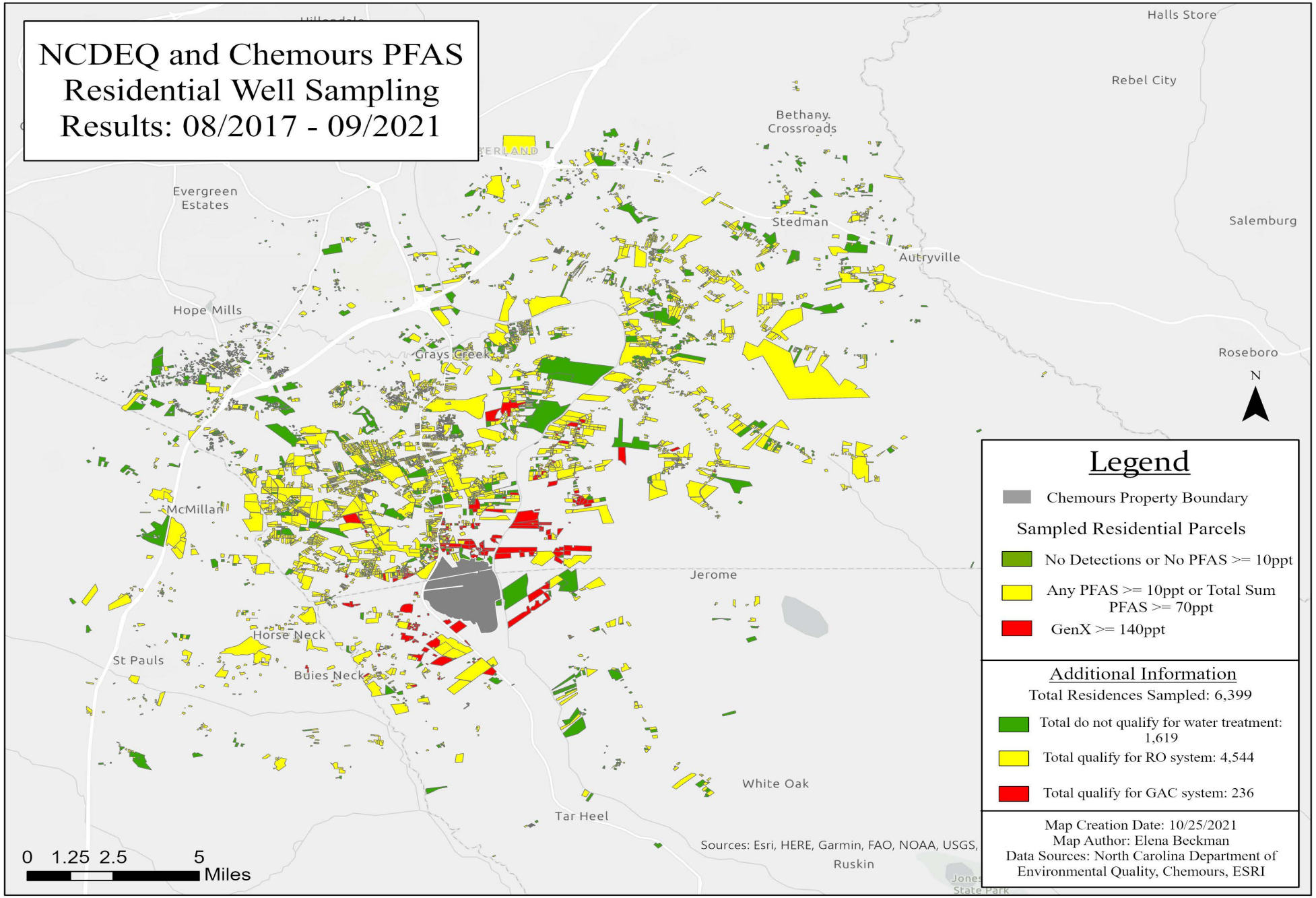
- Sample drinking water wells
  - ¼ mile beyond the closest well that had PFAS levels above 10 parts per trillion
  - Annually retest wells that were previously sampled
  - Bottled water in 3 days if exceed a Consent Order limit

- For those with GenX above 140 parts per trillion or applicable health advisory:
  - Provide permanent drinking water supply within 9 months
  - Public waterline connection or whole building GAC filtration system

- For those with combined PFAS levels above 70 parts per trillion or any individual PFAS compound above 10 parts per trillion:
  - Provide, install and maintain up to three under-sink reverse osmosis (RO) systems per residence
  - Provide RO systems within 6 months of Consent Order or receiving test results

DEQ November 2021 Actions

- DEQ has determined that Chemours is responsible for contamination of groundwater monitoring wells and water supply wells in New Hanover County and potentially Pender, Columbus, and Brunswick counties.
- Chemours is required to expand the off-site assessment required under the 2019 Consent Order to determine the extent of the contamination. Chemours must also conduct sampling of private drinking water wells to identify residents who may be eligible for replacement drinking water supplies.
- Chemours is required to review existing well sampling in communities surrounding the Fayetteville Works facility (Bladen County) to determine additional eligibility for whole house filtration and public water, in light of the revised Toxicity Assessment for GenX from the U.S. Environmental Protection Agency (EPA).
- Chemours must revise the assessment of public water feasibility for all affected residents under a lower health advisory level. DEQ is also requiring Chemours to develop a plan to transition residents who have previously received reverse osmosis systems based on GenX results to either public water or whole house filtrations systems as appropriate under a lower GenX health advisory level.


NCDEQ and Chemours PFAS Residential Well Sampling Results: 08/2017 - 09/2021
Halls Store
Rebel City
Bethany Crossroads
Evergreen Estates
Stedman
Salemburg
Autryville
Hope Mills
Grays Creek
Roseboro
N
McMillan
Jerome
Horse Neck
St Pauls
Buies Neck
White Oak
Tar Heel
Ruskin
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS,
0 1.25 2.5 5 Miles
Legend
Chemours Property Boundary
Sampled Residential Parcels
No Detections or No PFAS >= 10ppt
Any PFAS >= 10ppt or Total Sum PFAS >= 70ppt
GenX >= 140ppt
Additional Information
Total Residences Sampled: 6,399
Total do not qualify for water treatment: 1,619
Total qualify for RO system: 4,544
Total qualify for GAC system: 236
Map Creation Date: 10/25/2021
Map Author: Elena Beckman
Data Sources: North Carolina Department of Environmental Quality, Chemours, ESRI

GenX Private Well Summary Data

Private well PFAS data is summarized below.

Private Well Water Testing Summary	Combined Well Data
Distance from Chemours	18 miles
Well Collection Dates	Up to Sept 2021
Number of Wells Tested (by land parcel)	6,399
Number of Exceedances of Provisional Health Goal (Gen X, 140 ng/L)[a]	236
Number of Consent Order Exceedances of 10 ng/L for single PFAS or 70 ng/L total PFAS	4,544
Results all PFAS below 10 ng/L	1619
Maximum Detected GenX Concentration	4,000 ng/L (ppt)

a. The NC DHHS Provisional Drinking Water Health Goal for GenX is 140 ng/L (July 2017)

