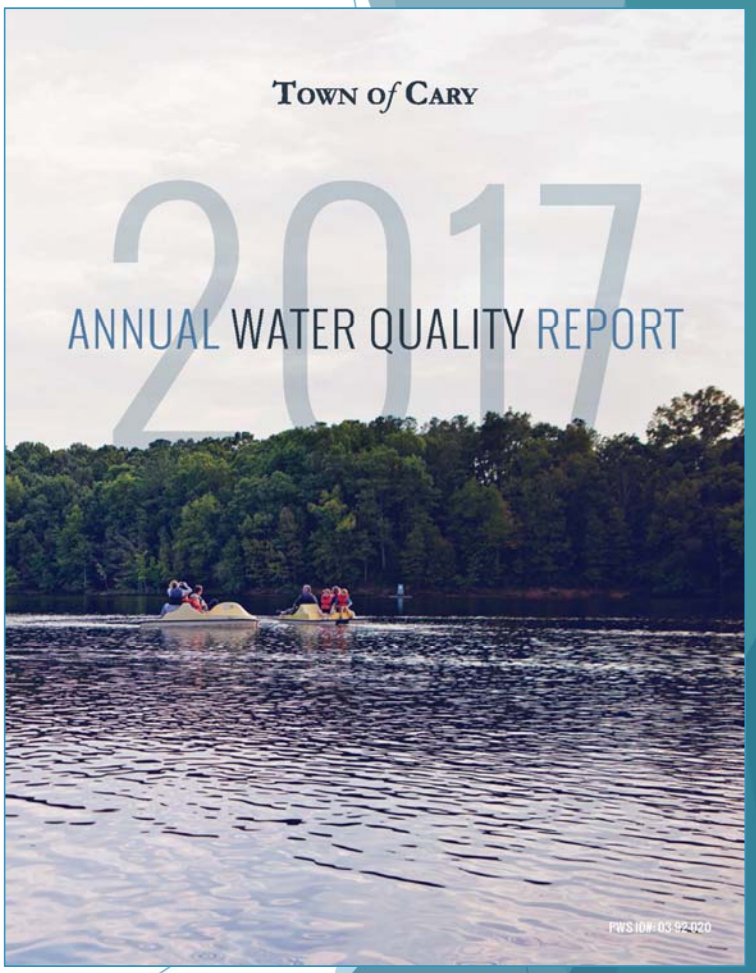
Cary's Water Quality

Emerging Contaminants Update

UCFRBA

November 13, 2018




Cary’s Water System Maintains Exceptional Water Quality and Has Been a Partnership for Safe Water Director’s Award Winner for 14 Years
PARTNERSHIP FOR SAFE WATER

