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NC Department of Environmental Quality Update on PFOA / PFOS / Gen X

Topics

- Gen X
- Current Resources
- DEQ Division specifics

    1. Water Resources
    2. Waste Management
    3. Air Quality

- Secretaries' Scientific Advisory Board

- PFOA / PFOS

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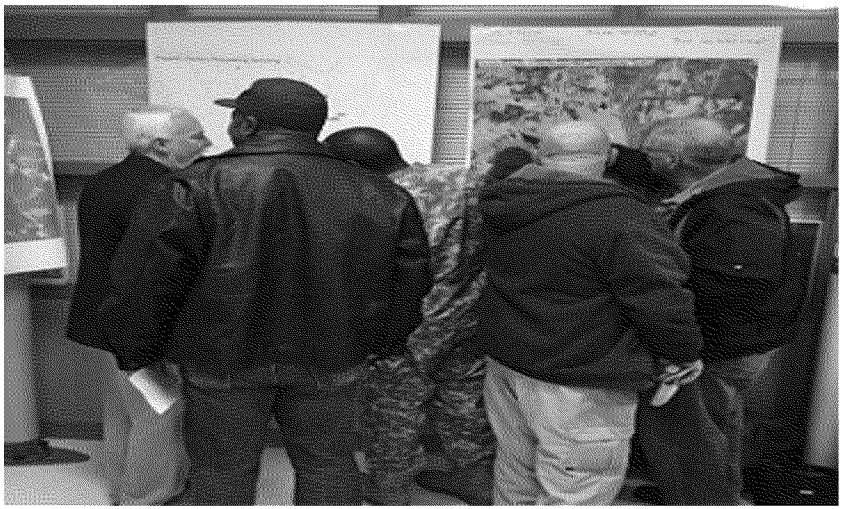
Gen X in North Carolina

- A man-made and unregulated chemical used in the manufacturing of non stick coatings and for other purposes.
- Chemours Fayetteville Facility started producing the compound in 2009 as a replacement for PFOA.
- It is also produced as a byproduct and may have been generated before 2009 at the plant.
- Initial focus in 2017 was on the Cape Fear River and public water utilities.



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Resources – Emerging Compounds

State Resources

- Department of Environmental Quality
  - Division of Water Resources
  - Division of Waste Management
  - Division of Air Quality
- Department of Health and Human Services

Federal Resources

- EPA

Local Resources

- County Health Departments
- Boards of Commissioners
- Public Water Utilities

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Areas of Focus

- Fully assess the environmental impact of the fluorinated compounds in the environment.
- Ensure current regulatory requirements are met and evaluate future needs.
- Address the needs of the surrounding communities and serve as a conduit for the community and local partners to help them respond to concerns.
- Further the knowledge base of fluorinated compounds through collaboration with the DEQ / DHHS Scientific Advisory Board.

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Recent History of the Cape Fear River data

- EPA's Third Unregulated Contaminant Monitoring Rule (UCMR) monitoring during 2013-2015 for 28 chemicals including PFOA, PFOS and 1,4-Dioxane. •
- NCSU and EPA's National Exposure Research Lab study PFOA, PFOS and other per- and poly-fluorinated chemicals in the Cape Fear River. •
- DEQ 2014-2016 study on 1,4-Dioxane, focusing on the Cape Fear River after results indicated higher concentrations than other river basins. •
- EPA NERL published a report in 2015 including the presences two compounds attributed to being byproducts of Nafion® manufacturing.
- Research findings published in Nov. 2016 on PFOA/PFOS, GenX and other related chemicals attributed to the Chemours facility.

Current Sampling

Division of Water Resources

- Two composite samples weekly at Chemours wastewater outfall into the Cape Fear River: Monday - Thursday and Friday - Sunday

- Drinking water facilities downstream are sampled weekly:

  Bladen Bluff

  International Paper

  NW Brunswick

  Pender County

  CFPU Sweeney

- Other watersheds across North Carolina

  Began monthly monitoring in Jordan Lake watershed Jan. 2nd

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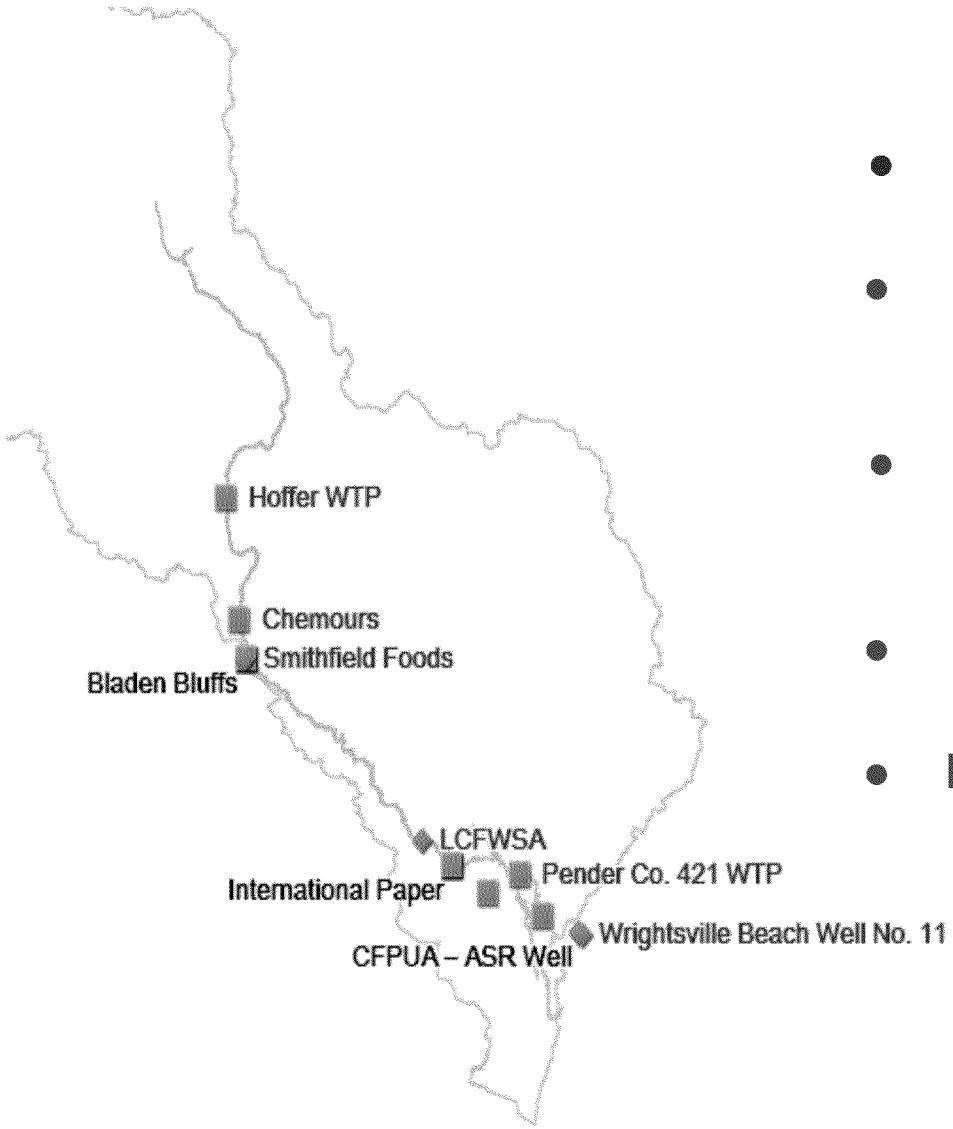
DEQ Sampling - Cape Fear River