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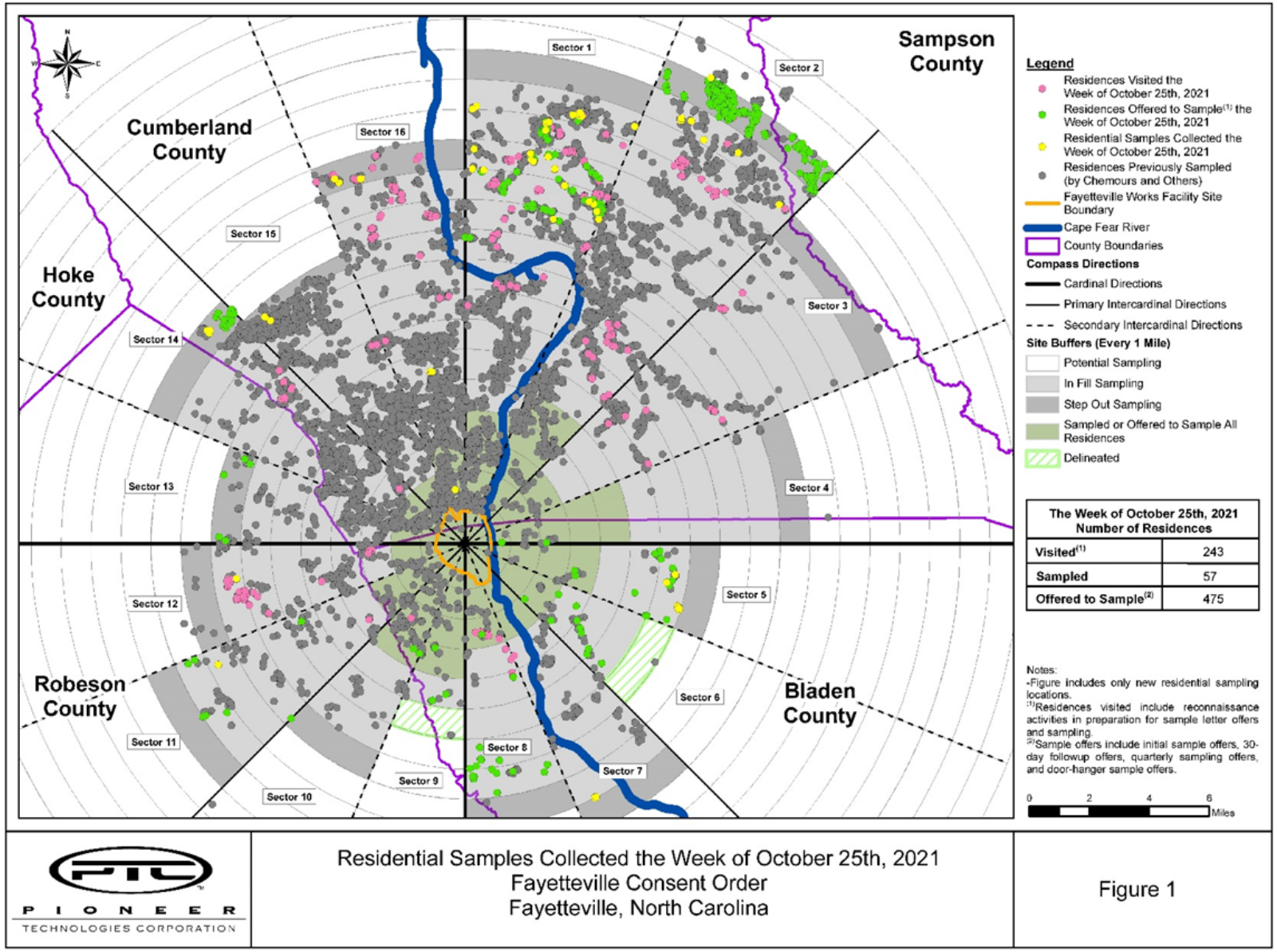

Consent Order required Chemours to develop a plan for well testing.

Chemours continues to sample wells to determine the extent of contamination and to identify all impacted wells within that area.

NORTH CAROLINA Department of Environmental Quality

Sampling Your Well

- Most wells can be sampled without entering a residence.
- Personal protective equipment and social distancing guidelines are being used.
- To request well testing around the Chemours plant in Bladen County, call Chemours at **910-678-1101**
- DEQ can assist residents in the Lower Cape Fear with well sampling questions but Chemours is not currently sampling in this area.
- Parsons Environment and Infrastructure – known as “Parsons” – is the independent water testing contractor for Chemours.
- If you do not respond, you will not be able to have your well sampled.
- If you refuse sampling by Parsons, you will not be eligible for replacement water.

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Filter Installation and Municipal Water Updates

Installation of water treatment systems has resumed for homes around the plant

Personal protective equipment and
social distancing guidelines are being used.

Some Reverse Osmosis eligible residents are being offered municipal water where the waterline is in close proximity to the home.

Whole house Granular Activated Carbon system

Reverse
Osmosis System

Municipal Water Connections

- Under the Consent Order, private well owners with Gen X levels at or above 140ppt are eligible for municipal water or whole house filtration (Granular activated carbon system)

- Municipal Water has been determined as not feasible in areas East of the Cape Fear River in Bladen and Cumberland Counties.

- Municipal water will be supplied for some Bladen residents who live west of the Cape Fear River and have Gen X in their private well at or above 140ppt.

- The final determination on the feasibility of municipal water in Cumberland County west of the Cape Fear river has not been made.

- In Nov. 3 letter, Chemours is required to revise the feasibility assessments for all affected residents, in light of the expected lower EPA Health Advisory Level for GenX in 2022.

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Bottled Water Questions

- Chemours can be contacted at (910) 678-1101 for bottled water questions.
- Chemours is using a new bottled water voucher system that may help some residents with their requests for different water volume sizes.
- The voucher card would allow residents to purchase the type of water and size of container they prefer with pre-paid money voucher cards provided by Chemours.

Community Update

April 2021

This community update includes the latest information that may be of interest to residents in the Cape Fear River Region and the communities near the Fayetteville Works facility.

The N.C. Department of Environmental Quality (NCDEQ) entered into a Consent Order with Chemours and Cape Fear River Watch in February 2019. The order requires Chemours to address all sources of PFAS at the facility to prevent further impacts to air, soil, groundwater and surface waters.

The full Consent Order and history of the GenX investigation can be found online at https://bit.ly/2Z7JHVA.

Surface Water

Penalties Assessed against Chemours for Violations
DEQ assessed a total of $199,379.16 in penalties against Chemours for failing to meet conditions of the Consent Order along with permit and rule violations related to the construction and installation of the required treatment measures at Old Outfall 002 and Seep C. The treatment system at Old Outfall 002 is currently working as intended, and DEQ continues to monitor the system's performance to ensure ongoing compliance with the Consent Order. Read more: https://bit.ly/325wIGI.

Reducing PFAS entering the Cape Fear River
As required by the Consent Order, Chemours is installing [illegible] systems to reduce PFAS reaching the Cape Fear River from residual groundwater contamination. Treatment measures will are being installed at four locations [illegible] B, C and D.

Removing PFAS from Stormwater
As [illegible] Order, Chemours is designing and installing a capture and [illegible]atment system to separate stormwater from non-process wastewater at the Chemours Monomers/IXM area. These efforts are intended to remove and

Foam Investigation
The Division of Water Resources continues to investigate reports of foam on surface waters. While there is no certified method for testing foam, DWR staff have collected samples for analysis and will continue to investigate the makeup and

Filtration Systems Decision Letters
Residents have up to a year to accept a filtration system before they lose the option to have the system installed by Chemours. You can view a presentation on filtration systems at: https://bit.ly/3n68DZA. Contact Chemours at (910) 678-1101 to accept a water treatment system. To find out if you are eligible, go to: https://bit.ly/2JPp4I5.

Sediment Sampling
DEQ plans to collect sediment samples along the Cape Fear River as staff continue to review Chemours' sediment characterization report, which can be found at: https://bit.ly/3vimgIF.

Onsite and Offsite Assessment
DEQ has informed Chemours that additional information is needed for the onsite and offsite assessment. This data will help with the development of the corrective action plan development to further reduce PFAS levels in the environment. Read more: https://bit.ly/2PiyGQQ.

Groundwater Standards for PFOS and PFOA
DEQ is working with the Environmental Management Commission to set groundwater standards for PFOA and PFOS. The provisional health goal for GenX in drinking water [illegible]

water, including PFOA. The districts began filtering their drinking water with GAC systems in 2007. Researchers found that PFOA levels in blood decreased each year at an average of 26 percent once the water filters were installed. This research shows the importance of stopping PFAS exposure in

DEQ Community Updates Info for Residents' web page Community Mailing

Community Outreach

Questions?