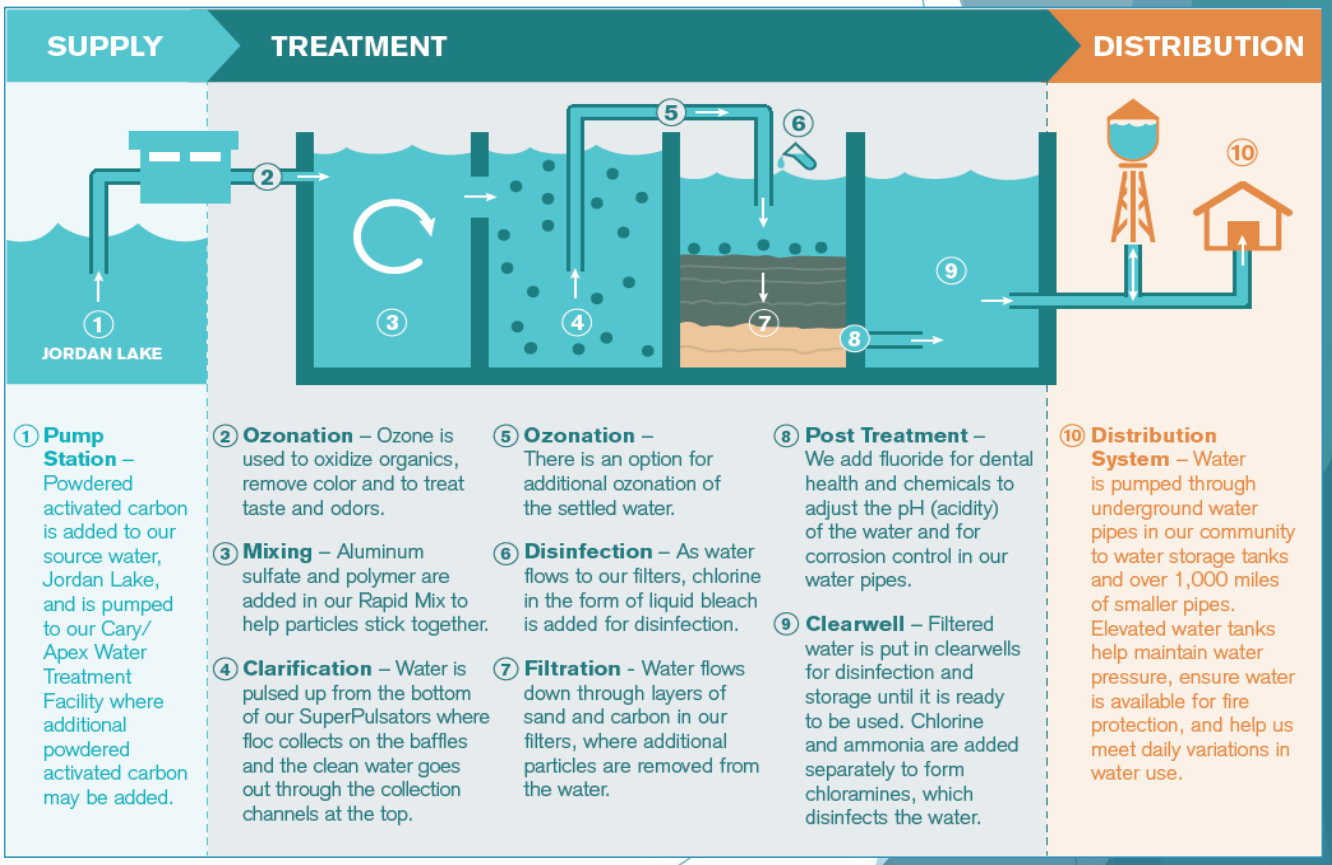

SOUTHEASTERN
DISTRIBUTORS
1-800-869-6327
WATER
METER
CITY OF
GREENSBORO

B. Everett Jordan Dam and Lake
US Army Corps of Engineers
Wilmington District
North Carolina
Morgan Creek Arm
Haw River
New Hope Arm
Cary/Apex/Morrisville/Chatham Intake
Low-End Elevation of Boat Ramps
RECREATION AREAS
US Army Corps of Engineers Visitor Assistance Center
Vista Point
Poplar Point
Ebenezer Church
New Hope Overlook
Crosswinds Campgrounds
Parkers Creek
Seaforth
White
Wildwood
Farrington Point
Pea's Ridge
Moncure
New Hill
Griffins Crossroads
Chapel Hill
Durham
Cape Fear River
Deep River
Haw River
Chatham County
Lee County
Orange County
Durham County
Wake County

Cary's Water Treatment Process

Multiple Barrier Approach

- Activated Carbon Adsorption
- Raw Water Ozone
- Activated Carbon Adsorption
- Coagulation
- Flocculation/Sedimentation
- Settled Water Ozone
- Dual Media Filtration
- Chlorine Primary Disinfection
- Chloramine Secondary Disinfection
- Corrosion Control/Fluoridation