- Process area sampling at Chemours
- Weekly composite sampling at the Chemours wastewater outfall 002
- Weekly sampling of finished drinking downstream of the Chemours facility
- Aquifer Storage Recovery Well
- Nearby Public Water Supply Wells

Chemicals Analyzed

- Currently analyzing for 23 Fluorinated Chemicals including GenX, PFOA and PFOS
- Nafion® byproducts – analysis pending from EPA

FOSA
HFPO-DA (GenX)
N-MeFOSAA
PFBA
PFBS
PFDA
PFDoA
PFDS
PFHpA
PFHpS
PFHxA
PFHxS
PFNA
PFNS
PFOA
PFOS
PFPeA
PFPeS
PFTrDA
PFUdA
4:2FTS
6:2FTS
8:2FTS

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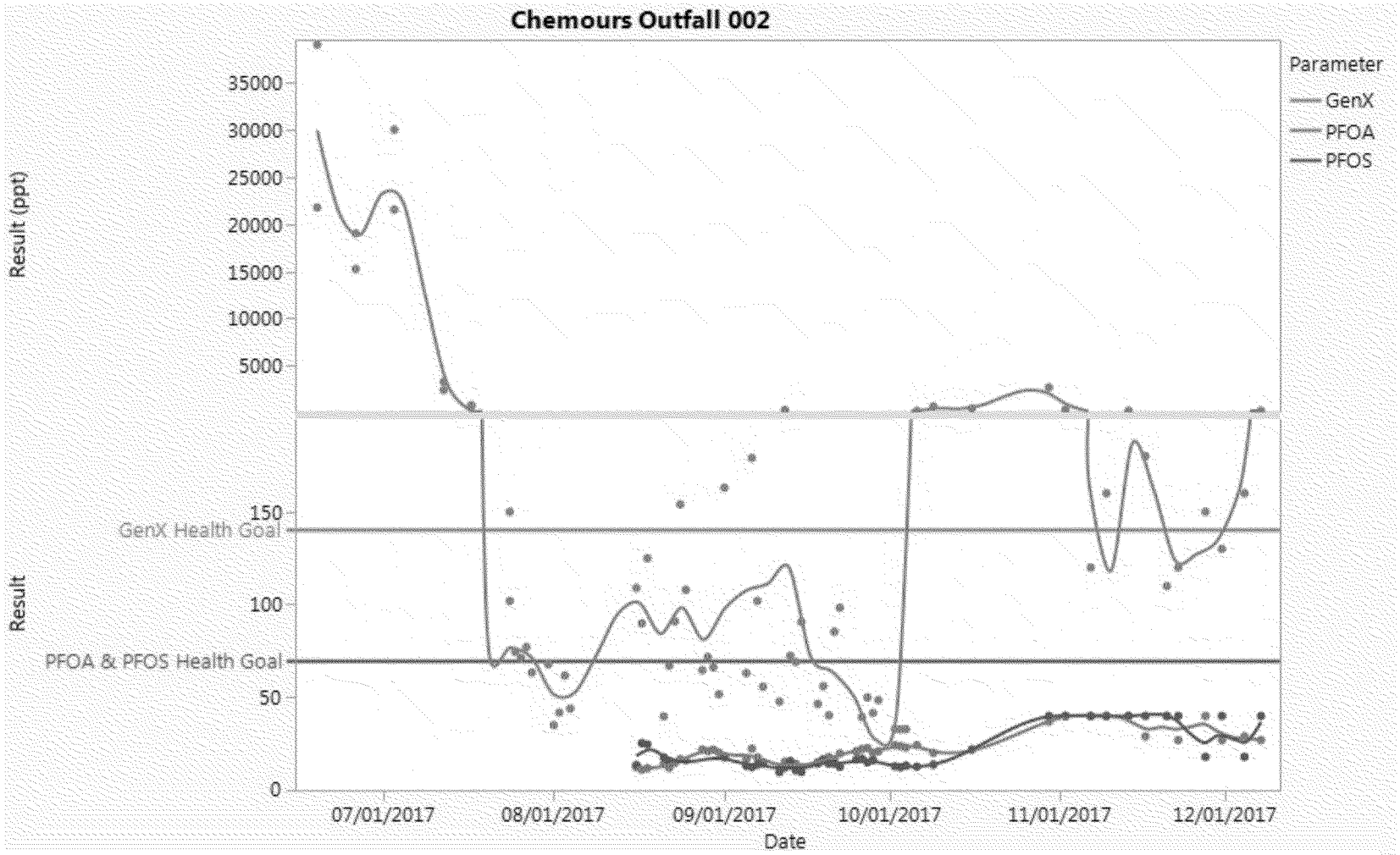
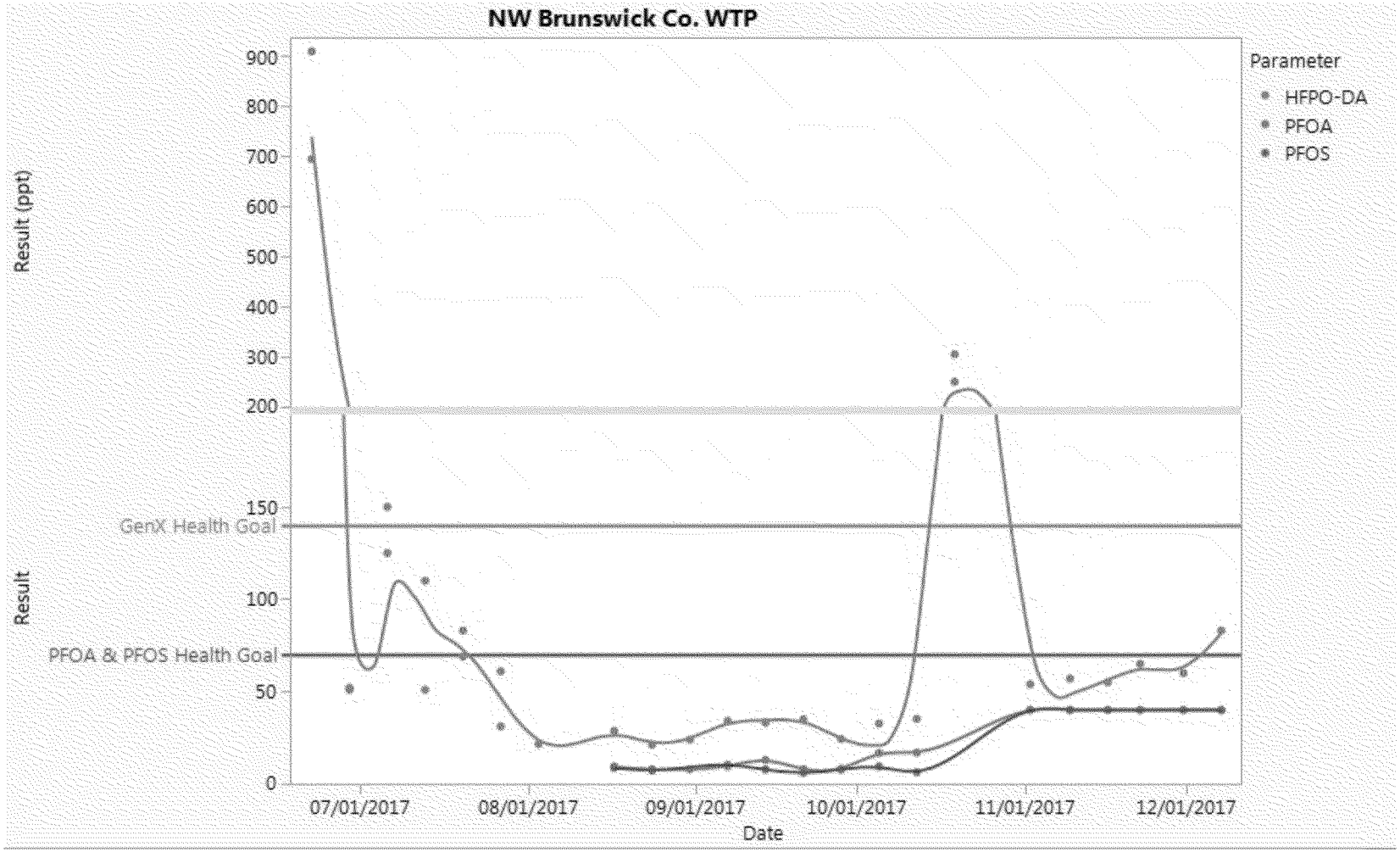
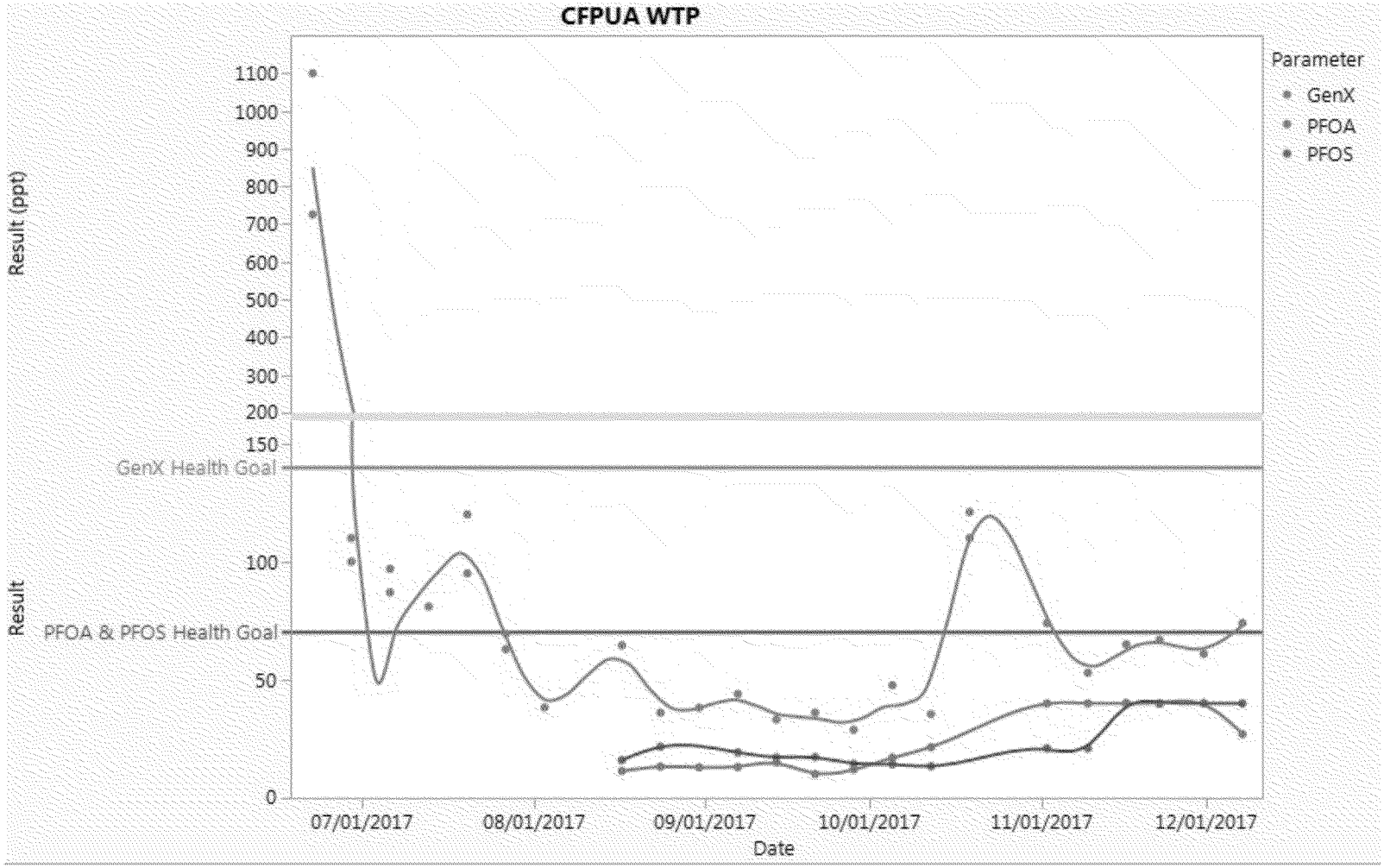
Data at Chemours Outfall 002
GenX (parts per trillion)