Michael E. Scott, Director
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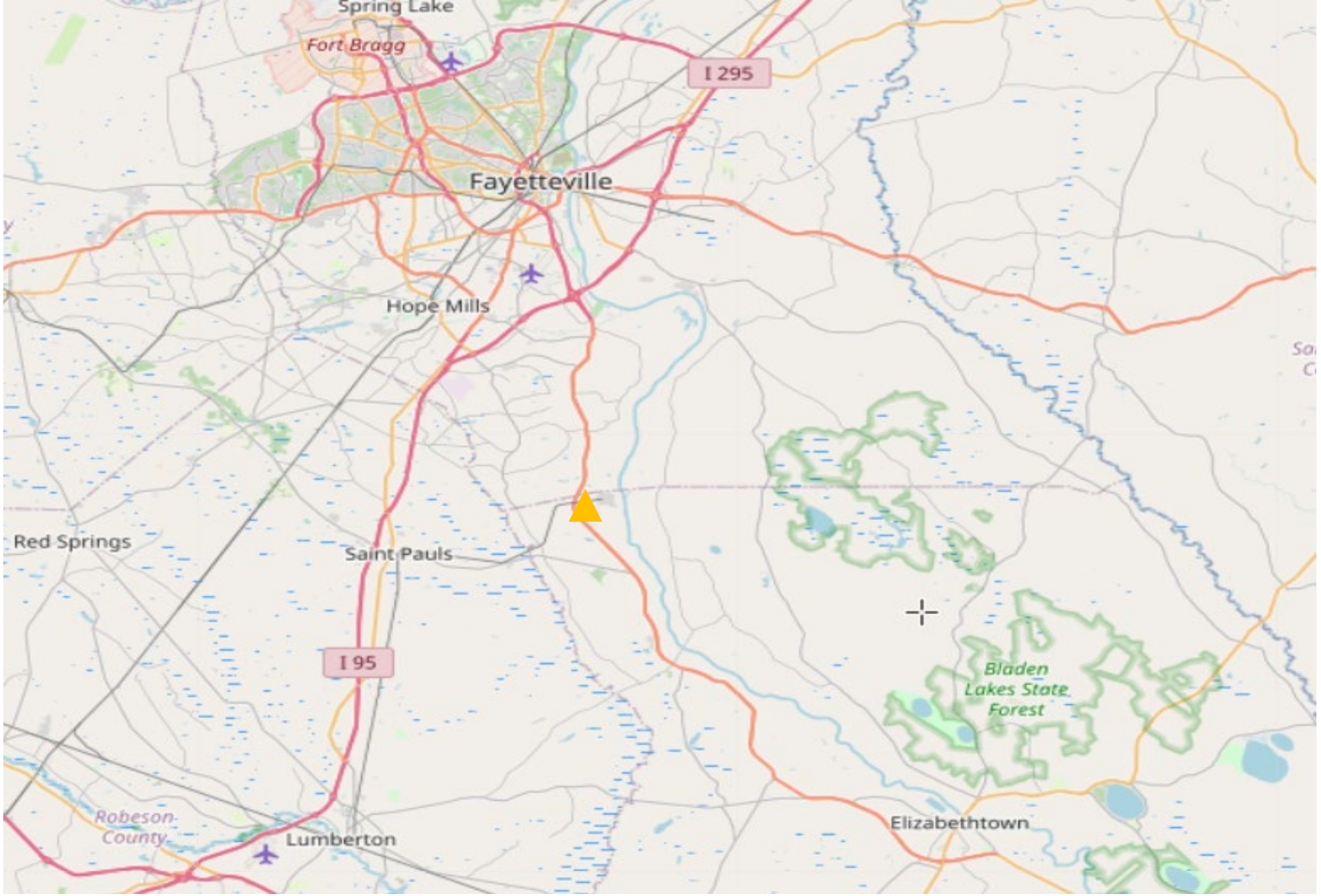
919-707-8200

November 16, 2021

Chemours Update

S. Daniel Smith,
Director, Division of Water Resources

Department of Environmental Quality


Spring Lake
Fort Bragg
I 295
Fayetteville
Hope Mills
Red Springs
Saint Pauls
I 95
Bladen
Lakes State
Forest
Robeson
County
Lumberton
Elizabethtown

DWR Surface Water Sampling

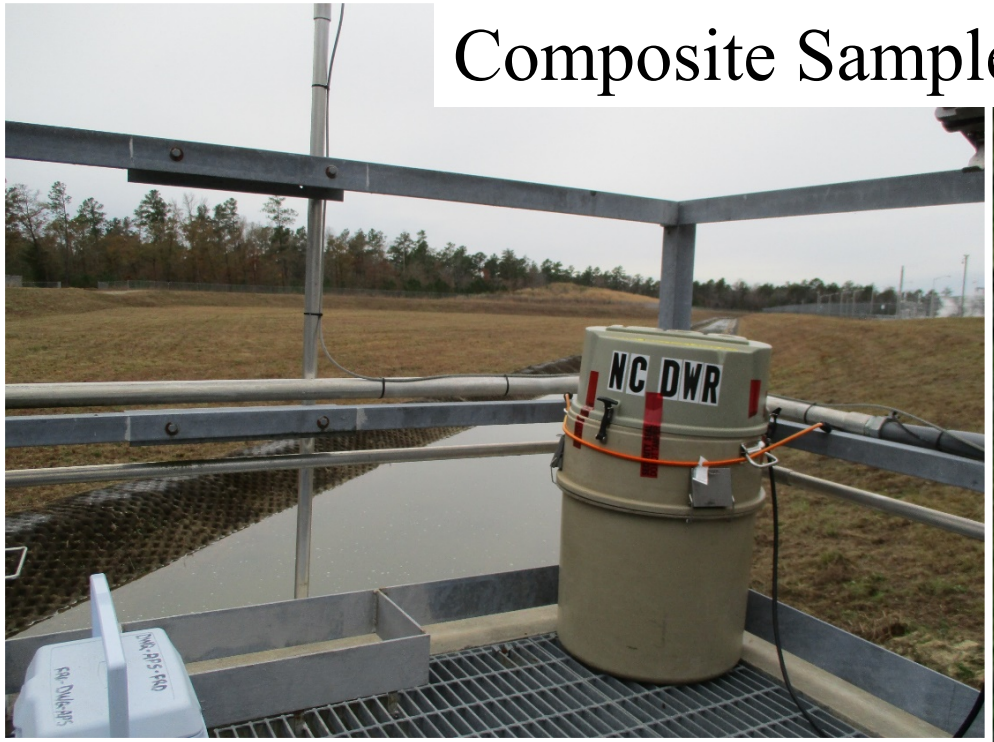
- Since October 2017 Chemours has been prohibited from discharging process wastewater.

- Staff from the Fayetteville Regional Office sample the Chemours Outfall 002 twice per week under normal circumstances (can vary with holidays and weather events).

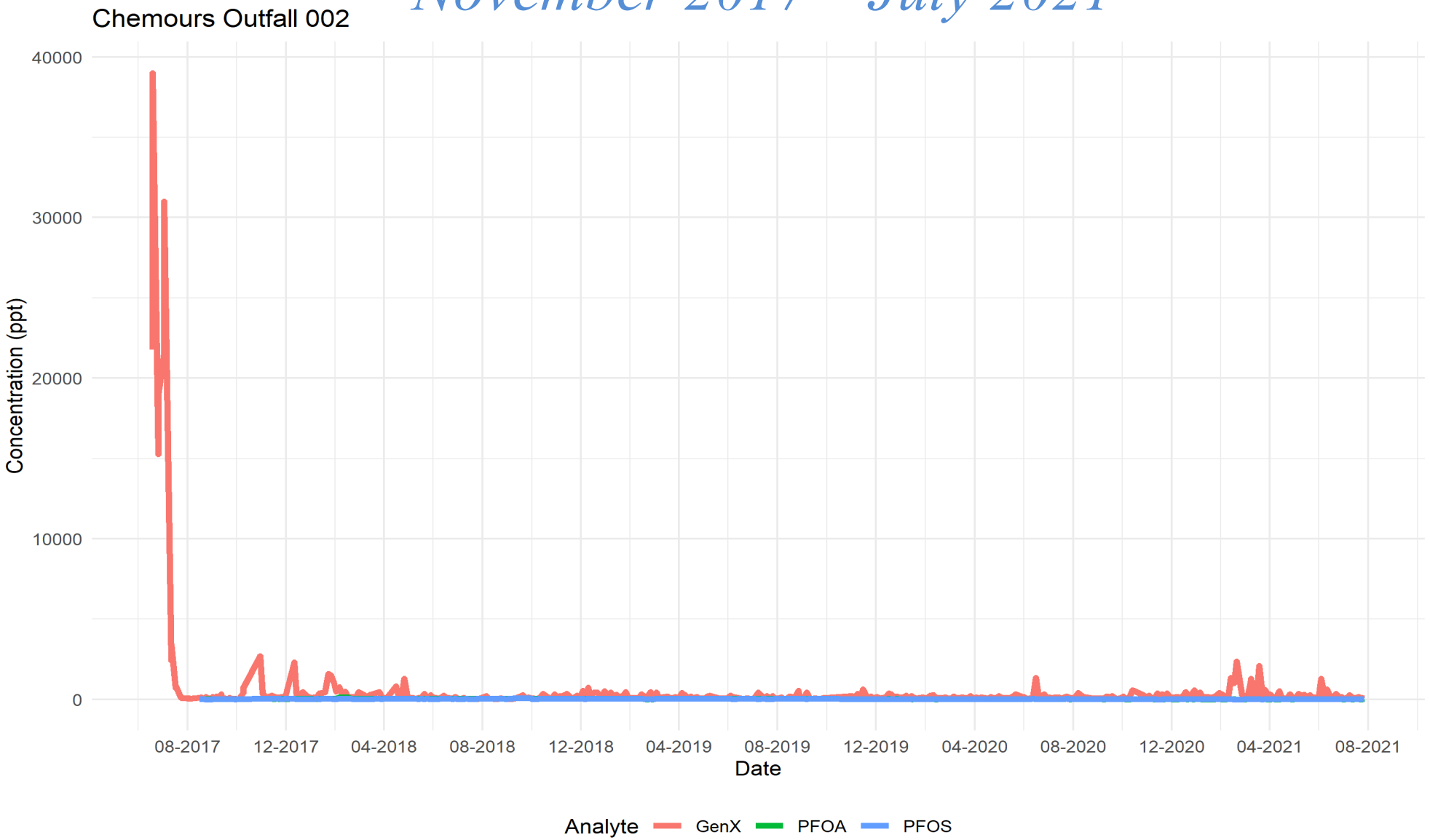
- The composite sampler runs from Friday until Tuesday, then from Tuesday to Friday, collecting 350-mls every 3 hours.