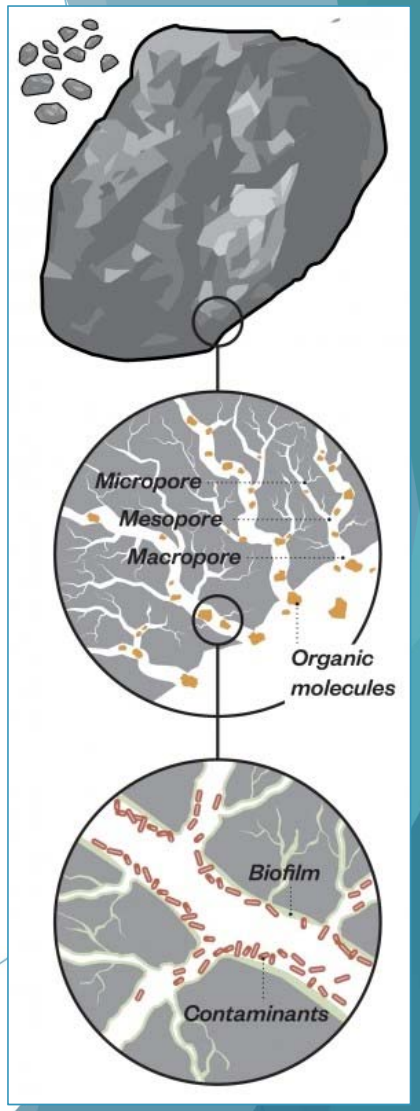


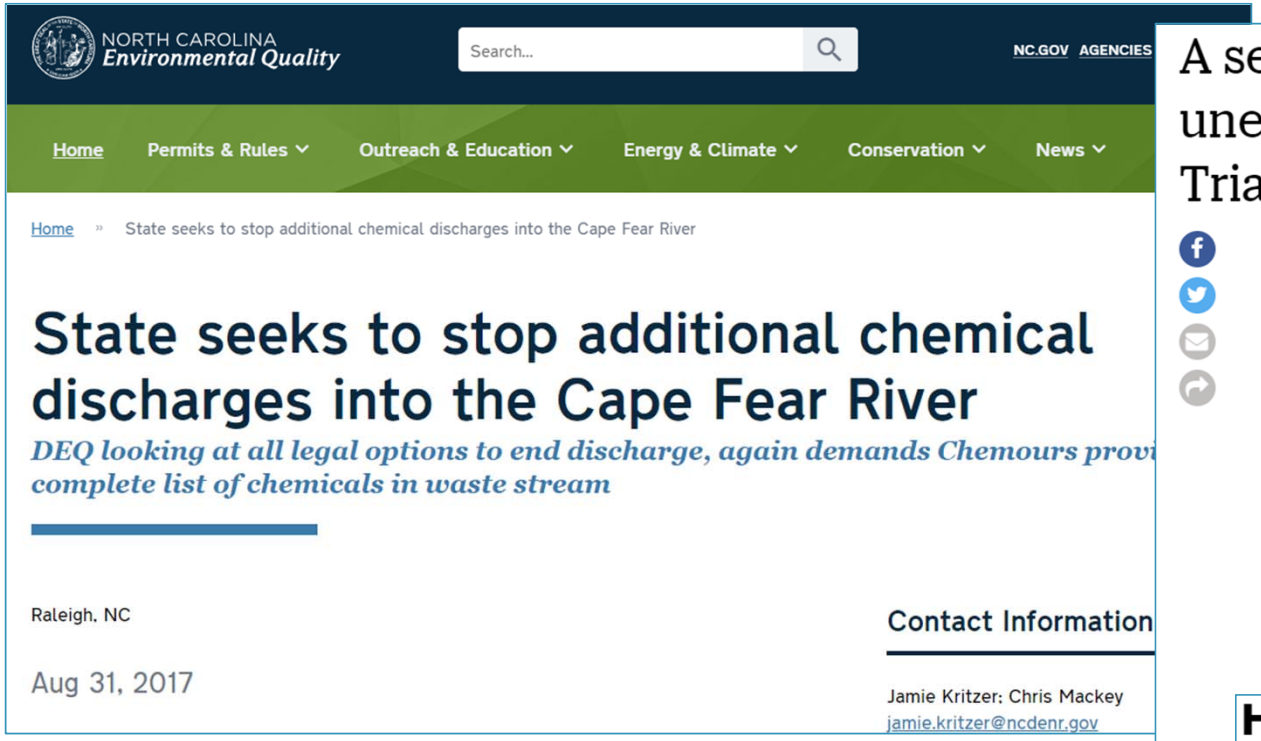
Water Quality Management Approach

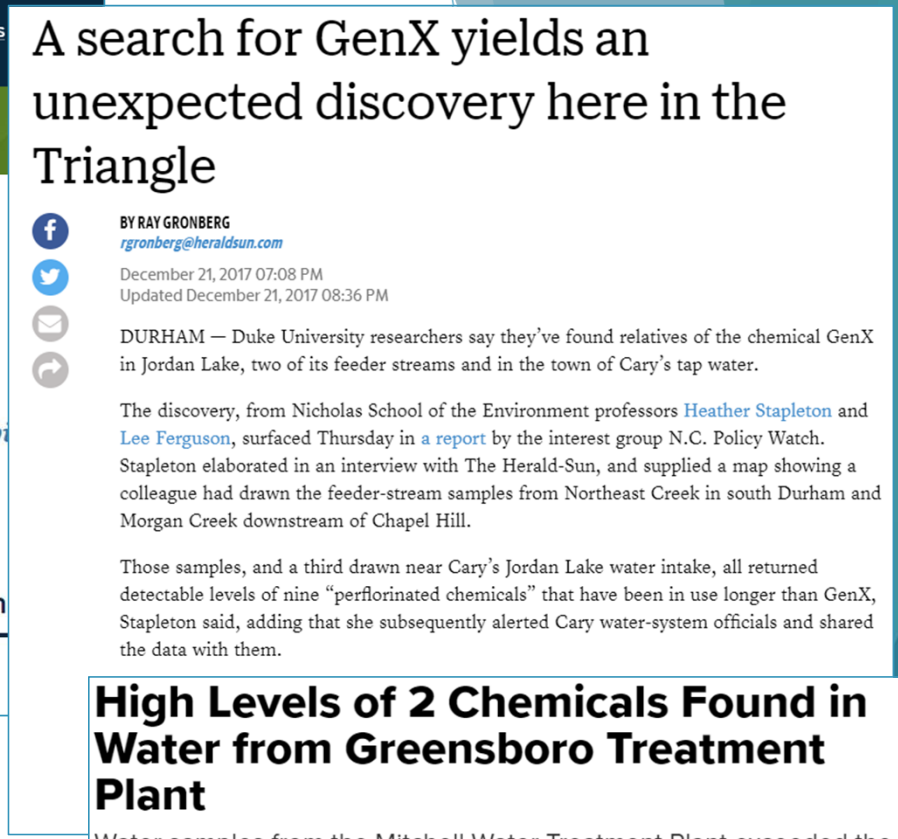
Certified Laboratory	▪ Monitor, analyze, and evaluate over 50,000 samples per year ▪ Respond to citizen inquiries
Regulatory Sampling	▪ Meet or exceed all regulatory standards ▪ Provide Annual Consumer Confidence Report
Process Control Management	▪ Seasonal adjustments to treatment process ▪ Field testing of Water Quality Parameters
Flushing Program	▪ Ensure water quality though entire system ▪ Maintain network of 126+ sampling stations

Planning for the Future: Ozone + Biofiltration

- Long-term, existing program
- Maximize benefits of multiple barriers
- Address emerging contaminants
  - ✓ Pharmaceuticals
  - ✓ Endocrine disruptors
  - ✓ Personal care products
  - ✓ Algal toxins
  - ✓ 1,4-dioxane
- Reduce disinfection by-products, taste & odor more efficiently







What about PFAS?

Per- and Polyfluoroalkyl Substances

PFAS & PFCs in Context

- Perfluorinated chemicals have used for more than 50 years
- Hundreds of chemicals in this class
- People have contact with these chemicals in multiple ways
- Technology can now measure to parts per trillion levels in water
- Not currently regulated in water systems
- EPA has issued a health advisory of 70 ppt for PFOS and PFOA
- Some States are establishing their own regulatory limits

Unregulated Contaminant Monitoring

- UCMR3 testing in 2015
- 6 PFCs tested
- One detection of PFHpA at 0.01 ppb
- Method detection limits at ppb range

UNREGULATED CONTAMINANT MONITORING RULE PART 3 (UCMR3) [4]			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
1,4-Dioxane (ppb)	2015	0.42	0.16–0.77
Chlorate (ppb)	2015	109	89–130
Hexavalent Chromium (ppb)	2015	0.02	ND–0.05
Perfluoroheptanoic acid (PFHpA) (ppb)	2015	0.01	ND–0.01
Strontium (ppb)	2015	61	55–68
Vanadium (ppb)	2015	0.1	ND–0.3

Results of Perfluorinated Compounds from the UCMR3 Testing

Date Collected	Sample ID	Perfluorobutanesulfonic acid (PFBS) (ug/L)	Perfluoroheptanoic acid (PFHpA) (ug/L)	Perfluorohexanesulfonic acid (PFHxS) (ug/L)	Perfluorononanoic acid (PFNA) (ug/L)	Perfluorooctane sulfonate (PFOS) (ug/L)	Perfluorooctanoic acid (PFOA) (ug/L)
2/4/2015	EP1 - Finished Entry Point	<0.09	<0.01	<0.03	<0.02	<0.04	<0.02
5/6/2015	EP1 - Finished Entry Point	<0.09	<0.01	<0.03	<0.02	<0.04	<0.02
8/10/2015	EP1 - Finished Entry Point	<0.09	<0.01	<0.03	<0.02	<0.04	<0.02
11/4/2015	EP1 - Finished Entry Point	<0.09	0.01	<0.03	<0.02	<0.04	<0.02

What's a part per trillion?