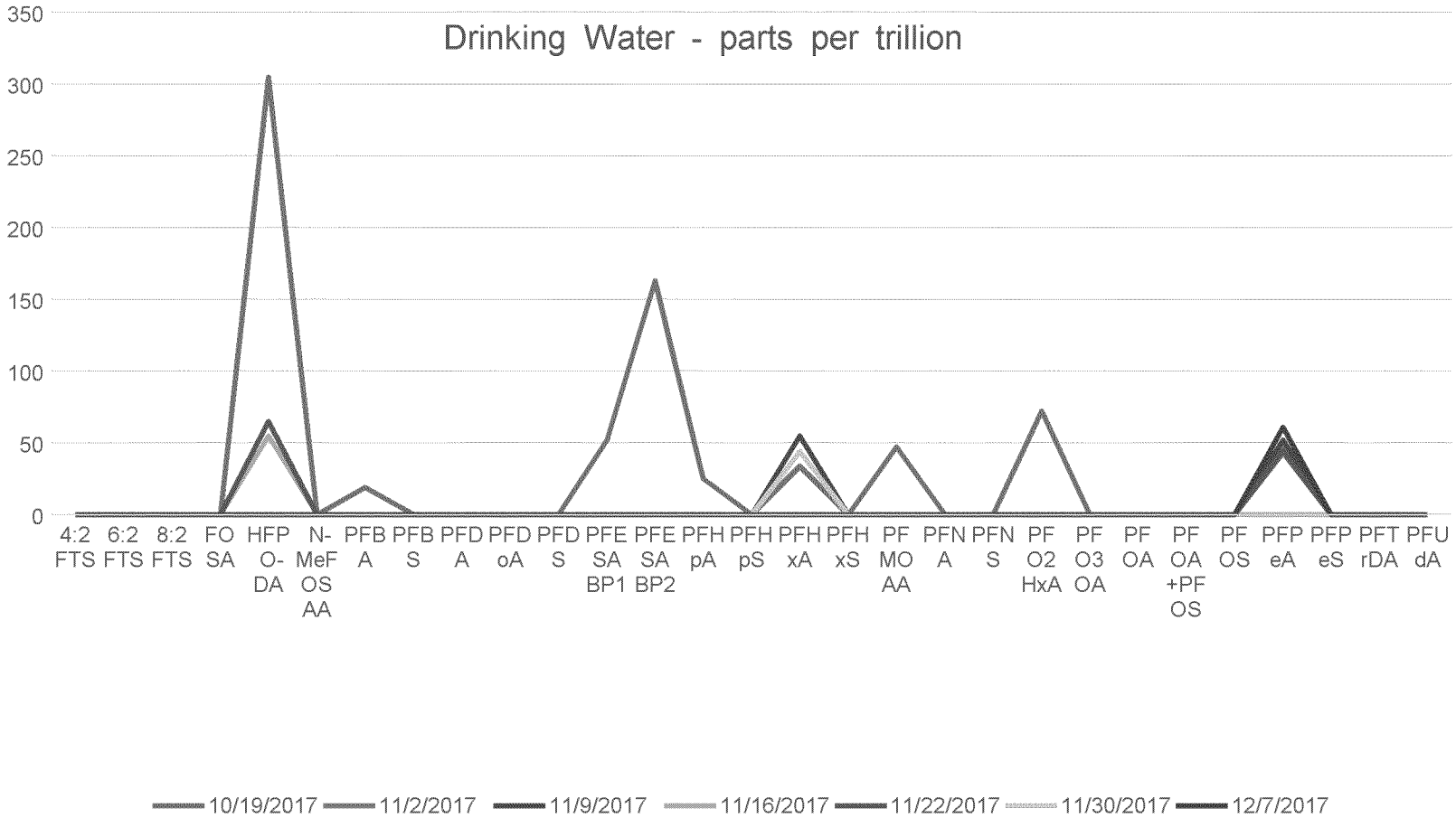
Data at Drinking Water Facilities GenX (parts per trillion)



Data at Drinking Water Facilities
GenX (parts per trillion)



Data at Drinking Water Facilities
Fluorinated Chemicals (parts per trillion)



Enforcement

- 60-day Notice of Intent to Revoke National Pollution Discharge Elimination System (NPDES) Permit (9/5/17)
- Motion for Temporary Restraining Order and Motion for Preliminary Injunctive Relief filed in Bladen County (9/7/17)
- Partial Consent Order entered with Bladen County Superior Court (9/8/17)
- Notice of Violation and Intent to Assess Civil Penalty for failure to notify of release on Oct. 6th (11/13/17)
- Notice of Partial Suspension and 60-day Notice of Intent to Partially Revoke NPDES Permit (11/16/17)

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Upcoming

- Resources to continue monitoring in the Cape Fear River basin and ambient monitoring for fluorinated chemicals across the state.
- Chemical analysis – continue EPA Athens lab analysis for weekly monitoring. Limitation – 5 week turnaround.
- Ambient monitoring will have to be coordinated to fit into EPA Athen's schedule, due to their support needed by other states.
- Evaluate factors for potential bioaccumulation and aquatic toxicity to develop surface water and groundwater standards, including SAB review.

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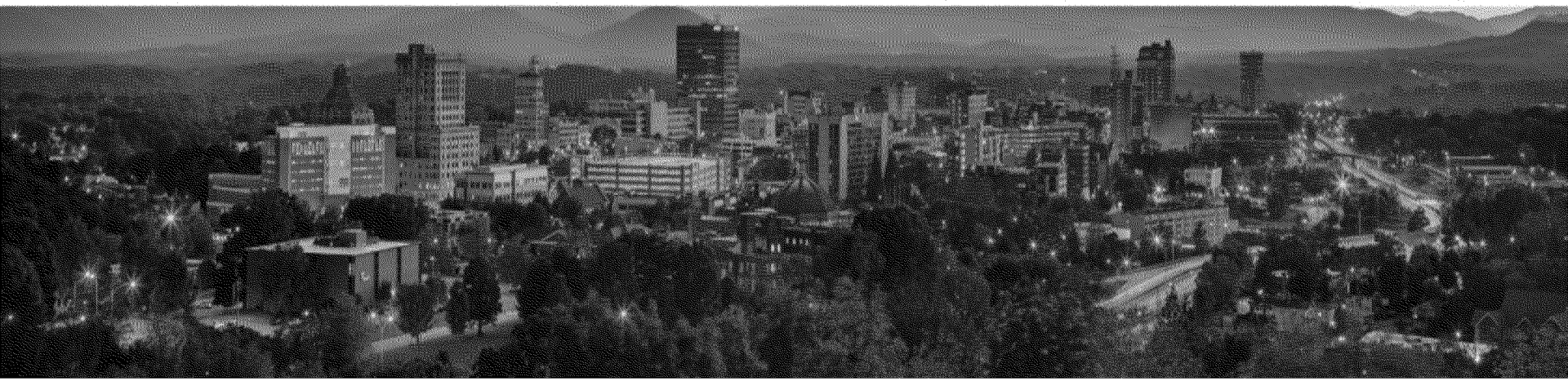
Division of Waste Management



Division of Waste Management: 19 Staff Working on GenX

Division Level

Division Director DWM Safety Officer

Public Information Officer

Hazardous Waste Section

Section Chief Toxicologist

Office Assistant

Facilities Management Branch

- Branch Manager
- Hydrogeologist

Financial and Info. Mgmt. Unit

- Processing Assistant

Compliance Branch

- Branch Manager
- Unit Manager
- Hydrogeologist
- Chemist
- 3 Environmental Senior Specialists
- 2 Environmental Senior Specialists
- Office Assistant

Color Code:

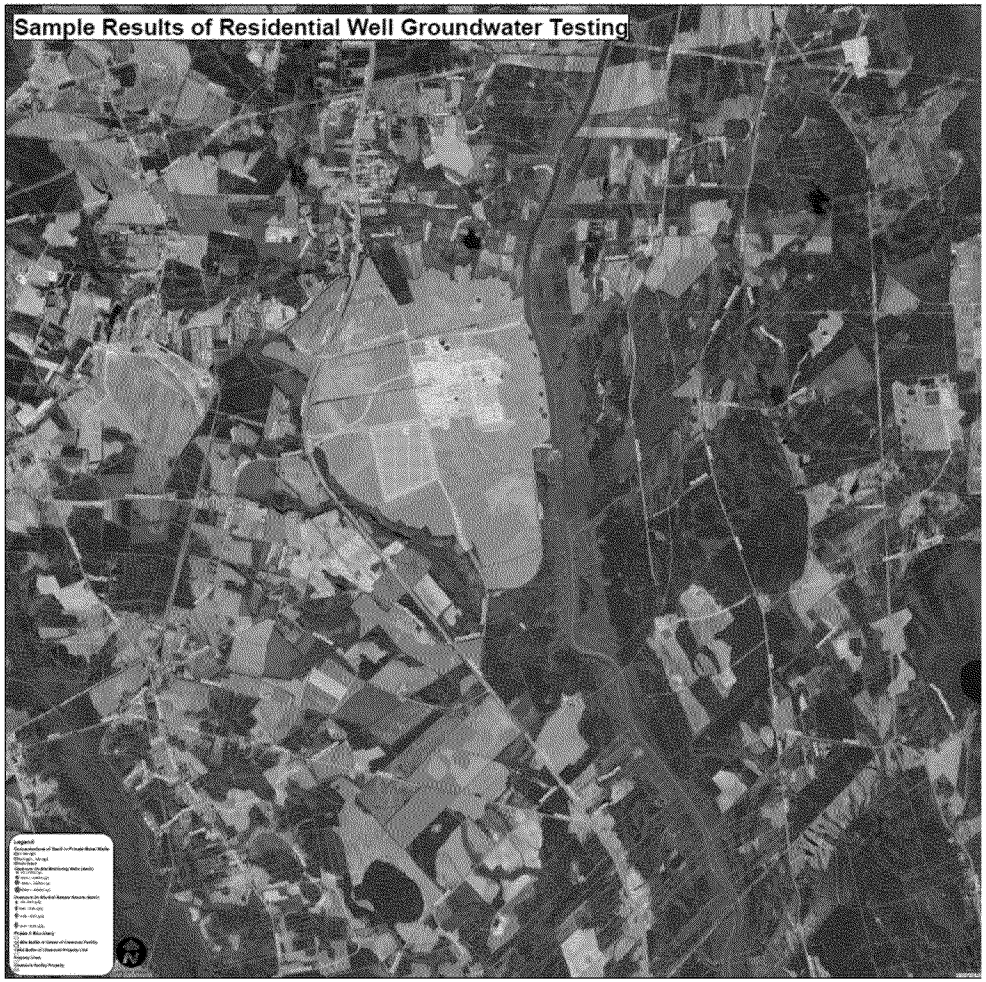
Paid by Fees

Paid by Federal Funding

Paid by State and Federal Funding

Paid by State Funding and Fees

Division of Waste Management



Well Sampling Results
in the Chemours area,
Phases 1-3
(up to ~1.5 mi. from facility border)

GenX: NC health goal = 140 ppt

Red = > 140ppt
Yellow= 0-140ppt
Green- Non detect

Combined Phase I, II, III Private Well PFAS Data Finalized as of January 12, 2018

Private Well Water GenX Summary	Phase I, II & III, Combined (%)
Distance from Chemours' border	Up to 1.5 miles
Well Collection Dates	9/6/2017 – 12/13/2017
Number of Wells tested	484
Number of Exceedances of the GenX Provisional Health Goal	151
Number of Not-Detected ("ND") GenX Analyses	123
Number of GenX Detections Less than the Health Goal [a]	210
Maximum Detected GenX Concentration	4000 ng/L

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

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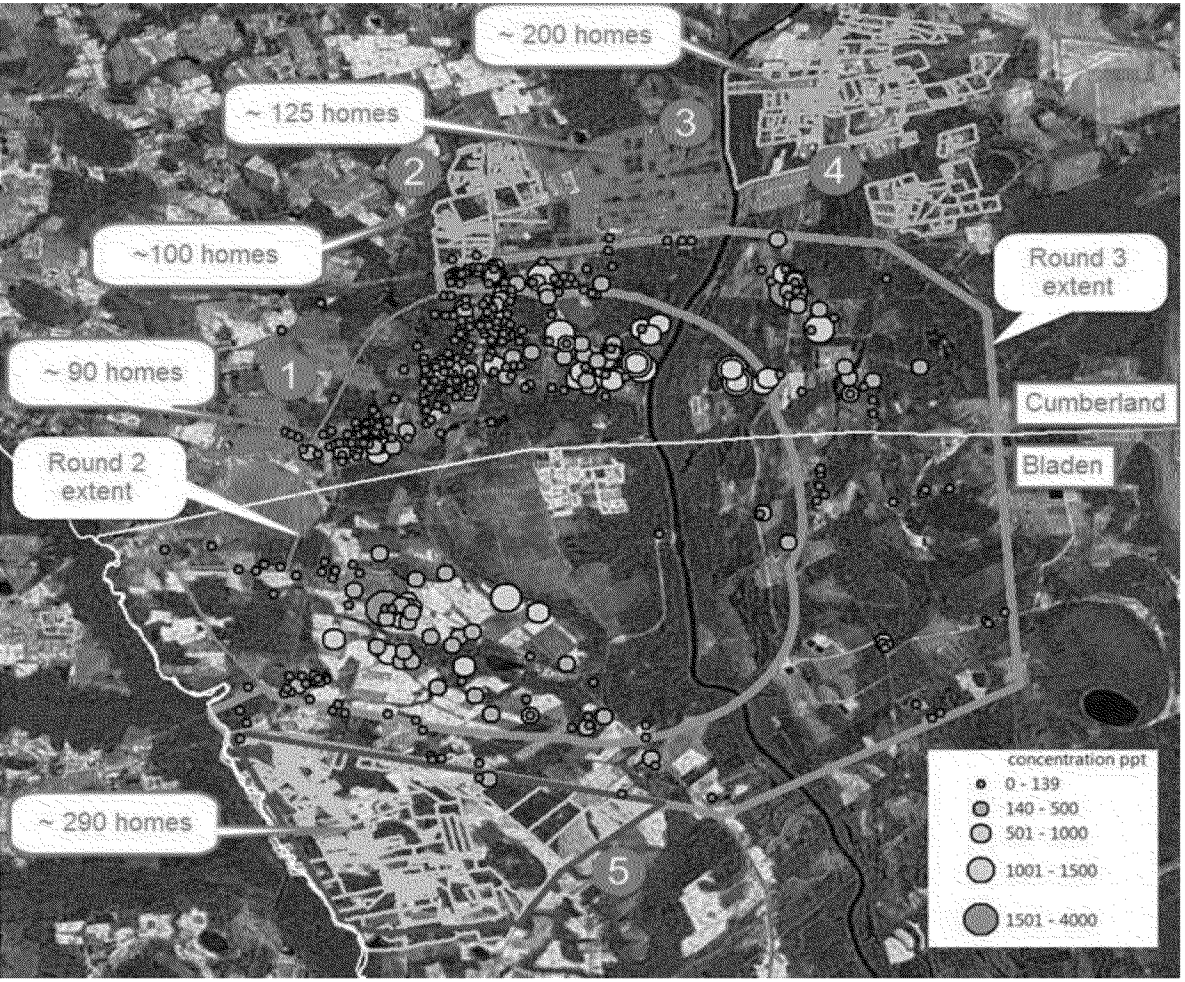
Division of Waste Management