Chemours Outfall 002

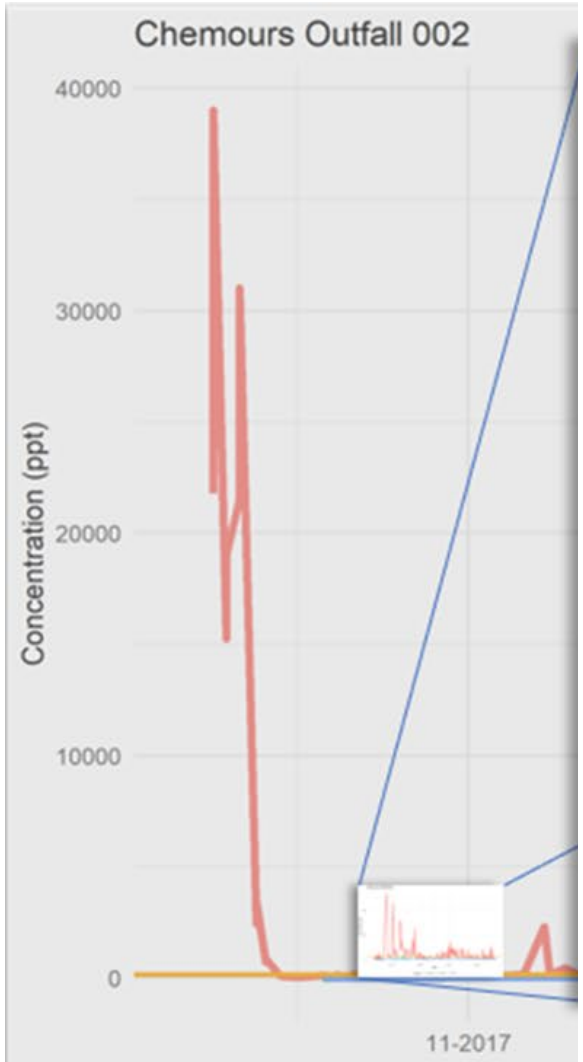
Composite Sample



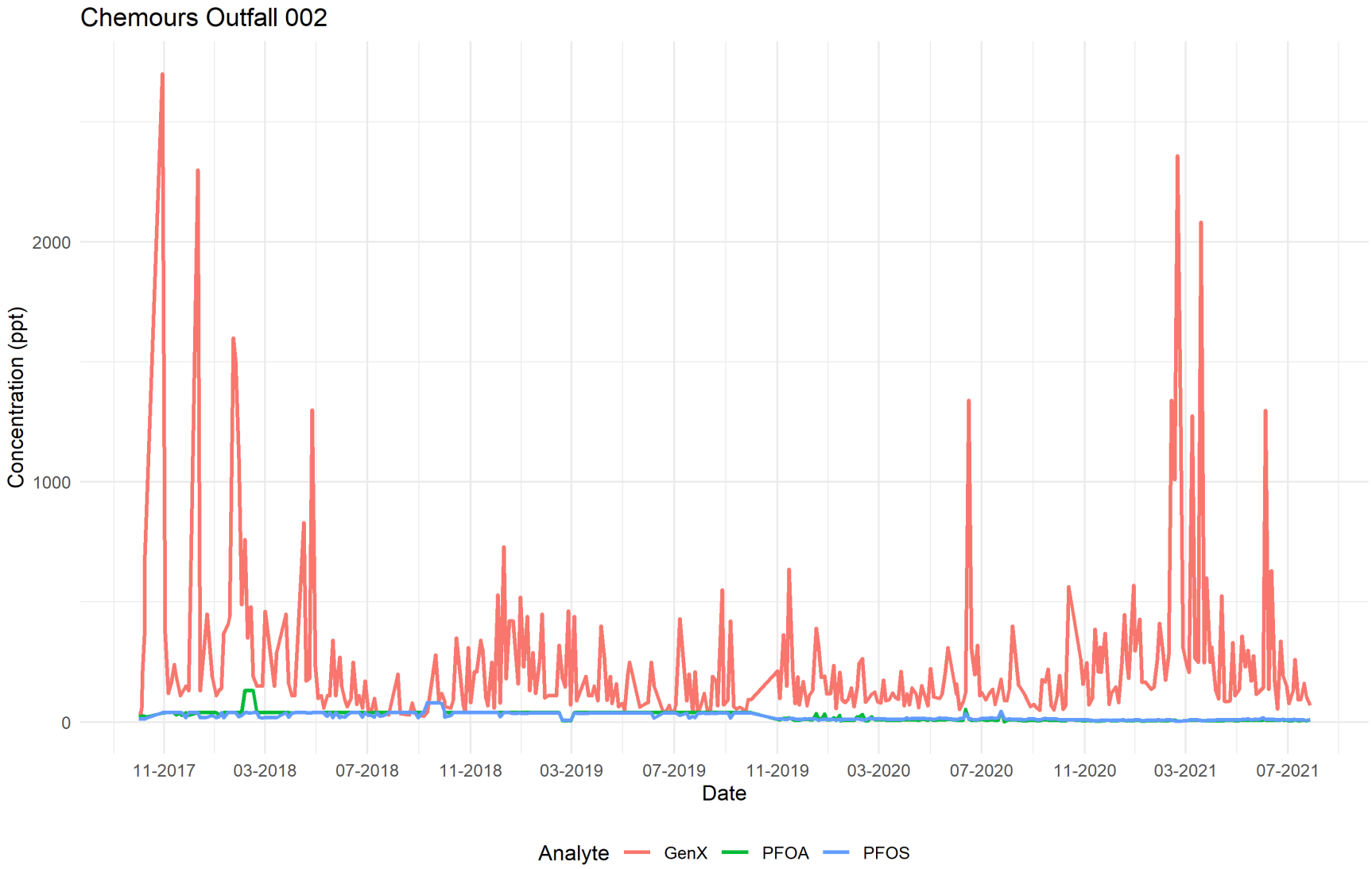
OUTFALL 002
November 2017 – July 2021

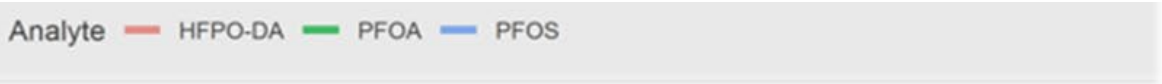


OUTFALL 002 November 2017 – July 2021



Note Change in Scale





Chemours – Consent Order Feb. 2019

Addressing contamination

- NC DEQ signed a Consent Order with Chemours Feb. 26, 2019: https://deq.nc.gov/news/hot-topics/genx-investigation
- NPDES Outfall 003 (old outfall 002)
- Stormwater from Monomers/Ion Exchange Materials
- Flow Through Seeps (A, B, C, D)
- Barrier wall and groundwater extraction system

Consent Order and Remediation: Outfall 003

- The old channel (old outfall 002) was previously used to discharge process wastewater from Chemours prior to Oct. 2012. It no longer receives process wastewater, but the feature (surface water, stormwater and groundwater) remains contaminated.

- The consent order required Chemours to implement a treatment system to capture dry weather flow (~610gpm) by September 30, 2020.

- The requirement is to treat base flow in the channel to remove at least 99% of the HFPO-DA (GenX), PFMOAA, and PMPA.

- The purpose is to reduce PFAS loading into the Cape Fear River.

