2017-2018

HOUSE SELECT COMMITTEE ON NORTH CAROLINA RIVER QUALITY

MINUTES

HOUSE SELECT COMMITTEE ON NC RIVER QUALITY

MEMBERS	ASSISTANT	PHONE	OFFICE
Senior Chairman			
Rep. Ted Davis, Jr.	Judy Lowe	733-5786	417B-LOB
Chairmen			
Rep. Holly Grange	Laura Holt-Kabel	733-5830	604-LOB
Rep. Frank Iler	Carla Langdon	301-1450	639-LOB
Members			
Rep. William Brisson	Caroline Stirling	733-5772	405-LOB
Rep. Jimmy Dixon	Michael Wiggins	715-3021	2226-LB
Rep. Elmer Floyd	Dorothy McLean	733-5959	1325-LB
Rep. Kyle Hall	Cameron Dawson	733-5609	536-LOB
Rep. Pricey Harrison	Sue Osborne	733-5771	1218-LB
Rep. Pat McElraft	Nancy Fox	733-6275	634-LOB
Rep. Chuck McGrady	Rita Harris	733-5956	604-LOB
Rep. Bob Muller	Gloria Whitehead	715-9664	644-LOB
Rep. Bob Steinburg	Andrew Bowers	733-0010	301B-LOB
Rep. Scott Stone	Marissa Turner	733-5886	2213-LB
Rep. Larry Yarborough	Leslie Murray	715-0850	1301-LB
Staff			
Jeff Hudson		733-2578	
Jennifer McGinnis		733-2578	
Chris Saunders		733-2578	
Mariah Matheson		733-2578	
Judy Lowe		733-5786	

ATTENDANCE

HOUSE SELECT COMMITTEE ON NC RIVER QUALITY

(Name of Committee)

DATES	9/29/17	10/26/17	11/30/17		1/4/18	2/21/18	3/22/18	4/26/2018							
CHAIRMEN															
Ted Davis, Jr., Senior Chair	✓	✓	✓		✓	✓	✓	✓							
Holly Grange, Chair	✓	✓	✓		✓	✓	✓	EXC							
Frank Iler, Chair	✓	✓	✓		✓	✓	Exc	✓							
MEMBERS															
William Brisson	✓	✓	—		✓	✓	✓	✓							
Jimmy Dixon	✓	✓	✓		✓	✓	✓	✓							
Elmer Floyd	—	—	✓		✓	✓	✓	✓							
Kyle Hall	✓	out	✓		✓	✓	✓	EXC							
Pricy Harrison	✓	✓	✓		Exc	✓	Exc	✓							
Pat McElraft	✓	Exc	✓		✓	✓	EV	✓							
Chuck McGrady	Exc	Exc	Exc		✓		✓	✓							
Bob Muller	—	—	✓		✓	✓	✓	✓							
Bob Steinburg	✓	✓	✓			✓	✓	✓							
Scott Stone	✓	Exc	✓		✓			✓							
Larry Yarborough	Exc	Exc	✓		✓	✓	✓	✓							
STAFF															
Jeff Hudson	✓	✓	✓	✓	✓	✓	✓	✓							
Jennifer McGinnis	✓		✓	✓		✓	✓	✓							
Chris Saunders	✓	✓	✓	✓	✓	✓	✓	✓							
Mariah Matheson	✓	✓	✓	✓		✓	✓	✓							
Judy Lowe, Committee Assistant	✓	✓	✓			✓	✓								
Kyle Evans			✓	✓			✓	✓							
Andrew Bowers								✓							
Jeff Cherry				sorry				✓							

Judy Lowe (Rep. Ted Davis)

From: Joseph Kyzer (Rep. Tim Moore)
Sent: Wednesday, September 27, 2017 03:58 PM
To: Joseph Kyzer (Rep. Tim Moore)
Subject: House River Quality Committee Plans Comprehensive GenX Agenda
Attachments: NC House River Quality Committee Agenda_092817.docx

North Carolina House of Representatives
Office of Speaker Tim Moore

FOR IMMEDIATE RELEASE – WEDNESDAY, SEPTEMBER 27, 2017

House River Quality Committee Plans Comprehensive GenX Agenda

Raleigh, N.C. – The House Select Committee on North Carolina River Quality released its first meeting agenda Wednesday, previewing presentations from state agencies, local utilities and university researchers regarding the GenX contaminant in the Cape Fear River.