Parts per million (mg/L)

- 3 drops in a barrel

Parts per billion (ug/L)

- 1 drop in a tanker truck

Parts per trillion (ng/L)

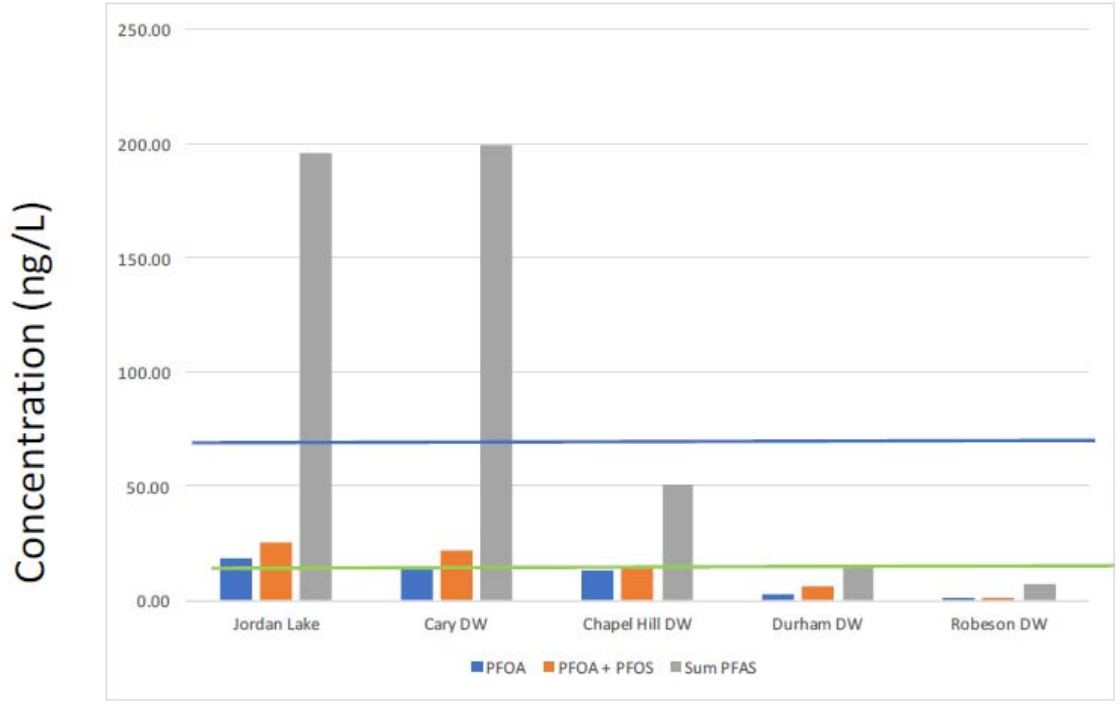
- 10 drops in a football stadium of water
- 1 grain of sugar in an Olympic swimming pool
- …1 bad apple in 2 billion barrels

Duke University Research – Fall 2017

Includes PFAS compounds not requested by EPA during UCMR3

Perfluorinated Compounds Data (µg/L)											
		Duke University Professor's Data						Town of Cary's Data			
		Duke Lab			EPA Lab in RTP			2015 UCMR3 Finished Water Data			
Name	Acronym	Durham 1	Durham 2	Cary	Cary A hose bib	Cary B kitchen faucet	Cary C activiated carbon	2/4/2015	5/6/2015	8/10/2015	11/4/2015
Perfluorobutanoic acid	PFBA	0.00	0.00	0.01	0.02	0.02	0.01				
Perfluorodecanoic acid	PFDA	0.00	0.00	0.00	0.00	0.00	0.00				
Perfluoroheptanoic acid	PFHpA	0.00	0.00	0.02	0.02	0.02	0.02	<0.01	<0.01	<0.01	0.01
Perfluorohexanoic acid	PFHxA	0.00	0.00	0.02	0.03	0.03	0.03				
Perfluorohexansulfonate	PFHxS	0.00	0.00	0.00	0.00	0.00	0.00	<0.03	<0.03	<0.03	<0.03
Perfluorononanoic acid	PFNA	0.00	0.00	0.00	0.00	0.00	0.00	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid	PFOA	0.00	0.00	0.01	0.01	0.01	0.01	<0.02	<0.02	<0.02	<0.02
Perfluooctane sulfonate	PFOS	0.00	0.00	0.00	0.00	0.00	0.00	<0.04	<0.04	<0.04	<0.04
Perfluoropentanoic acid	PFPA	0.00	0.00	0.03	0.03	0.03	0.02				
	Total	0.01	0.01	0.08	0.10	0.12	0.09				
Perfluorobutanesulfonic acid	PFBS							<0.09	<0.09	<0.09	<0.09
Health advisory level for PFOA and PFOS combined is 0.07 parts per billion (ppb).											

Duke University Research – Fall 2017



Health Advisory

EPA = 70 ng/L
(PFOA +PFOS)