Chemours proposed "Phase 4" sampling plan

Starts with areas in red and yellow (2, 4 and 5)

Will move on to blue areas depending on results

Alternate Water Update

- Bottle water is currently being provided to Bladen and Cumberland County residents who have GenX above the state's provisional drinking water health goal of 140 parts per trillion.
- Chemours delivers a letter to each residence that has an exceedance with 5 cases of water.
- DEQ reviews lab data and sends a health risk evaluation letter to each well owner noting appropriate uses of the water.
- Each residence is then set up with Cyrstal Springs who provides water dispensers.
- Bottle water is also available at the Chemours plant after an exceedance is detected.

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Granular Activated Carbon Point of Use Filtration Systems

- Chemours has submitted to DEQ a proposal to install granular activated carbon filtration systems for residences with GEN X present in the well above 140 ppt
- DEQ has provided initial feedback to Chemours to include the requirement to install 4 additional filter systems for sampling
- DEQ and Chemours/ consultant would sample the systems over the next few months to determine carbon filter effectiveness

Chemours testing of a residential point of use (POU) water treatment system

- Chemours Employee POU water treatment system
- DEQ-collected 12/20/17, analyzed for expanded PFAS suite
  - A high concentration of GenX (845 ng/L) was present in the pre-filter sample that was not detected in the carbon-treated samples
  - The "post-filter, no purge" sample simulates Chemours' sample collection practice; DEQ purges the water lines prior to sample collection
  - 16 PFAS were detected in the pre-filter sample, 1 PFAS was detected in the post-filter sample (1.08 J ng/L GenX)
  - Data summary -
    - Pre-filter: 845 ng/L GenX; 15.5 (PFOS + PFOA); 1491 ng/L Total PFAS
    - Mid-filter: 1.36 J ng/L GenX; ND (PFOS + PFOA); 1.58 ng/L Total PFAS
    - Post-filter: 1.08 ng/L GenX; 1.08 (PFOS + PFOA); 1.08 ng/L Total PFAS
    - Post-Filter, No Purge – all ND

J = estimated concentration, greater than the detection limit and less than the reporting (quantitation) limit

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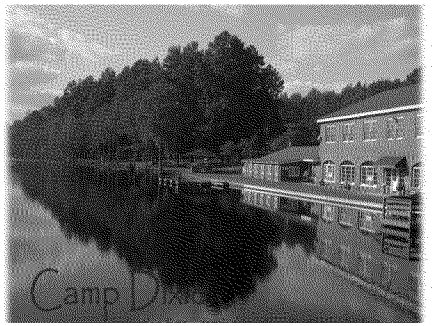
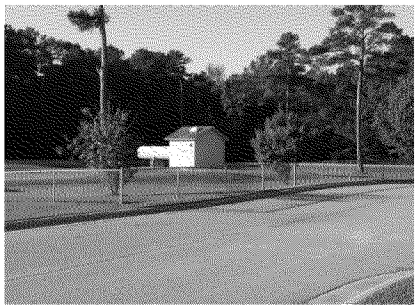
Additional DEQ Sampling

- Two Cumberland County Elementary school wells were sampled. (Gen x levels of 5 ppt and Non detect)
- Surface water samples were collected at Camp Dixie in Bladen County and Marshwood Lake In Cumberland County. (Gen x levels of 620 and 915 ppt)
- DEQ has worked collaboratively with DHHS to address use of recreational areas.
- DEQ has also sampled an athletic field in Cumberland County that used well water onsite.





Next Steps – Private Well Water

- PWW Next Steps:
  - Continue PWW testing ("Phase IV") farther from Chemours – see map of planned areas for next sampling set
  - Identify treatment technologies that are effective at removing all PFAS from drinking water sources and other human and ecological exposure sources
  - Continue to work with Chemours, locals govts on potential long-term solutions
- Future steps:
  - Full characterization of the PFAS contamination and exposure pathways for human and ecological receptors
  - Characterize variability of individual PFAS contaminant fate and transport characteristics
  - Gather and assess toxicity profiles for human and ecological receptors

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Next Steps - Continued

- Mitigate on-site releases to environment in all media
  - Implementation of On-site investigation
    - Report due January 31, 2018
    - Review to be completed by March 15, 2018
    - Additional on-site sampling during Summer 2018

- Full delineation of soil and groundwater contamination, off-site
  - Implement Off-site soil and groundwater investigation 2018/2019
  - Install off-site soil borings and monitoring wells
  - Analyze and map results

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Next Steps - Continued

Remediate and/or control soil and groundwater contamination found off-site to protect human health and the environment

- Corrective Measures Study
- Select Remedial Options
- Implement Long-Term Remedies