View on SpeakerMoore.com

The committee's first meeting is scheduled for 9:00 am on Thursday, September 28, 2017, in Room 643 of the Legislative Office Building in Raleigh.

"I appreciate the dedication of Chairman Ted Davis to develop a thorough fact-finding agenda for the first meeting of the House Select Committee on North Carolina River Quality," said House Speaker Tim Moore.

"Our investigation is focused on uncovering as much information as possible to protect the people of the Cape Fear region from the GenX contamination."

The speakers include Sheila Holman, Assistant Secretary of Environment at the Department of Environmental Quality, who is slated to present on the regulatory history of the Chemours Fayetteville Works facility.

Mike Brown, Chairman of the Cape Fear Public Utility Authority Board, and Frank Styers, Chief Operations Officer at the Cape Fear Public Utility Authority, are also scheduled to present their plan to potentially implement funding provided by the General Assembly in H.B. 56 Amend Environmental Laws, a measure vetoed by Gov. Roy Cooper.

"The agenda for our initial meeting continues the process of obtaining information necessary to address numerous questions from citizens concerning the quality of their drinking water," said Senior Committee Chairman Ted Davis (R-New Hanover).

"This committee will continue to meet so that additional legislation can hopefully be recommended for the House to act upon and successfully address as many concerns as possible of our constituents throughout the state."

Dr. Ralph Mead, a professor from the Department of Chemistry and Biochemistry at the University of North Carolina Wilmington (UNCW), will also present a plan to potentially study GenX with funding provided by the state General Assembly. Mark Lanier, Assistant to the Chancellor of UNCW, will also address the committee.

Mark Benton, Deputy Secretary for Health Services at the Department of Health and Human Services (DHHS), and Zack Moore, Epidemiology Section Chief at the Division of Public Health within DHHS, will also present on the presence and health effects of GenX and related compounds in the lower Cape Fear River basin.

Tracy Skrabal, Coastal Scientist and Manager of the Southeast Regional Office of the North Carolina Coastal Federation and Dr. Lee Ferguson, Associate Professor at the Department of Civil and Environmental Engineering at Duke University, will conclude the meeting with presentations on state and federal regulations related to emerging compounds.

The state General Assembly's joint Environmental Review Commission met in Wilmington on August 18, 2017, and North Carolina House Speaker Tim Moore appointed the House Select Committee on North Carolina River Quality on August 31, 2017.

The House Select Committee on North Carolina River Quality plans to meet again in October.

###

Judy Lowe (Rep. Ted Davis)

From: Joseph Kyzer (Rep. Tim Moore)
Sent: Wednesday, October 04, 2017 11:42 AM
To: Joseph Kyzer (Rep. Tim Moore)
Subject: N.C. House Delivers GenX Treatment Funds With Veto Override

North Carolina House of Representatives
Office of Speaker Tim Moore

FOR IMMEDIATE RELEASE
Wednesday – October 3, 2017

Contact: Joseph Kyzer

N.C. House Delivers GenX Treatment Funds With Veto Override

Raleigh, N.C. – The North Carolina House of Representatives overrode Gov. Roy Cooper's veto of House Bill 56 Amend Environmental Laws on Wednesday, providing water treatment funding to local utilities in Southeastern North Carolina to address the discharge of the chemical compound GenX into the Cape Fear River.

View on SpeakerMoore.com

The legislation appropriates $435,000 to local utilities and the University of North Carolina at Wilmington for water testing and treatment efforts. It also initiates the development of an electronic filing database for chemical discharge permits to heighten transparency and accountability of the administration's processes.

"Providing immediate resources for water treatment facilities and researchers in Southeastern North Carolina was an important step to protect the people of the Cape Fear region," said House Speaker Tim Moore.

"We will continue to hold hearings in the House Select Committee on North Carolina River Quality to investigate the GenX contamination and develop solutions that ensure administrative accountability and clean drinking water for our citizens."

The proposal provides $185,000 to the Cape Fear Public Utility Authority to coordinate with the Pender and Brunswick County utilities for ongoing monitoring, withdrawal, treatment and distribution of drinking water from the Cape Fear River.

It also provides $250,000 to the University of North Carolina at Wilmington to identify and measure the concentration of the GenX chemical and study what risk the contaminant poses to human health.

Background

The General Assembly's Joint Environmental Review Commission met to discuss Genx in Wilmington on August 23, 2017, following a legislators' tour of the Cape Fear Public Utility Authority's Sweeney Water Treatment Plant.