Consent Order and Remediation: Outfall 003 (old outfall 002)

Consent Order and Remediation: Outfall 003 (Old Outfall 002)

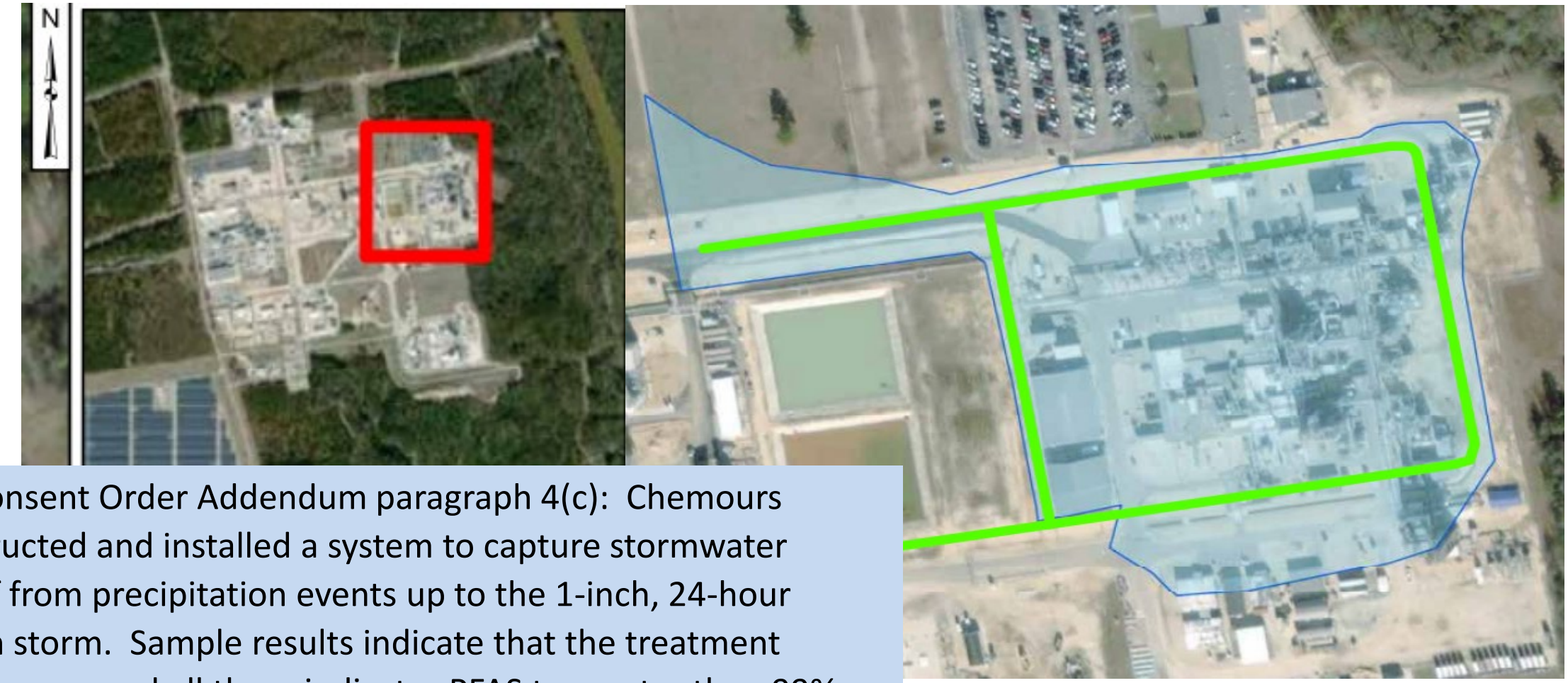
- As required per the Consent Order the remediation system was installed and operational on September 30, 2020.

- Inspections and review of Discharge Monitoring Reports (DMRs) data confirmed permit limit exceedances for October and November 2020. DWR issued an NOV and assessed a Civil Penalty for these violations.

- Since December 2020, the remediation system has remained in compliance with effluent limits treating flow to 99% removal.

Consent Order and Remediation:

Stormwater capture and treatment system -Monomers/Ion Exchange Materials (IXM)



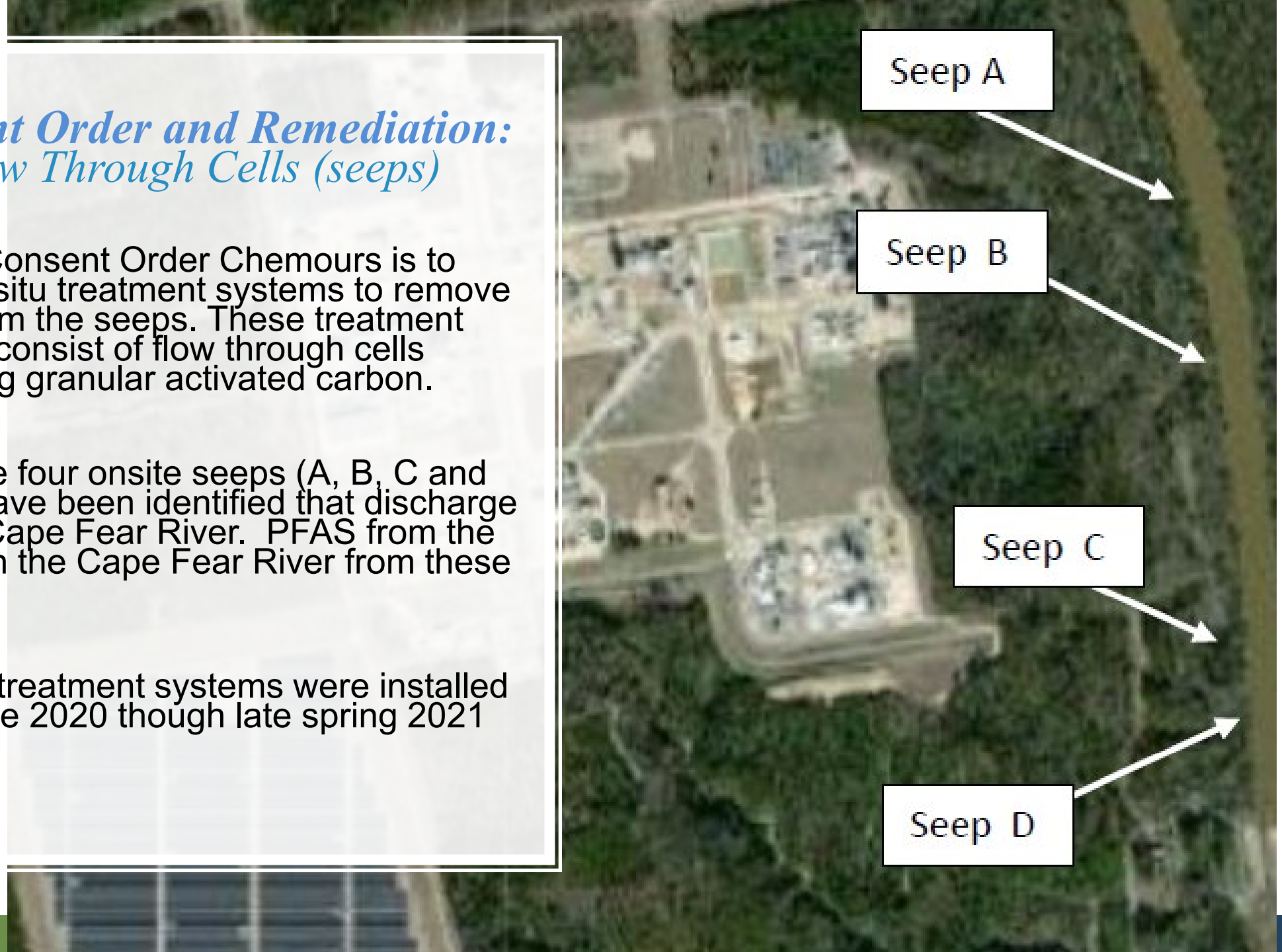
Per Consent Order Addendum paragraph 4(c): Chemours constructed and installed a system to capture stormwater runoff from precipitation events up to the 1-inch, 24-hour design storm. Sample results indicate that the treatment System removed all three indicator PFAS to greater than 99% during the months of July and August 2021.