NJ = 14 ng/L

Regulatory PFOA MCL

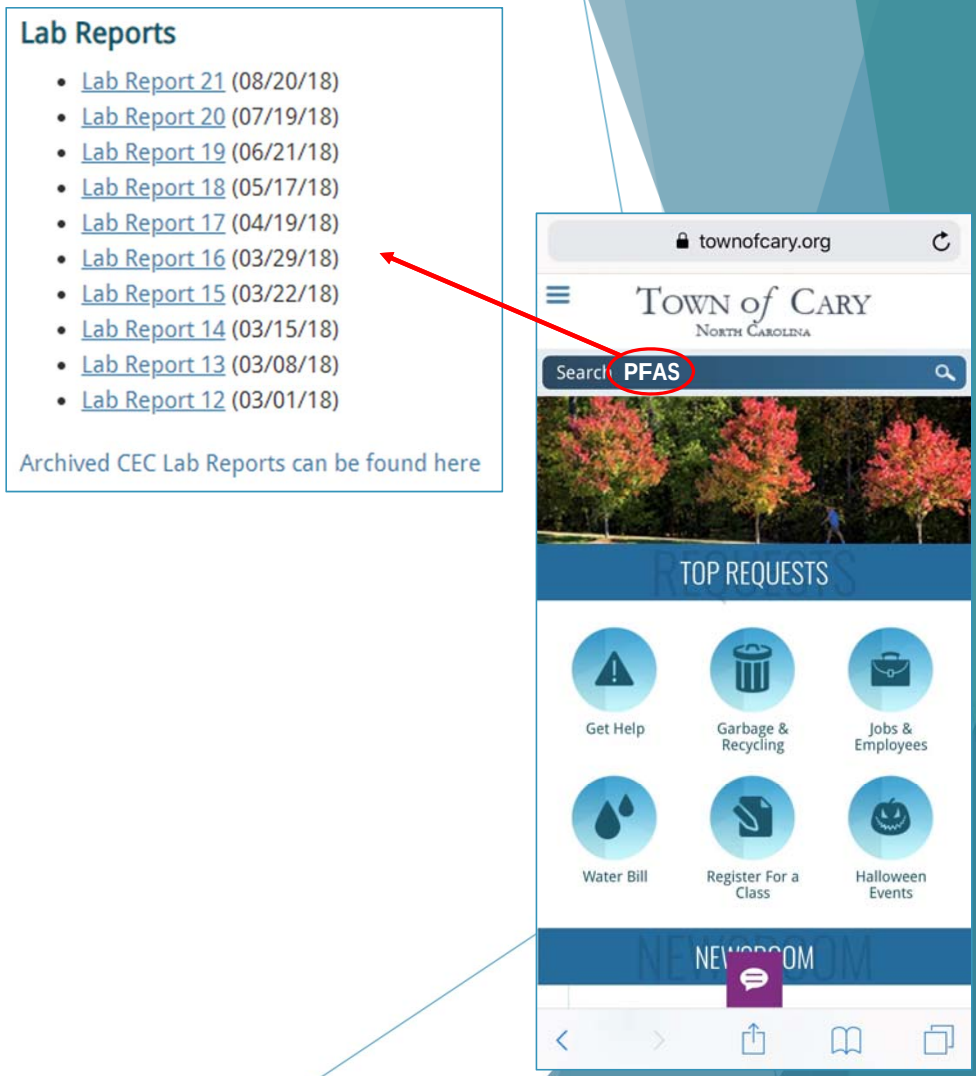
*Sum PFAS = sum total of the 7 carboxylic acids and the two sulfonic acids

Immediate Actions

- Invest in independent testing
  - ✓ EPA Method 537
- Build a data set
  - ✓ What's the extent of the issue
  - ✓ Support future engineering work
- Reach out to experts
- Transparency with the public
  - ✓ Develop a web page to share data
  - ✓ Prepare a fact sheet summarizing actions
- Testing showed some removal was occurring in our treatment process
- Increase activated carbon feed to test for additional removal

Initial Results

- 6 samples were tested November 2017
  - ✓ 1 Jordan Lake
  - ✓ 1 finished water
  - ✓ 4 biofiltration pilot project
- No GenX detected
- ~55% total PFAS reduction through treatment process with high carbon dose
- PFOA – 5.6 ppt
- PFOS – not detectable
- All data available online



Media Reports

December 2017 (NC Policy Watch & WRAL)

ENVIRONMENT

Chemical cousins to PFAs, PFOAs, found in Jordan Lake, Town of Cary drinking water

By Lisa Sorg December 21, 2017 1 Comment In Environment

Share Tweet Email

Heather Stapleton, one of the Duke University scientists who found the chemical compounds in Jordan Lake and the Town of Cary drinking water. (Photo: Duke University)

This is a developing story; it will be updated as more information becomes available.

Chemical compounds in the same family as GenX have been found in Jordan Lake and the Town of Cary's drinking water, raising concerns that these substances are widespread in North Carolina.

It's important to note that no GenX was found in any of the samples, the results were preliminary, and the sampling size was small.

The results are based on testing conducted by Duke University scientists P. Lee Ferguson and Heather Stapleton. In November, they collected three samples from Jordan Lake and four from faucets in Cary. They also collected one sample from Chapel Hill, two from Durham and nine from Robeson County.

Ferguson said he and Stapleton took water samples from the lake, as well as their own home faucets and those of their friends and colleagues. Using state-of-the-art methods, the researchers analyzed the water for seven types of perfluorinated compounds, which are categorized as "short-carbon chain" or "long-carbon chain," depending on the number of carbon molecules.

LOCAL NEWS

Elevated levels of unregulated chemicals found in Jordan Lake, Cary drinking water

Posted December 21, 2017

By Tyler Dukes

RALEIGH, N.C. — Researchers at Duke University have discovered elevated levels of several perfluorinated compounds – an unregulated family of industrial chemicals including some that can raise cancer risks – in Jordan Lake and drinking water treated by Cary.

Cary water treatment officials, who have independently confirmed the findings of Duke researchers, say the town's water is safe to drink. They also point out that the compounds detected are still below health advisory levels set by the U.S. Environmental Protection Agency.

But they are continuing to test both treated and untreated water and have enhanced their treatment process in an attempt to filter out the substances, which are often difficult to remove, as they continue to supply drinking water for about 233,000 people in Cary, Apex, Morrisville and elsewhere.

"We take the concerns of our citizens very seriously," Alexandra Jones, Cary's water systems manager, said. "We've started collecting a lot of additional data to get a better handle on what the situation is."