The North Carolina House approved H.B. 56 Amend Environmental Laws to provide direct aid to local utilities and administrative accountability measures on August 31, 2017, but the bill was vetoed on September 21, 2017.

Speaker Moore appointed the House Select Committee on North Carolina River Quality to focus specifically on the Cape Fear River contamination. The panel held a full day of hearings on September 28, 2017 and plans to meet again in October.

Speaker Moore also toured Brunswick County's Northwest Water Treatment Plant and met with local utility officials during a visit with Rep. Ted Davis (R-New Hanover) and Frank Iler (R-Brunswick) on September 13, 2017.

###

Judy Lowe (Rep. Ted Davis)

From: Joseph Kyzer (Rep. Tim Moore)
Sent: Wednesday, October 04, 2017 11:42 AM
To: Joseph Kyzer (Rep. Tim Moore)
Subject: N.C. House Delivers GenX Treatment Funds With Veto Override

North Carolina House of Representatives
Office of Speaker Tim Moore

FOR IMMEDIATE RELEASE
Wednesday – October 3, 2017

Contact: Joseph Kyzer

N.C. House Delivers GenX Treatment Funds With Veto Override

Raleigh, N.C. – The North Carolina House of Representatives overrode Gov. Roy Cooper's veto of House Bill 56 Amend Environmental Laws on Wednesday, providing water treatment funding to local utilities in Southeastern North Carolina to address the discharge of the chemical compound GenX into the Cape Fear River.

View on SpeakerMoore.com

The legislation appropriates $435,000 to local utilities and the University of North Carolina at Wilmington for water testing and treatment efforts. It also initiates the development of an electronic filing database for chemical discharge permits to heighten transparency and accountability of the administration's processes.

"Providing immediate resources for water treatment facilities and researchers in Southeastern North Carolina was an important step to protect the people of the Cape Fear region," said House Speaker Tim Moore.

"We will continue to hold hearings in the House Select Committee on North Carolina River Quality to investigate the GenX contamination and develop solutions that ensure administrative accountability and clean drinking water for our citizens."

The proposal provides $185,000 to the Cape Fear Public Utility Authority to coordinate with the Pender and Brunswick County utilities for ongoing monitoring, withdrawal, treatment and distribution of drinking water from the Cape Fear River.

It also provides $250,000 to the University of North Carolina at Wilmington to identify and measure the concentration of the GenX chemical and study what risk the contaminant poses to human health.

Background

The General Assembly's Joint Environmental Review Commission met to discuss Genx in Wilmington on August 23, 2017, following a legislators' tour of the Cape Fear Public Utility Authority's Sweeney Water Treatment Plant.

The North Carolina House approved H.B. 56 Amend Environmental Laws to provide direct aid to local utilities and administrative accountability measures on August 31, 2017, but the bill was vetoed on September 21, 2017.

Speaker Moore appointed the House Select Committee on North Carolina River Quality to focus specifically on the Cape Fear River contamination. The panel held a full day of hearings on September 28, 2017 and plans to meet again in October.

Speaker Moore also toured Brunswick County's Northwest Water Treatment Plant and met with local utility officials during a visit with Rep. Ted Davis (R-New Hanover) and Frank Iler (R-Brunswick) on September 13, 2017.

###

- NC Policy Watch - http://www.ncpolicywatch.com -

Drinking water safety at stake in the latest absurd special session

Posted By *Chris Fitzsimon* On 10/3/2017 @ 12:54 pm In Top Story | Comments Disabled



[1]

Here we go again. Another special session of the General Assembly begins Wednesday at noon and no one other than a handful of legislative leaders is exactly sure what lawmakers will be discussing.

That's the way the legislature operates these days, mostly in secret while the media and the voters and even rank-and-file lawmakers wait around to be told what will happen.

House Speaker Tim Moore did email Republican members of the House last week with a tentative list of legislation that may come up. Democrats and the public received no notice.

A copy of the email obtained by NC Policy Watch shows that among the issues the House is likely to take up are judicial redistricting, two controversial local bills and "fixes" for film tax credits, DWI statute of limitations and criminal appeals—whatever all that means.

Conference reports may also surface, which ones is anyone's guess and what is actually in them won't likely be known until they are released and presented for a final vote on the House and Senate floor.

The process is beyond absurd, concentrating power in a few hands and keeping everyone else in the dark.