Consent Order and Remediation:
Flow Through Cells (seeps)

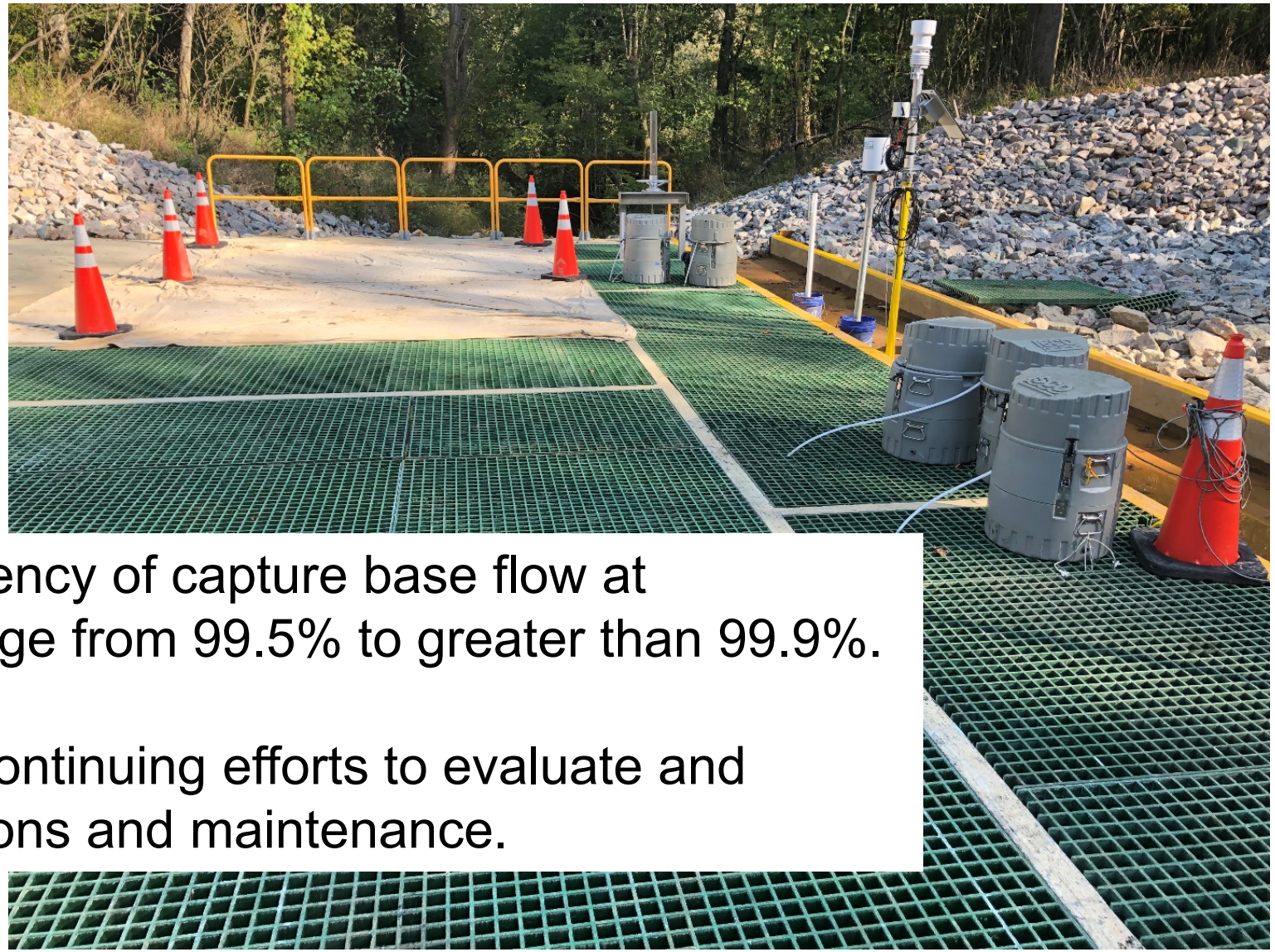
Per the Consent Order Chemours is to install in situ treatment systems to remove PFAS from the seeps. These treatment systems consist of flow through cells containing granular activated carbon.

There are four onsite seeps (A, B, C and D) that have been identified that discharge into the Cape Fear River. PFAS from the site reach the Cape Fear River from these seeps.

The four treatment systems were installed during late 2020 though late spring 2021



Flow Through Cell



Removal efficiency of capture base flow at Seeps A-D range from 99.5% to greater than 99.9%.

Chemours is continuing efforts to evaluate and modify operations and maintenance.

Consent Order and Remediation:
Barrier wall and groundwater extraction system

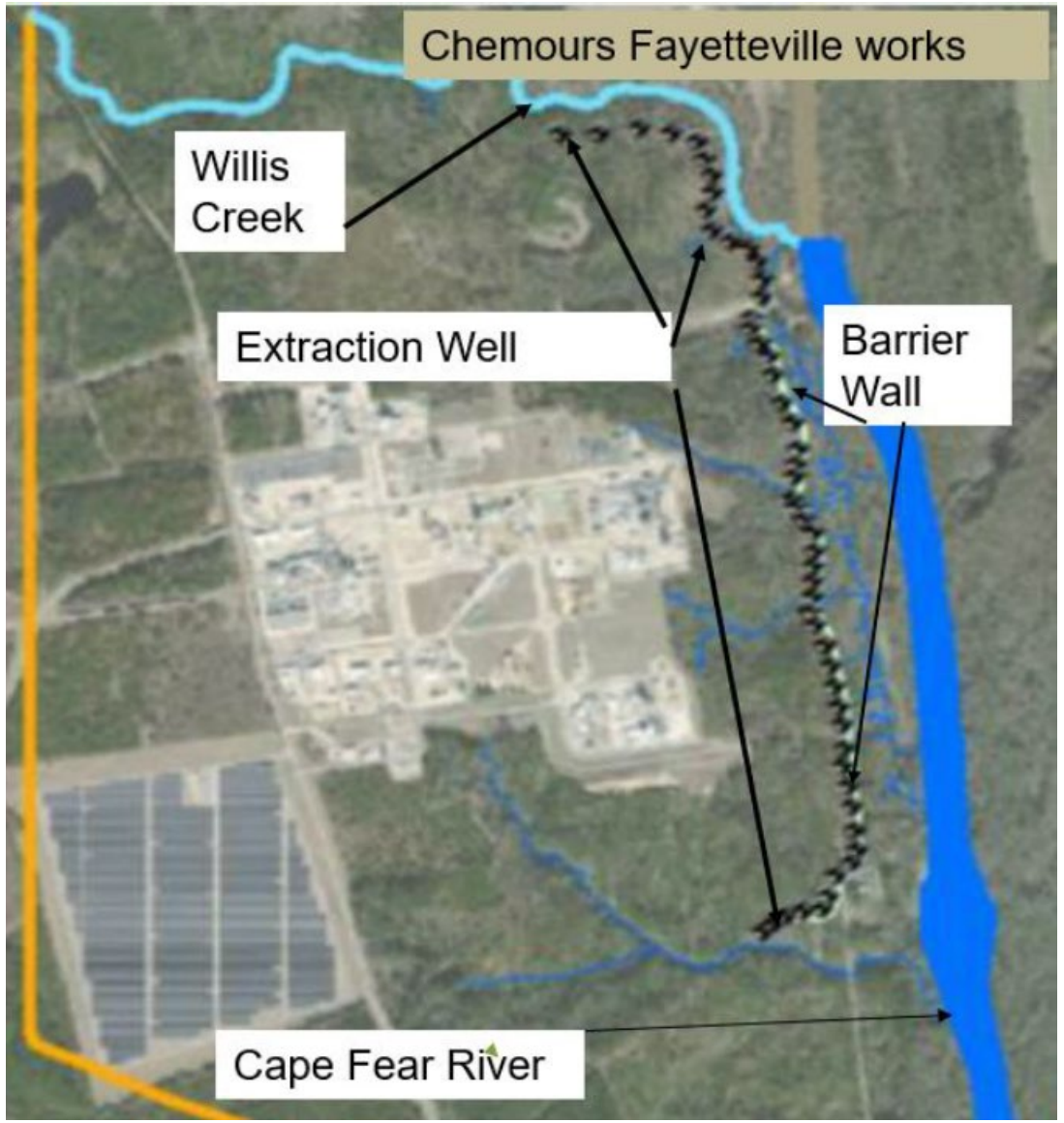
Groundwater and Seeps Remedy

- On August 13, 2021, DEQ received submission of Barrier Wall and Groundwater Extraction System, a 60% Design Report from Chemours.
- The system includes barrier wall, extraction wells, and groundwater capture system. The purpose is to control groundwater in both the Surficial and Black Creek Aquifers and the seeps that form from discharge of water at the bluff face (Seeps A, B, C and D).
- The capture and treatment system is to remove at least 99% of PFAS flowing from groundwater under the facility to the Cape Fear River.
- As required by the Consent Order, Chemours is intending to construct an approximate 6,050-foot subsurface barrier wall and groundwater extraction system. The system is to completed by March 2023.