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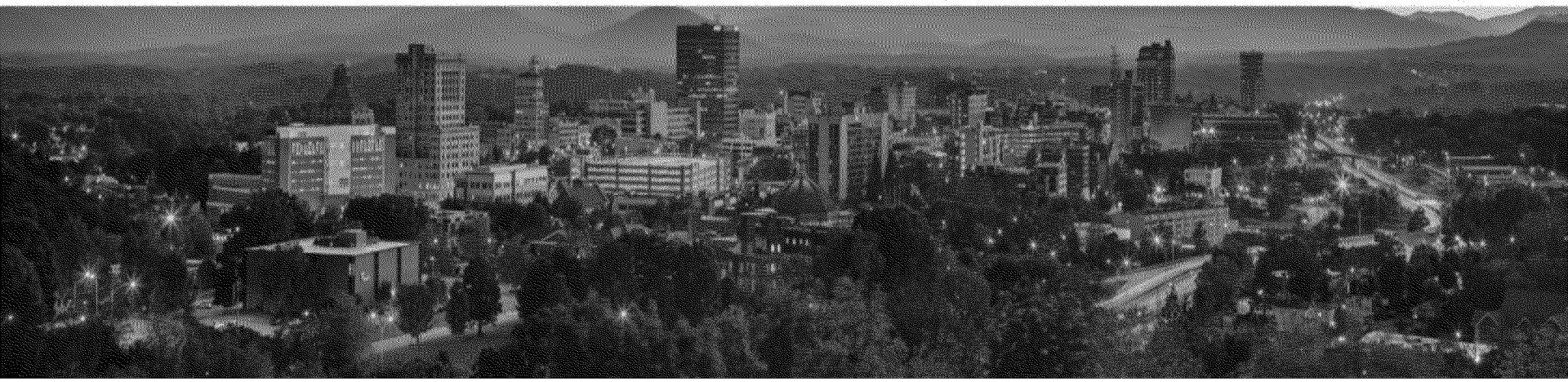
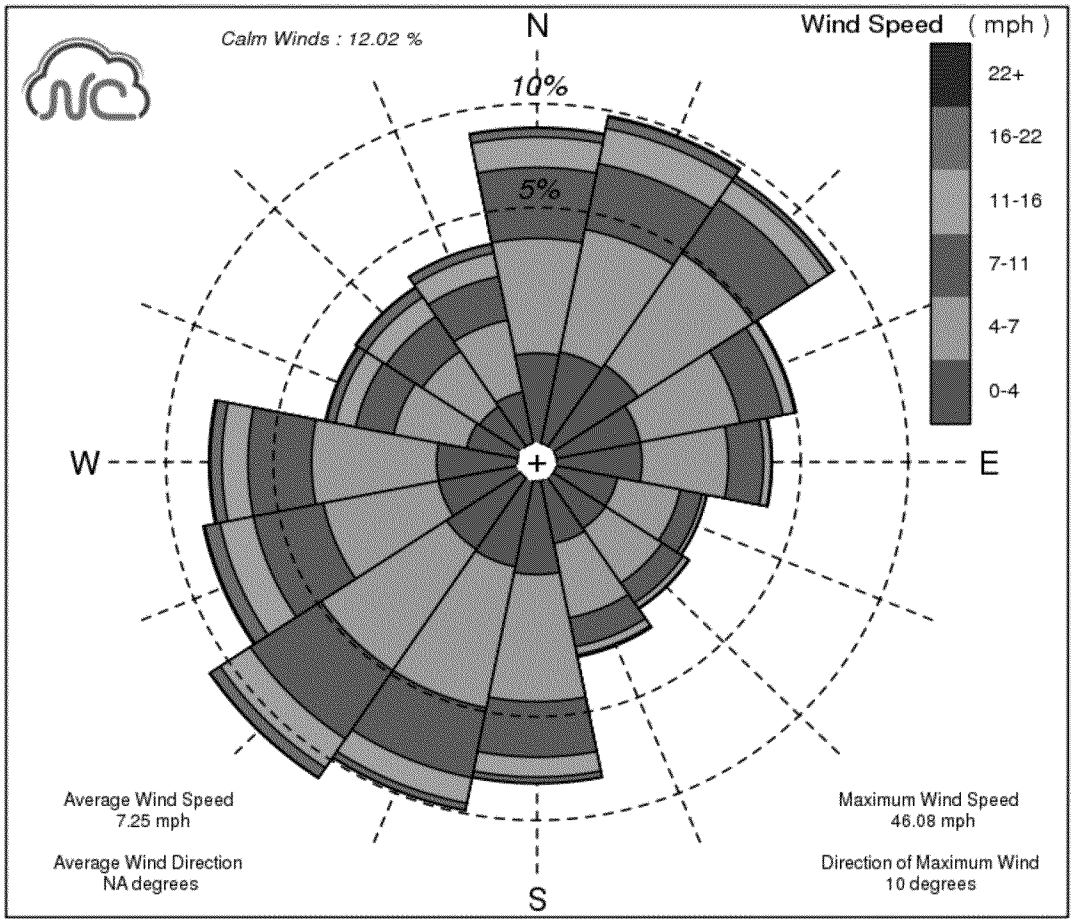


Chemours reported air emissions (pounds per year)

	2012	2013	2014	2015	2016
C3 dimer acid fluoride	500	539	545	669	591
C3 dimer acid (GenX)	1	3	4	3	3
C3 dimer acid ammonium salt	1	3	3	2	2

- **All data based on chemical process computational model.**

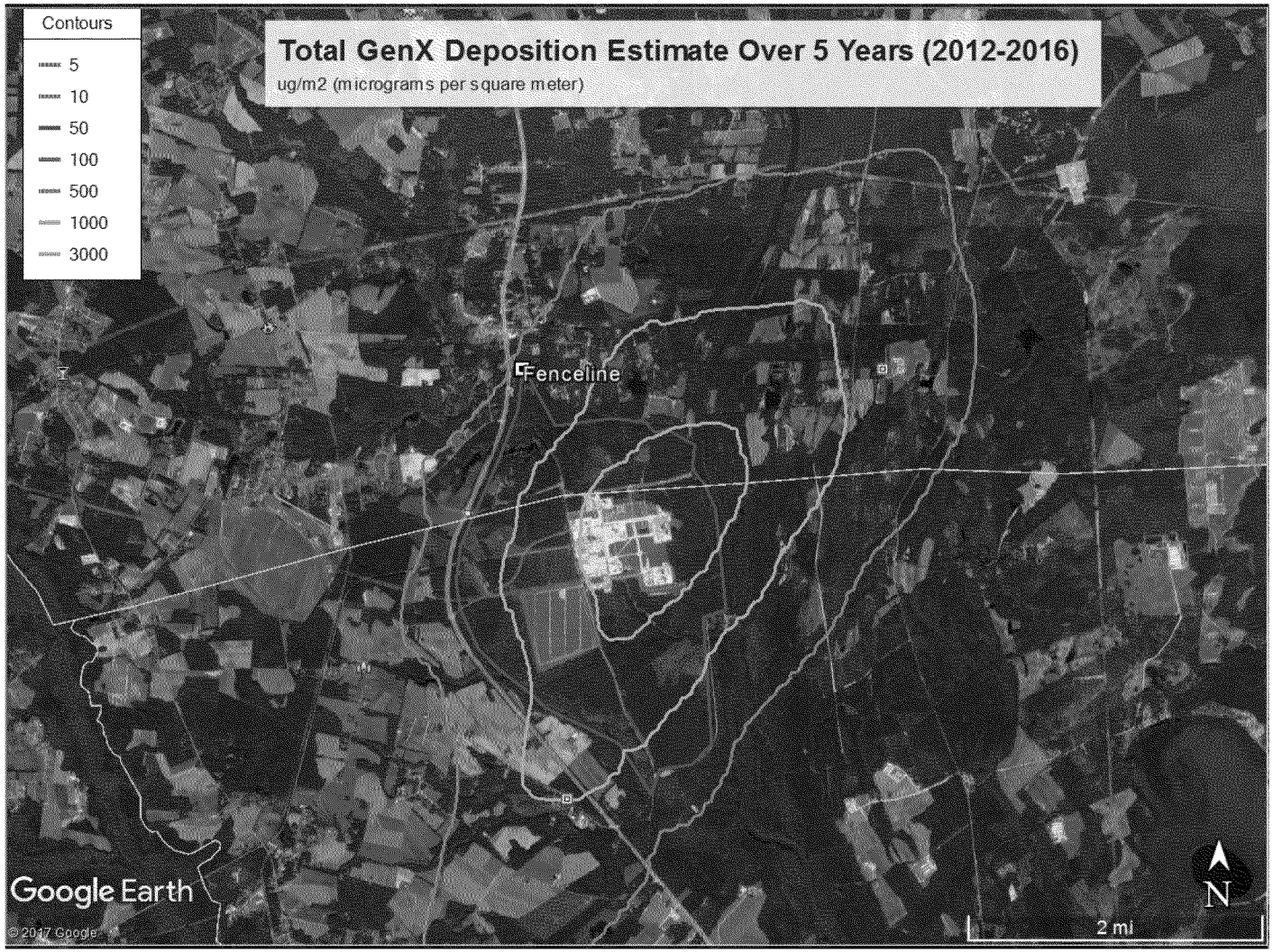
Wind Rose for Fayetteville Airport (KFAY)
Jan. 10, 1998 to Sep. 29, 2017