Building Partnerships

TOWN OF CARY

December 22, 2017

Jessica Godreau, P.E., BCEE
Chief, Public Water Supply Section at NC DEQ
Division of Water Resources
Department of Environmental Quality
1634 Mail Service Center
Raleigh NC 27699-1634

Subject: Request for Assistance with Managing Emerging Contaminants in the Jordan Lake Watershed that Provides Water Supply to Cary, Apex, and Chatham County

Dear Ms. Godreau:

We very much appreciate the guidance and support from Public Water Supply and the Division of Water Resources over the last two weeks as we have obtained additional information about the detection of perfluorinated compounds in the Jordan Lake Watershed. As a general summary, the Cary/Apex Water Treatment Facility has conducted monitoring of perfluorinated compounds in accordance with UCMR3 and has recently received third party data from research scientists in our area. In all previous testing, we are pleased to report that drinking water from the Cary/Apex WTF has been in full compliance with all Federal and State regulatory standards and EPA health advisories. Since perfluorinated compounds, (PFCs) have been detected in Jordan Lake, the Town has embarked on two rounds of sampling and testing for PFCs. The testing, which has been completed by an independent contract laboratory under EPA Standard Method 537, has further confirmed that water from the Cary/Apex WTF is in full compliance with EPA health advisories for PFOA and PFOS. We plan to continue testing on a regular basis to build a more complete dataset for the watershed and better understand any seasonal variations in PFC concentrations. As an additional factor of safety, the Cary/Apex Water Treatment Facility has increased carbon adsorption treatment by increasing the powder activated carbon feed contributing to greater removal of PFCs from our source water.

The Towns of Cary, Apex, and Chatham County would like to request formal assistance from the State Department of Environmental Quality to provide direction and support in addressing the challenges of removing PFCs from the Jordan Lake Watershed. As water utilities who rely upon Jordan Lake for our drinking water supply, we all have a shared interest in advancing a science-based approach to identify any potential source water conditions upstream of our shared water intake facility that may be causing detectable levels of PFCs in our water supply. In order to initiate more formal collaboration on PFC removal, we are requesting a meeting to discuss our testing, review the best available guidance on PFC removal from the watershed, and discuss follow up actions and recommendations from the NC Dept. of Environmental Quality.

TOWN of CARY
400 James Jackson Avenue • Cary, NC 27513 • PO Box 8005 • Cary, NC 27512-8005
tel 919-469-4090 • fax 919-469-4304 • www.townofcary.org

Request for Assistance 12/22/2017

Cary, Apex, and Chatham County are committed to providing our citizens with high quality and safe water that surpasses all existing Federal and State regulatory standards and all established EPA Health Advisories, and we are dedicated to evaluating the needed actions to ensure the full trust and confidence in our water supply at Jordan Lake. We appreciate the opportunity for continued collaboration with the NC Department of Environmental Quality to help us achieve the best possible source water conditions in the Jordan Lake Watershed.

Thanks in advance for reviewing our request for a meeting and we look forward to additional assistance from the NC Department of Environmental Quality. I can be reached via phone at 919.469.4303 or via e-mail at jamie.revels@townofcary.org for coordination and scheduling.

Sincerely,

Jamie Revels, P.E.
Town of Cary

Cc: Alexandra Jones, Town of Cary
Marty D. Stone, Town of Apex
Dan J. LaMontagne, Chatham County
Larry Bridges, Chatham County
Jeff Adkins, Town of Cary

NC to test water sources for industrial chemicals

BY EMERY P. DALESIO
Associated Press
DECEMBER 23, 2017 10:29 AM
UPDATED DECEMBER 23, 2017 12:47 PM

RALEIGH — North Carolina environmental regulators will start testing the state's major supplies of drinking water to learn whether people are ingesting industrial chemicals whose health effects are poorly understood, a state official said Friday.

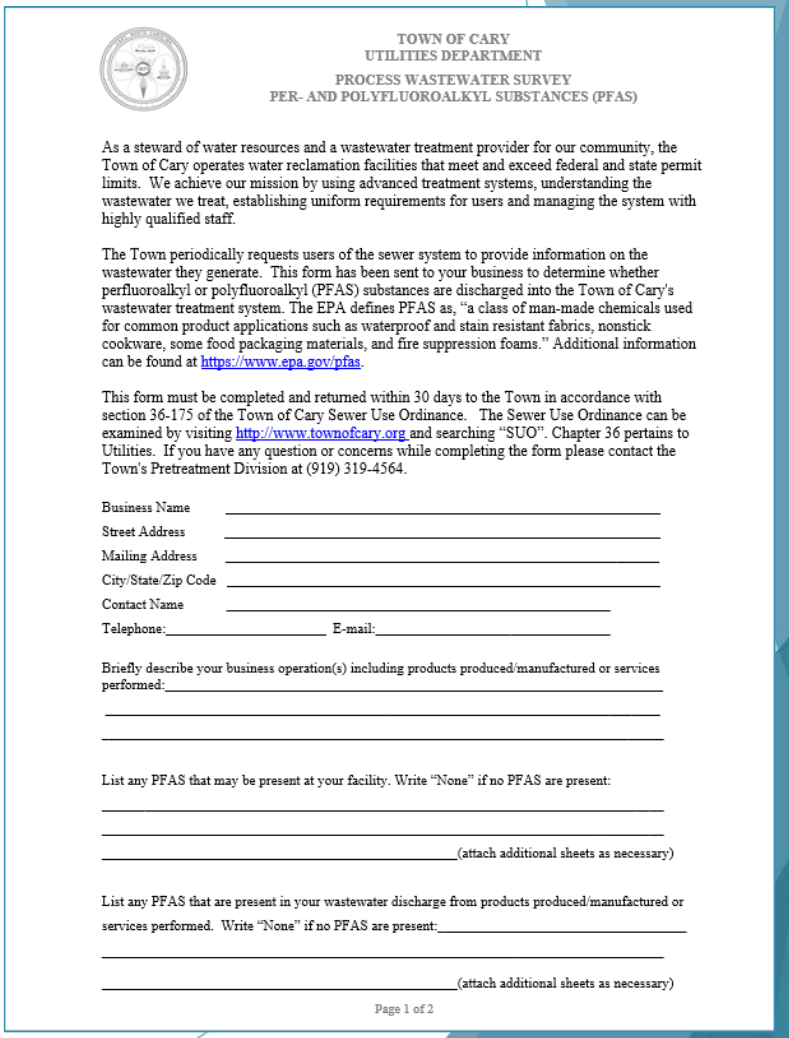
Monitoring could start next month for nearly two dozen unregulated chemicals that the U.S. Environmental Protection Agency classifies as "emerging contaminants" needing more study, state Department of Environmental Quality spokesman Jamie Kritzer said.