One thing that is almost certain to be debated is the override of Gov. Roy Cooper's veto of House Bill 56, legislation passed during the last outrageous special session that includes a number of controversial anti-environmental provisions thrown together at the last minute to avoid open debate.

The bill repeals the common sense ban on plastic bags on the Outer Banks and bizarrely allows law enforcement to cut back vegetated areas near rivers and streams.

Most notably, it addresses the GenX contamination of the Cape Fear River that threatens drinking water supplies by giving a little money to the local utility and UNC-Wilmington and ignoring Gov. Roy Cooper's request to restore budget cuts to the N.C. Department of Environmental Quality.

Cooper called the legislation cynical when he vetoed it and that's an understatement. Legislative leaders have repeatedly slashed the budget of DEQ in recent years, including again in this summer's session, and now the state is paying the price with inadequate funding in place to protect the safety of the state's water supply and to react to new dangerous chemicals like GenX when they appear.

Cooper asked for more money for the state agency best equipped to address water pollution crises and the General Assembly, in a troubling display of putting partisan politics ahead of public safety, instead gave the money the Cape Fear Public Utility Authority and UNC-W.

Democrats in the General Assembly repeatedly pointed out that other rivers across the state are also struggling with pollution and that DEQ remains the best agency to address the problems.

But Senate President Pro Tem Phil Berger and Speaker Moore seem more desperate to blame Cooper for the GenX crisis that to actually fix it.

Both bizarrely blamed DEQ for failing to protect water quality when both championed deep budget cuts for the agency claiming its environmental rules were too stringent and hurting businesses.

Those cuts forced DEQ to eliminate 70 position in the water quality division in the last few years and cut staff that reviewed permits for companies that discharge chemicals into waterways.

One prominent Republican lawmaker whose office overlooked the building where DEQ is housed famously drew a circle with a bullseye on the window over the building.

Now that the cuts have been made and the agency is struggling to respond, it's all DEQ's fault and by extension, of course Cooper is to blame. Berger even claimed Cooper was more interested in "growing a bureaucracy" than addressing the GenX crisis, which is an absurd way to describe an effort to restore basic staffing levels to an agency charged with protecting clean water and air for 10 million people.

One right-wing think tank that has long criticized the federal government and questioned the legitimacy of the EPA, is now calling on the EPA to intervene in North Carolina. The cynicism and hypocrisy are breathtaking to behold.

But that's what happens when it is about politics and ideology first, from secretly planned special sessions to gross distortion of the facts to convenient and situational born-again environmentalism.

Anything to win, to punish political opponents and deceive the people they are supposed to represent to mask the devastating effects of their ideological crusade.

That's the House and Senate these days and why it's so worrisome that they are coming back to town.

Article printed from NC Policy Watch: **http://www.ncpolicywatch.com**

URL to article: **http://www.ncpolicywatch.com/2017/10/03/drinking-water-safety-stake-latest-absurd-special-session/**

URLs in this post:

[1] Image: **http://www.ncpolicywatch.com/wp-content/uploads/2017/10/bergermoore-genx.jpg**

Copyright © 2016 NC Policy Watch. All rights reserved.

November 6, 2017 by Coastal Review Online (https://www.northcarolinahealthnews.org/author/coastalreview/)

Related Articles

- Newest GenX Lawsuit Attacks DuPont Science (https://www.northcarolinahealthnews.org/2017/11/02/newest-genx-lawsuit-attacks-dupont-science/)

Although the state now has two legislative committees, a newly reformed science panel and resources in two state departments committed to GenX, there's no consensus yet on a way forward.

By Kirk Ross

Coastal Review Online (http://www.coastalreview.org)

After this summer's revelations about the extent of GenX and other compounds in the Wilmington region's drinking water supply, state and local officials have vowed to do two things: Secure the safety of the water and prevent similar events from occurring in the future.



(https://1lbxcx1bcuig1rfxaq3rd6w9-wpengine.netdna-ssl.com/wp-content/uploads/2017/11/Screen-Shot-2017-11-06-at-8.18.53-AM.png)

Workers from the state Dept. of Environmental Quality take water samples for testing. Photo courtesy: NC DEQ

As testing and cost estimates of additional filtering and treatment come in, the first goal is looking possible, but expensive. The second goal, however, appears for now to be far more elusive.

Although the state now has two legislative committees, a newly reformed science panel and resources in two state departments committed to effort, there's no consensus yet on a way forward when it comes to identifying what unknown contaminants are in the state's drinking water sources, how to regulate them and how all that is communicated to the public.