Barrier wall and groundwater extraction system

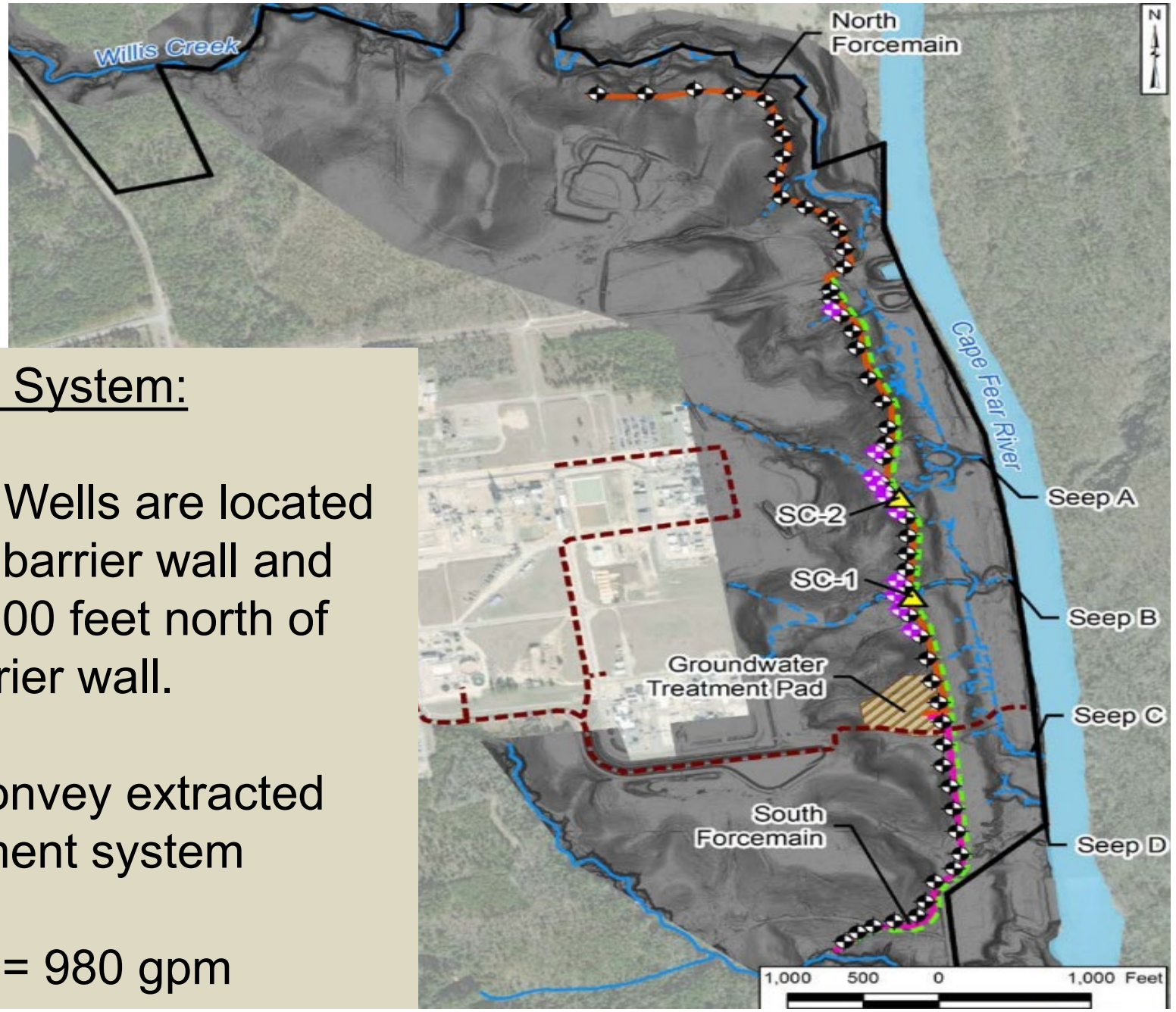
Barrier Wall Design

- 6,050 feet long and 70-80 feet deep. Keyed into Upper Cape Fear Confining Unit
- Wall is approx. ½ meter thick
- One-pass installation mixes soil and bentonite/cement mix continuously during construction



Groundwater Extraction System:

- 64 Extraction Wells – Wells are located along entire length of barrier wall and extending approx. 1,000 feet north of the termination of barrier wall.
- Two force-mains to convey extracted groundwater to treatment system
- Design total flow rate = 980 gpm



Surface Water Foam

- Surface water foam:
  - foam floating on streams, rivers, and lakes.
  - often naturally occurs when turbulence mixes organic matter, water and air (ex. seafoam)
  - can also form from synthetic substances like PFAS
  - synthetic substances can intermix with natural foam.
- Since mid-2020, DWR has received some reports about surface water foam and foam samples analyzed at the DWR Chemistry Lab have routinely detected the presence of many PFAS compounds.
- Similar to precautions taken to prevent contact with surface waters that exhibit indications of a waste (e.g. sewer overflow, algal bloom, oil sheen, etc.), we also recommend avoiding contact with foam.

Working to enhance

- SOP Development
- PFAS Database Process
- PFAS Field Form Development
- Internal Education /Sampling
- Lab capacities

NORTH CAROLINA Department of Environmental Quality

Contact

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Air Quality Update

Mike Abraczinskas, Division of Air Quality

November 16, 2021

NC Department of Environmental Quality

Division of Air Quality - Outline

- *Performance testing – Thermal Oxidizer/Scrubber control system*
- *Facility-wide GenX emissions cap*
- *Violation and Assessment*
- *Atmospheric Deposition Data*

Air Quality – Control Technology Improvements

- *Control Technology Improvements:* Thermal Oxidizer/Scrubber system
- By December 31, 2019, control all PFAS in process streams routed to the control system at an efficiency of 99.99%.
  - Thermal Oxidizer/Scrubber system - installed and operational on December 27, 2019
  - Testing for the 99.99% control efficiency
    - occurred in February 2020 and January 2021
  - DAQ reviewed results: 99.99% control efficiency confirmed

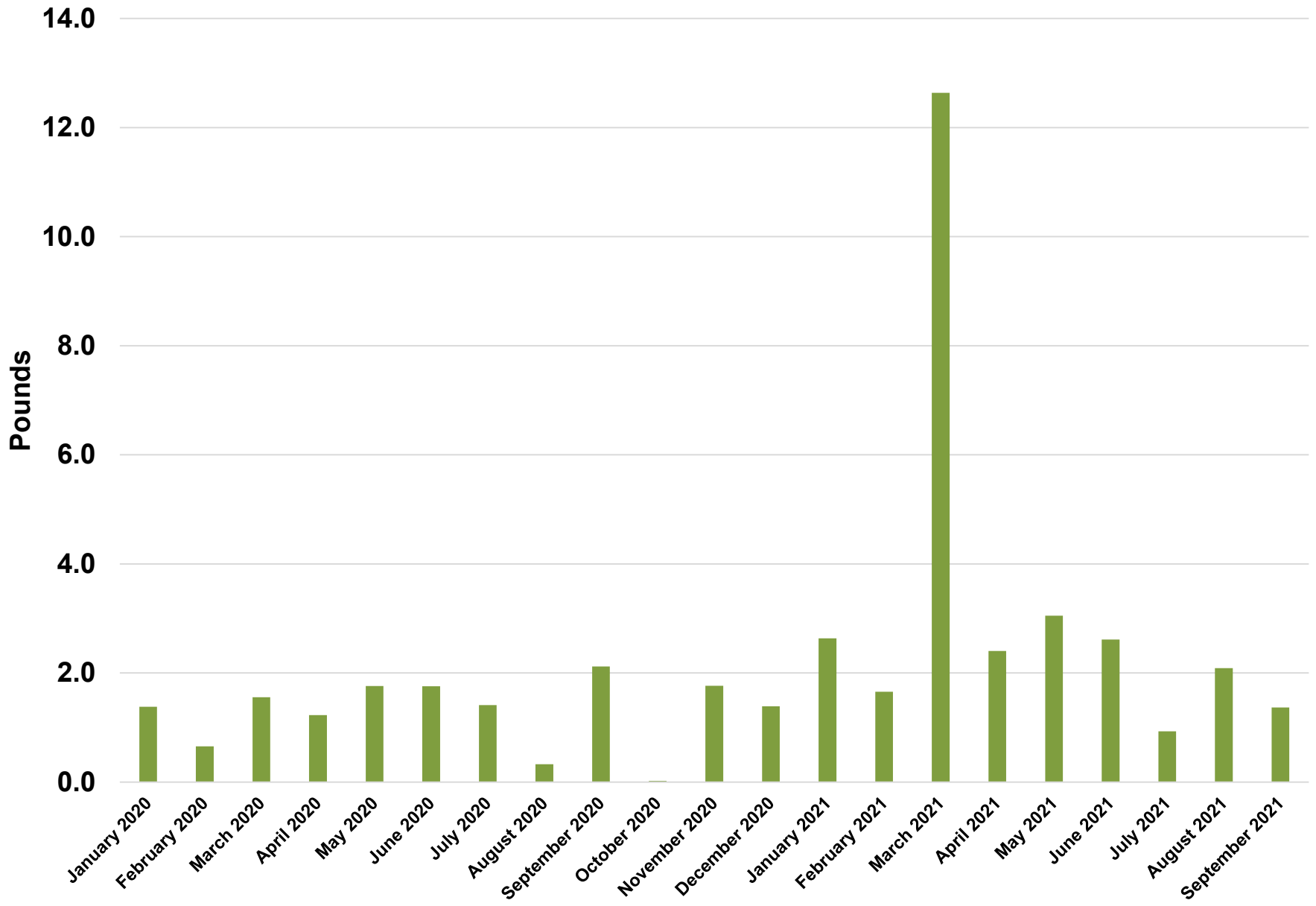
Air Quality – Facility-Wide GenX Emission Reductions