The testing is an outgrowth of concerns that a Chemours Co. chemical called GenX used to make Teflon and other coatings was in Wilmington's chief water supply.

The broader testing, to include Norman, Falls and Jordan lakes, and the Yadkin and Catawba rivers, will focus on so-called perfluorinated chemicals similar to GenX, Kritzer said. Such compounds have been found in industrial countries such as the U.S., Germany and China. The compounds are suspected of posing an increased cancer risk in humans.

Pretreatment: Wastewater Survey

- Surveyed 44 commercial/industrial customers in February 2018
- Customers generated from existing Industrial Wastewater Survey (IWS) list plus permitted industries
- Approx. 85% response rate
- One customer disclosed using chemicals with PFAS in their business
- Cary staff are making plans to conduct a second round of testing at our Wastewater Treatment Facilities



TOWN OF CARY
UTILITIES DEPARTMENT

PROCESS WASTEWATER SURVEY
PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

As a steward of water resources and a wastewater treatment provider for our community, the Town of Cary operates water reclamation facilities that meet and exceed federal and state permit limits. We achieve our mission by using advanced treatment systems, understanding the wastewater we treat, establishing uniform requirements for users and managing the system with highly qualified staff.

The Town periodically requests users of the sewer system to provide information on the wastewater they generate. This form has been sent to your business to determine whether perfluoroalkyl or polyfluoroalkyl (PFAS) substances are discharged into the Town of Cary's wastewater treatment system. The EPA defines PFAS as, "a class of man-made chemicals used for common product applications such as waterproof and stain resistant fabrics, nonstick cookware, some food packaging materials, and fire suppression foams." Additional information can be found at https://www.epa.gov/pfas.

This form must be completed and returned within 30 days to the Town in accordance with section 36-175 of the Town of Cary Sewer Use Ordinance. The Sewer Use Ordinance can be examined by visiting http://www.townofcary.org and searching "SUO". Chapter 36 pertains to Utilities. If you have any question or concerns while completing the form please contact the Town's Pretreatment Division at (919) 319-4564.

Business Name _____
Street Address _____
Mailing Address _____
City/State/Zip Code _____
Contact Name _____
Telephone:_____ E-mail:_____

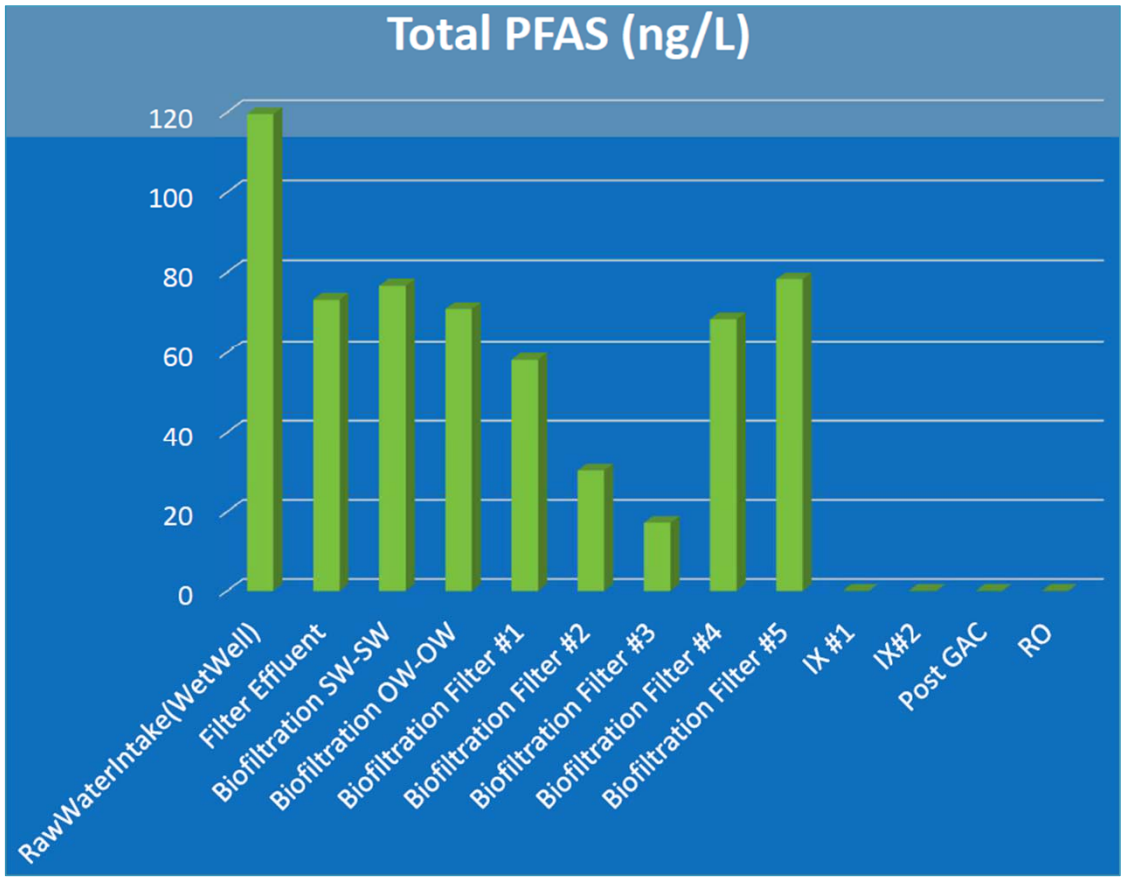
Briefly describe your business operation(s) including products produced/manufactured or services performed:_____
_____
_____