"Issues around emerging contaminants have been known problematic issues for a long time and yet no one that I'm aware of has come up with a full map for getting on top of their presence in the waters that we use," said Richard Whisnant, professor of public law at the University of North Carolina Chapel Hill's School

of Government and a newly appointed member of the state's Environmental Management Commission. "It's one of those things that we as a state are going to have to take one bite of at a time."

Challenge of the Unknown

Whisnant said that with a rapidly expanding universe of compounds, a major part of the challenge is knowing what to look for and then knowing what to do with the data once you have it, he said.

Then, there is the challenge of resources.

Regulators and public health officials are going to have to develop a kind of triage system, Whisnant explained, one that prioritizes contaminants that are of the highest concern.

"I think a next-level question is, 'Are there ways of grouping this huge world of emerging contaminants into things that deserve special scrutiny either on the monitoring and permitting side or on the back-end testing health effects side?'" he said.



(https://1lbxcx1bcuig1rfxaq3rd6w9-wpengine.netdna-ssl.com/wp-content/uploads/2017/11/Cape-Fear-River-Genx.png)

This map shows the locations of the Chemours facility, wastewater treatment plants, International Paper and wells along the Cape Fear River. Map courtesy: NC DEQ

Robin Smith, a consultant who served as assistant secretary of the Department of Environment, Heath and Natural Resources, now the Department of Environmental Quality, said she agrees that prioritizing the emerging contaminants is a key step.

"One of the challenges is that there are so many chemicals out there," she said. "So, to wrap your arms around it, you have to have some way to at least start figuring out what you're most concerned about and how to address those that are of highest concern."

But Smith said the state doesn't have to wait to develop a new regulatory program to start tightening oversight and permitting. It could use existing programs to take action on emerging contaminants that are not yet regulated under federal rules.

"There's certainly some authority at the state level to go beyond where federal rules are," Smith said.

The state could adopt drinking water standards for chemicals for which the Environmental Protection Agency has [illegible]

for which the Environmental Protection Agency has no national adopted standards, she said, and the state can also adopt a stricter standard for those that do have a federal standard. DEQ regulators could also apply more scrutiny in issuing discharge permits.

Any new oversight will take a serious commitment to the science behind it, she said.

> Meeting materials from Oct. 26 House Select Committee on River Quality (http://www.ncleg.net/gascripts/DocumentSites/browseDocSite.asp?nID=362&sFolderName=%5CMeetings%5C2%20-%20Oct%2026%202017)

"To make that possible it's important to have the expertise at the state level to do the kind of risk analysis that's necessary."

At the minimum, that's likely to mean adding at least another state toxicologist at the Department of Health and Human Services and additional science positions at DEQ to make up the core of a new program, she said.

Industry Pushback

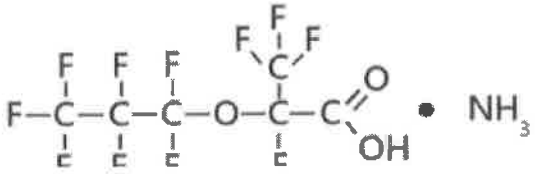
If the state does move ahead on regulating emerging contaminants, any proposal is likely to face heavy scrutiny from manufacturers.

Preston Howard, president of the North Carolina Manufacturer's Alliance, was contacted but declined to comment for this story. Howard said that, for now, the organization is not prepared to comment on potential legislation or regulatory proposals. But during a recent forum on environmental issues at Meredith College in Raleigh, Howard said the organization is watching the GenX response and will seek to have input into any regulation that results.

Whisnant said there is no doubt there would be strong pushback from manufacturers and other discharge permittees if they determine the state has gone too far.

(https://1lbxcx1bcuig1rfxaq3rd6w9-wpengine.netdna-ssl.com/wp-content/uploads/2017/06/GenXStructure.png)One friction point is whether a new chemical may be discharged without extensive testing of its effects on human health. Advocates, including some Republicans in the legislature, say a regulatory system that uses a precautionary principle to vet new chemicals and compounds could be the safest approach.

"If there are emerging compounds that are discharged into our water and we don't know what they do, then they do not need to be discharged in our water," New Hanover Republican Rep. Holly Grange, co-chair of the new



House Select Committee on North Carolina River Quality, said in a meeting last week. "That's really what the bottom line is here – to make sure we have safe drinking water for all the citizens across our state."