Air Dispersion Modeling

- Chemours reported emissions for 2012-2016
  - GenX compounds only
- Actual stack characteristics
- Hourly meteorology over the 5-year period

Division of Air Quality



Air Emissions Testing or “Stack Testing”

Capture and quantification of specific pollutants being emitted to the atmosphere from a process through the stack.

Chemours has submitted a protocol to define which sources they will test, which test method they will use and which contaminant they will target for quantification.

Division of Air Quality

Air Emissions Testing or "Stack Testing"

- Target contaminant – C_3 Dimer Acid (GenX)

- Sources to be tested:
  - Fluoromonomers, Nafion, and Polymer Processing Aid (PPA) processes
  - Test Locations - Division, VE South Scrubber and PPA stacks

- Shake-down testing – January 9 & 12
- Full scale testing – week of January 22 & beyond
  - Split samples for independent assessment by EPA lab
- Results expected late February/early March

Division of Air Quality

<u>Ambient Air Quality Monitoring</u>

- Network of wet deposition monitors planned
- Goal: Quantify near-field deposition rates and confirm cause/effect relationships. Quantify "background" amounts of PFAS in rainwater.
  - Source-oriented sites near Chemours
    - 2 northeast of facility
    - 2 southwest of facility
  - Background sites
    - Asheville
    - Raleigh
    - Candor
    - Wilmington

Division of Air Quality

What control techniques will eliminate or significantly reduce the air emissions of interest?

- Exploring all options.
- Studying technologies, gathering available test data.

- Understanding secondary impacts of adding air pollution controls to reduce PFAS.
  - Solid waste generated?
  - Waste water generated?
  - Secondary air pollutants generated

Description of the Science Advisory Board and its work

The board of 16 experts in toxicology, public health, ecology, engineering and related fields will study ways to better protect North Carolina's people and environment from new and emerging chemicals of concern, including GenX and hexavalent chromium.

- Under the board's new charter, the scope of its work has expanded from toxic air pollutants to a broader focus on the impact of new and emerging chemicals. Members come from academic institutions, the public and private sectors, and independent research facilities.

- Examine new and emerging chemicals and their potential impacts to human health and the environment.
    - Assisting the agencies in identifying contaminants of emerging concern and helping determine whether the contaminants should be studied further.
    - Evaluate the human health impacts of exposure to hazardous contaminants, and give input to DHHS as the agency establishes health goals for emerging contaminants.

- The board will meet at least six times each year.

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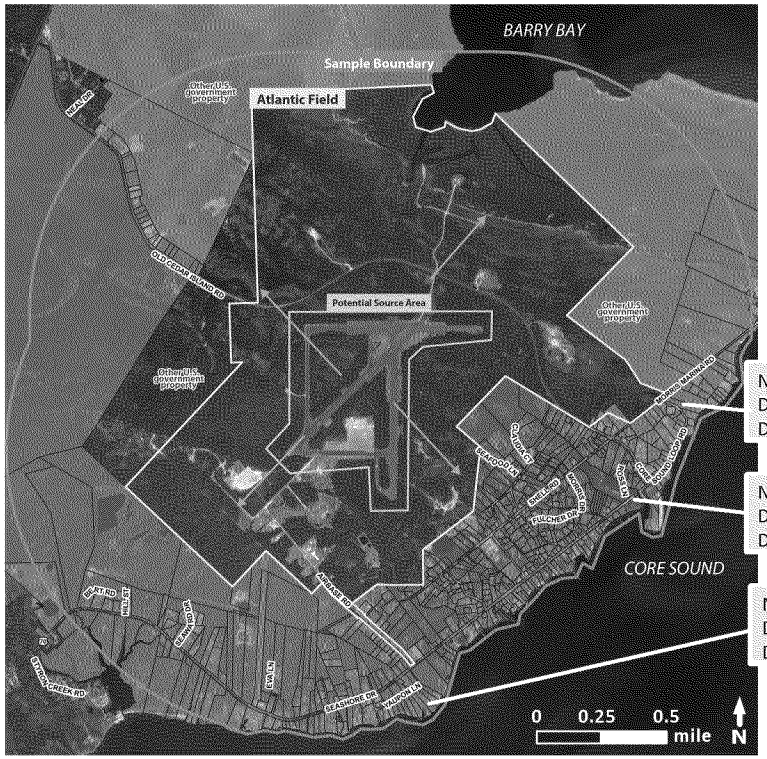
Marine Corps Outlying Field (MCOLF) Atlantic



- 223 drinking water samples were collected in the sampling area during initial sampling by the Navy in Nov-Dec 2017.
- 197 samples had non-detect values.
- 26 samples had detections.
- 2 samples had detections above the EPA lifetime health advisory (LHA) of 70 parts per trillion (ppt).*

*The 2 samples with detections above the EPA lifetime health advisory are included in the number of detections.

No detections – 96% (26 of 27)
Detections less than LHA – 4% (1 of 27)
Detections greater than LHA – 0% (0 of 27)

No detections – 87% (117 of 134)
Detections less than LHA – 12% (17 of 134)
Detections greater than LHA – 1% (1 of 134)

No detections – 80% (54 of 62)
Detections less than LHA – 18% (8 of 62)
Detections greater than LHA – 2% (1 of 62)

LEGEND
Parcel
Assumed Groundwater Flow Direction

Marine Corps Outlying Field (MCOLF) Atlantic

- Navy is the lead; DEQ is acting in a supporting role to the Navy
- DEQ participated in a public meeting held by the Navy in Atlantic, NC on November 8, 2017
- DEQ is participating in a second public meeting on February 21, 2018
- DEQ is one of the primary point-of-contacts for the local community

Questions?

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Department of Environmental Quality

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