GenX Emissions Reduction Milestones

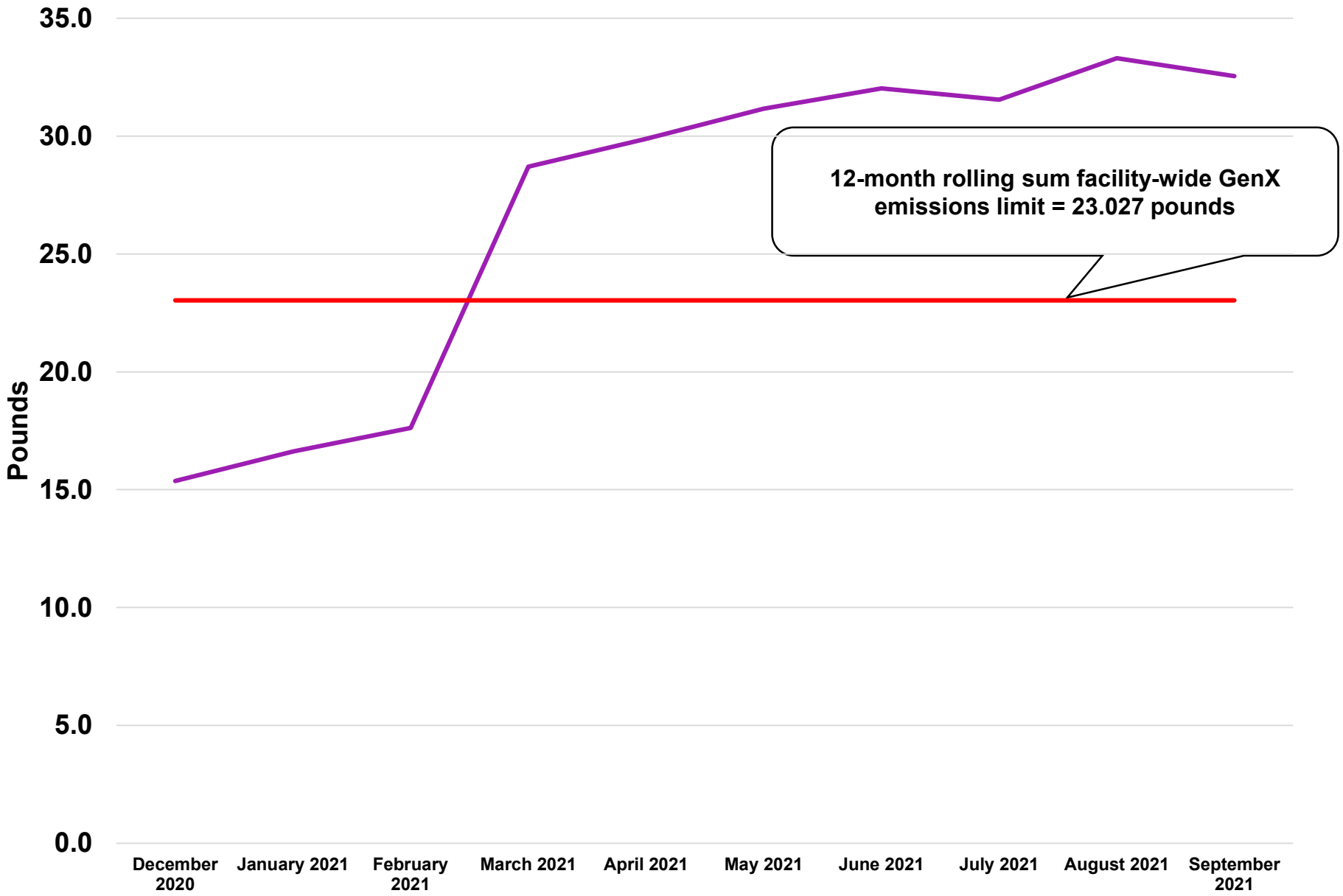
- **99%** facility-wide reduction of GenX compounds relative to 2017 total reported emissions by December 31, 2019 and for each consecutive 12-month period following that date
  - 2017 Baseline – 2302.7 lbs
  - Air Quality Permit – 23.027 lb/yr GenX emissions cap

  - 2020 reported GenX emissions – 15.36 pounds, facility wide
  - DAQ reviewed data and confirmed results

Monthly Facility-Wide GenX Emissions



12-month Rolling Sum Facility-Wide GenX Emissions



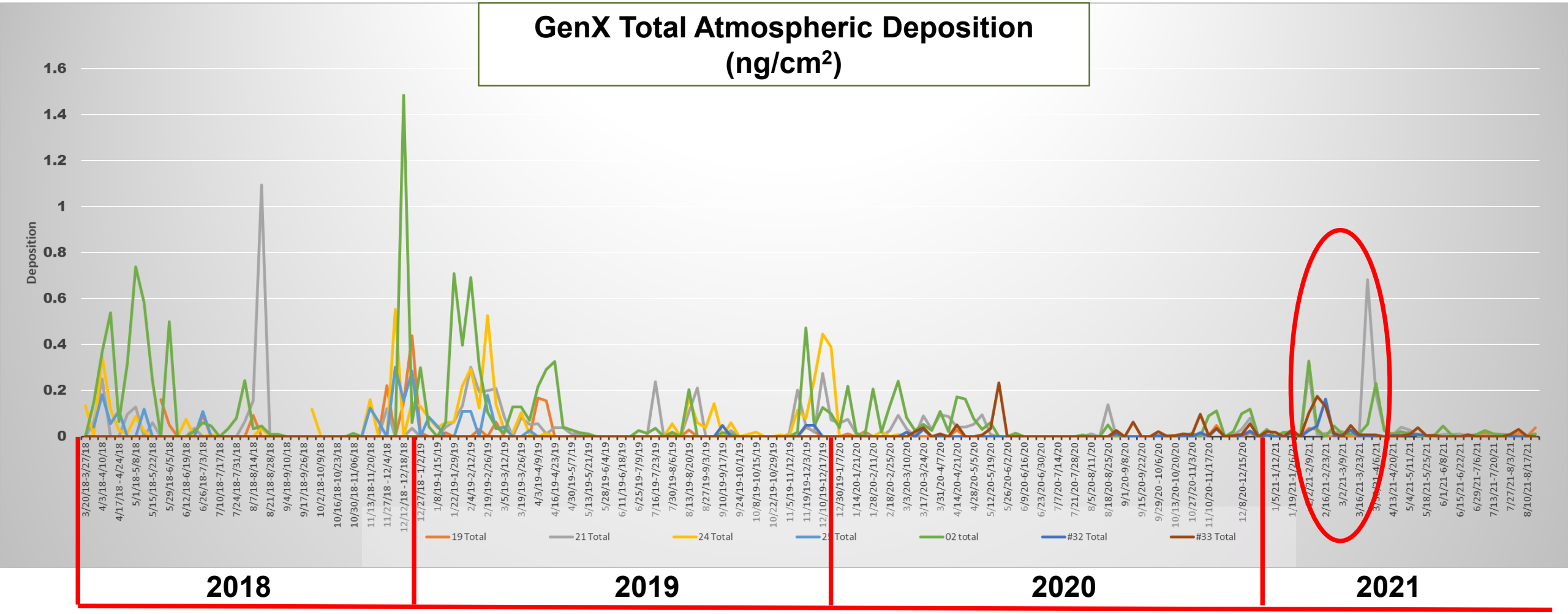
Air Quality – Facility-Wide GenX Emission Reductions Enforcement Actions

- **Issued Notice of Violation/Recommendation of Enforcement on August 26, 2021**
- **Issued Civil Penalty Assessment on October 1, 2021**
  - **7 violations for failure to reduce the 12-month rolling sum facility-wide emissions of GenX Compounds to less than 23.027 pounds (covers March-September)*.**
  - **26 violations for failure to properly operate and maintain the control device.**

- **Total assessment: $305,611.00**

*Note: noncompliance with the 12-month rolling sum of facility-wide GenX emissions limit may persist into the future beyond the date of this Civil Penalty. Any period of noncompliance that occurs subsequent to this assessment will be addressed through a separate action as appropriate.

GenX Total Atmospheric Deposition (ng/cm²)



Contact information

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Thank you!!!