GenX Chemical Structure

But the change would require a major regulatory overhaul from a legislative leadership that has overseen extensive regulatory rollbacks.

Whisnant said that while there is some support now for a precautionary system, it's hard to imagine the more stringent so-called "European model" making it through the North Carolina General Assembly.

"I don't think it's tenable at that level," he said. "I think we're going to have to evolve to something like, 'What's the set of things we won't put in the river unless we know it's safe?"

Legislation Coming

One clear area of agreement is that the issue of emerging contaminants has expanded beyond GenX and the lower Cape Fear River basin.

Last week during the second meeting of the House Select Committee on North Carolina River Quality, chair Rep. Ted Davis, (R-Wilmington), said he expected the next round of legislation to be a statewide approach.

Last month, the legislature passed legislation sending $435,000 in state money to the Cape Fear Public Utility Authority for new filtration systems and the University of North Carolina Wilmington for testing to determine the extent of contamination in the lower Cape Fear.

Davis said he expected the committee's fact-finding phase to wrap up this month and then will begin working on legislation. He noted that the timetable is tight since next year's short session of the legislature could start as early as March.

In a presentation to the committee last week (http://www.ncleg.net/documentsites/committees/house2017-185/Meetings/2%20-%20Oct%2026%202017/Knappe_NCSU.pdf), Detlef Knappe, an environmental engineering professor at North Carolina State University who was part of the team that published the Cape Fear study on GenX, underlined the need to expand the scope of a response statewide.



Knappe told the committee there are areas of concern farther up in the Cape Fear watershed, where testing shows high levels of bromide and 1,4-Dioxane and PFASs, or per- and poly-fluroalkyl substances. He also noted ongoing studies that show levels of 1,4-Dioxane

far above the surface water standard in long stretches of the Haw, Deep and Cape Fear rivers.

Compounding the problem, he told committee members, is that the contaminants are not being filtered out by standard wastewater treatment plants and are being returned to the river.

Knappe said that in addition to better oversight of wastewater permitting and reducing discharges, the state needs to invest in treatment systems that deal with emerging contaminants.



(https://1lbxcx1bcuig1rfxaq3rd6w9-wpengine.netdna-ssl.com/wp-content/uploads/2016/09/DioxaneEnv-Lab_Knappe_March-2016-32-1.jpeg)

North Carolina State University water quality scientist Detlef Knappe and graduate student Catalina Lopez at work in Raleigh. Knappe's investigations identified the presence of GenX in the Cape Fear. He will be working with other scientists to probe the extent of the problem and to attempt to identify methods for remediation. Photo credit: Julie Williams Dixon

Please Donate Now to Support Our Journalism

(http://www.northcarolinahealthnews.org/support-health-journalism-matters)

About Coastal Review Online

Coastal Review Online, or CRO, is a daily, not-for-profit, news and feature service covering the N.C. coast. It is produced by the N.C. Coastal Federation, a 501(c)(3) nonprofit group dedicated to protecting and preserving the N.C. coast.

Raleigh N&O
11/8/17

What's in your water?

You deserve to know.

Since 2011 each state legislative session has seen legislation that has dismantled important protections for North Carolina's environment. The assault on clean water has been particularly harmful to citizens of North Carolina, who can no longer assume that their water is safe to drink.

Contact your legislator to let them know what you think about their votes on clean water protections here: 919-733-4111.

How did your legislator vote on bills that impact our water protections?

H56 Overview

On October 4th, the legislature overrode Governor Cooper's veto of House Bill 56. This bill, now law, contains the latest two attacks on the buffer rules that protect our water quality. The legislature has been chipping away at our buffer protections each year since 2011. Although it appropriates minimal funding to address the GenX chemical dumping crisis, it directs too little money to the wrong places. This bill also lifts the

ban on plastic bags in the Outer Banks, which prevents litter from polluting our waterways.

S16 Overview

On October 5th, the legislature overrode Governor Cooper's veto of Senate Bill 16. This bill, now law, impacts local governments' ability to take measures to improve the water quality of impaired streams through retrofit of new developments. We should be making it easier, not harder, for state and local governments to protect water quality.

Click on your region below to see how legislators voted. If you're not sure who represents you, **click here to find out**.