List any PFAS that may be present at your facility. Write "None" if no PFAS are present:
_____
_____
_____(attach additional sheets as necessary)

List any PFAS that are present in your wastewater discharge from products produced/manufactured or services performed. Write "None" if no PFAS are present:_____
_____
_____(attach additional sheets as necessary)

Page 1 of 2

Biofiltration Study Expanded



Removal Estimates Pending Site Specific Testing

Treatment Technology	Removal Performance [Excellent (>90%), Good (70-90%), Moderate (30-60%), Weak (<30%), Unknown)]					
	GENX	PFA's	1,4 Dioxane	NDMA	EDCs / PPCPs	Hexavalent Chromium
RO	Excellent	Excellent	Excellent	Moderate	Excellent	Excellent
NF	Excellent	Excellent	Moderate	Poor	Excellent	Moderate
AOP-UV	Poor	Poor	Moderate	Excellent	Moderate	None
AOP-O3	Poor	Poor	Excellent	Poor	Moderate	None
O3-BAF	Poor	Moderate	Excellent	Excellent	Excellent	Poor
Ion Exchange	Excellent	Moderate	Excellent	Excellent	Poor	Excellent
GAC	Moderate**	Excellent	Poor	Moderate	Excellent	Excellent

* Low end assumes use existing filters

** Fresh GAC is effective, but is spent quickly

CDM Smith

Ongoing Actions

August 2018

10:2 Fluorotelomer sulfonic acid (10:2 FTS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
ADONA	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
F-53B Major	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
F-53B Minor	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
GenX	L402	---	5.0	< 5.0	ng/L	< 5.0	ng/L
N-ethylperfluorooctane sulfonamide (NEtFOSA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
N-ethylperfluorooctane sulfonamidoethanol	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
N-methylperfluorooctane sulfonamide (NMeFOSA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
N-methylperfluorooctane sulfonamidoethanol	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorobutanesulfonic acid (PFBS)	L402	---	2.0	< 2.0	ng/L	4.6	ng/L
Perfluorobutanoic acid (PFBA)	L402	---	5.0	16	ng/L	19	ng/L
Perfluorodecanoic acid (PFDA)	L402	---	2.0	< 2.0	ng/L	2.4	ng/L
Perfluoroheptanoic acid (PFHpA)	L402	---	2.0	5.8	ng/L	18	ng/L
Perfluorohexanesulfonic acid (PFHxS)	L402	---	2.0	< 2.0	ng/L	3.3	ng/L
Perfluorohexanoic acid (PFHxA)	L402	---	2.0	15	ng/L	27	ng/L
Perfluorododecanoic acid (PFDoA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorononanoic acid (PFNA)	L402	---	2.0	< 2.0	ng/L	2.3	ng/L
Perfluorooctanesulfonic acid (PFOS)	L402	---	2.0	< 2.0	ng/L	13	ng/L
N-ethyl Perfluorooctanesulfonamidoacetic acid	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
N-methyl Perfluorooctanesulfonamidoacetic acid	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorooctanoic acid (PFOA)	L402	---	2.0	< 2.0	ng/L	11	ng/L
Perfluorotridecanoic acid (PFTrDA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluoroundecanoic acid (PFUnA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorododecanesulfonic acid (PFDoS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorodecanesulfonic acid (PFDS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluoroheptanesulfonic acid (PFHpS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorohexadecanoic acid (PFHxDA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluoro-2-methoxyethoxyacetic acid	L402	---	5.0	< 5.0	ng/L	< 5.0	ng/L
Perfluoro-4-isopropoxybutanoic acid	L402	---	5.0	< 5.0	ng/L	< 5.0	ng/L
Perfluoro-4-methoxybutanoic acid (PFMOBA)	L402	---	5.0	< 5.0	ng/L	< 5.0	ng/L
Perfluoro-3-methoxypropanoic acid (PFMOPrA)	L402	---	5.0	< 5.0	ng/L	< 5.0	ng/L
Perfluorononanesulfonic acid (PFNS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorooctane sulfonamide (PFOSA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluoropentanoic acid (PFPeA)	L402	---	2.0	20	ng/L	26	ng/L
Perfluoropentanesulfonic acid (PFPeS)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L
Perfluorotetradecanoic acid (PFTeDA)	L402	---	2.0	< 2.0	ng/L	< 2.0	ng/L

Legislative Agenda Item

The Town of Cary supports legislation that provides resources for state agencies to develop reasonable, science-based health advisory levels for emerging contaminants.

Are toxic chemicals in our drinking water? Statewide testing should let us know.

BY CRAIG JARVIS
cjarvis@newsobserver.com

August 06, 2018 03:34 PM
Updated August 06, 2018 06:01 PM

CHAPEL HILL — North Carolina's leading university science researchers will try to find out if water supplies in the state have been contaminated with toxic compounds like GenX, an unregulated chemical discovered in the Cape Fear River last year.

Over the next year, each municipality in the state will have its water tested at the point where the water enters the public system. In addition, each municipality will pick one well that supplies public drinking water to test. Air testing will also be conducted across the state because emissions can settle on the ground. It isn't known yet how many locations will have air testing.

Summary and Conclusions

- Commercial lab capabilities for PFAS continue to expand and cost per sample decreases; Cary has made use of these analyses
- After nearly a year of testing, we have no detections of GenX
- PFOA + PFOS concentrations have been less than EPA's health advisory level of 70 ppt
- Feeding 30 to 50 ppm of carbon has demonstrated effective removal of PFOA and PFOS, as well as some other PFAS in our treatment process
- High dose powder activated carbon comes with significant additional expense, and it does not remove all PFAS
- EPA continues to report greater emphasis on these substances, but regulation will require years of research and public comment
- In the meantime, we continue to monitor the various States-level approaches to health advisories and Maximum Contaminant Levels
- We plan to continue extensive testing to determine if there are seasonal or lake-level induced variations in PFAS concentrations and complete our pilot study
- Our future plans for CAWTF are focused on a wider ranger of emerging contaminants of concern than before