WILMINGTON AREA
RALEIGH/WAKE COUNTY
MECKLENBURG COUNTY
GUILFORD COUNTY

WILMINGTON AREA

Votes on H56

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Michael Lee	(R)		X
Bill Rabon	(R)		X
House			
Deb Butler	(D)	✔	
Ted Davis, Jr.	(R)		X
Holly Grange	(R)		X
Frank Iler	(R)		X

Votes on S16

Legislator	Party	For Clean Water	Against Clean Water

Senate			
Michael Lee	(R)		X
Bill Rabon	(R)		X
House			
Deb Butler	(D)	✔	
Ted Davis, Jr.	(R)		X
Holly Grange	(R)		X
Frank Iler	(R)		X

RALEIGH/WAKE COUNTY

Votes on H56

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Chad Barefoot	(R)		X
Tamara Barringer	(R)		*
Dan Blue	(D)	✔	
Jay Chaudhuri	(D)		*
House			
Gale Adcock	(D)	✔	
Nelson Dollar	(R)		X
Rosa Gill	(D)	✔	
Duane Hall	(D)	✔	
Yvonne Lewis Holley	(D)	✔	
Linda Hunt Williams	(R)		X
Darren Jackson	(D)	✔	
Joe John	(D)	✔	
Chris Malone	(R)		X
Grier Martin	(D)	✔	

Votes on S16

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Chad Barefoot	(R)		*
Tamara Barringer	(R)		X
Dan Blue	(D)	✔	
Jay Chaudhuri	(D)	✔	
House			
Gale Adcock	(D)	✔	
Nelson Dollar	(R)		X
Rosa Gill	(D)	✔	
Duane Hall	(D)	✔	
Yvonne Lewis Holley	(D)	✔	
Linda Hunt Williams	(R)		X
Darren Jackson	(D)	✔	
Joe John	(D)	✔	
Chris Malone	(R)		X
Grier Martin	(D)	✔	

MECKLENBURG COUNTY

Votes on H56

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Dan Bishop	(R)		X
Joel Ford	(D)	✔	
Jeff Jackson	(D)		*
Jeff Tarte	(R)		*

Joyce Waddell	(D)	✔	
House			
Kelly Alexander	(D)	✔	
John Autry	(D)	✔	
Chaz Beasley	(D)	✔	
Mary Belk	(D)	✔	
John Bradford	(R)		X
Bill Brawley	(R)		X
Becky Carney	(D)	✔	
Carla Cunningham	(D)	✔	
Andy Dulin	(R)		X
Beverly Earle	(D)	✔	
Rodney Moore	(D)	✔	
Scott Stone	(R)		X

Votes on S16

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Dan Bishop	(R)		X
Joel Ford	(D)	✔	
Jeff Jackson	(D)	✔	
Jeff Tarte	(R)		*
Joyce Waddell	(D)	✔	
House			
Kelly Alexander	(D)	✔	
John Autry	(D)	✔	
Chaz Beasley	(D)	✔	
Mary Belk	(D)	✔	
John Bradford	(R)		X

Bill Brawley	(R)		X
Becky Carney	(D)	✔	
Carla Cunningham	(D)	✔	
Andy Dulin	(R)		X
Beverly Earle	(D)	✔	
Rodney Moore	(D)	✔	
Scott Stone	(R)		X

GUILFORD COUNTY

Votes on H56

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Gladys Robinson	(D)	✔	
Trudy Wade	(R)		X
House			
John Blust	(R)		*
John Faircloth	(R)		X
Jon Hardister	(R)		X
Pricey Harrison	(D)	✔	

Votes on S16

Legislator	Party	For Clean Water	Against Clean Water
Senate			
Gladys Robinson	(D)	✔	
Trudy Wade	(R)		X
House			
John Blust	(R)		X

John Faircloth	(R)		X
Jon Hardister	(R)		X
Pricey Harrison	(D)	✔	

* denotes an excused absence

THE NEXT 30 YEARS | SOUTHERN ENVIRONMENTAL LAW CENTER

NRDC

Paid for by SELC and NRDC.

2/9/18

FRIDAY FEBRUARY 9 2018
NEWSOBSERVER.COM

The News & Observer
2/9/18

Republicans move GenX bill forward, over objections by Democrats

BY WILL DORAN
wdoran@newsobserver.com

RALEIGH

A new version of a bill to address North Carolina's GenX pollution issue passed a Senate committee Wednesday night, clearing the way for a vote soon.

The bill already passed the state House of Representatives – unanimously – but Senate leader Phil Berger wouldn't let it come up for a vote in the Senate last month. And this new version of the bill makes several changes to the House version.

Sen. Michael Lee, a Wilmington Republican, led Wednesday's heated discussion. Eventually the committee approved it along party lines, with Republicans in support and Democrats opposed.

"I get a lot of political flak for this, from both sides of the aisle, but I think this is the best plan," Lee said.

Democrats questioned why Lee's version of the bill removed a key part of the House bill, which would have given the N.C. Department of Environmental Quality money to buy a piece of equipment called a mass spectrometer. Berger has questioned the claims of DEQ officials who say they need one to figure out what is in the water here, other than GenX.



2017 AP file photo

Chemours Co. has faced questions about the unregulated chemical GenX that was discharged from a plant near Fayetteville into the Cape Fear River. A bill that would address GenX pollution cleared an N.C. Senate committee Wednesday night.

GenX is an unregulated chemical, used in Teflon and other products. State officials say the chemical companies DuPont and Chemours secretly dumped it into the Cape Fear River for years, from a factory they have operated just south of Fayetteville.

That river serves as the main drinking water source for much of southeastern North Carolina, and a new class action lawsuit claims the companies knew the chemicals they were dumping into the river have been tied to cancer and other diseases.

Instead of giving DEQ money to buy the new equipment and hire scientists to run it, the new bill would direct DEQ to work with the Environmental Protection Agency or the state's university system to borrow the use of a mass spectrometer.

Lee said that will save the state time and money.

This new proposal would also give $2.4 million to DEQ this year to conduct several studies.

In the next fiscal year, however, that money would go away and DEQ's budget would be cut by another $1 million.

The House version of the bill would have directed DEQ to work with the Secretaries' Science Advisory Board to review health goals; that board was created earlier this year by Democratic Gov. Roy Cooper.

The new version of the bill removes all references to that board and instead directs DEQ to work with the North Carolina Policy Collaboratory at UNC-Chapel Hill, a new science group with a former science adviser to Berger in a top job. The choice of that adviser, Jeff Warren, as research director for the center spurred complaints by university professors who feared politics might outweigh research.

Sen. Erica Smith-Ingram, a Democrat who represents northeastern North Carolina, asked to amend the bill. She wanted more spending to eliminate a months-long backlog of environmental permit reviews at DEQ, and to hire more people to analyze the state's water quality.

"Seventy positions have been eliminated since 2013 that would help us address these emerging compounds," she said.

But Lee discouraged any amendments, which he said could jeopardize the bill's chances of passing the full Senate. He said the legislature needs to do something soon, and that lawmakers can always do more later.

"I live in Wilmington," Lee said. "I drink the water in Wilmington. My kids drink the water in Wilmington. This is not political."

Doran: 919-836-2858; Twitter: @will_doran

2/11/18

2/11/18

Senate Republicans tweak GenX bill but Democrats still object

BY WILL DORAN
wdoran@newsobserver.com

RALEIGH

Responding to concerns of Democrats, the North Carolina Senate amended an anti-pollution bill Friday, giving more spending flexibility to environmental regulators and ending their duties. Many Democrats voted against the bill anyway, saying it still didn't go far enough. Among other concerns, they said the $2.4 million it gives the state Department of Environmental Quality is one-time spending, instead of a permanent boost.

The bill is part of the state's response to pollution of the Cape Fear River by a chemical known as GenX, which a class-action lawsuit claimed is tied to cancer and other diseases.

The bill passed 27-13, and it now goes to the House for approval.

Republican Sen. Michael Lee, who wrote the Senate bill, said he amended it Friday to give the added spending flexibility because of comments from Democrats during a contentious committee meeting Wednesday night.

Those changes would let DEQ use a third of the $2.4 million to create new jobs – temporarily – to cut down on the department's months-long backlog to review permits, or to get more people in the field analyzing air and water for pollution.

Before the changes, the money would only have been used to carry out several studies.

"That was something that was expressed in the committee," Lee said. He later added: "This is an amendment to give more flexibility to DEQ ... this is not partisan, not political."

However, Democrats had other political complaints. Some said they voted against the bill because it gives responsibilities to the NC Policy Collaboratory, a controversial new center at UNC-Chapel Hill whose chief researcher is Jeff Warren, a former adviser to Republican Senate

SEE GENX, 2C

FROM PAGE 1C

GENX

leader Phil Berger.

Republican supporters say the collaboratory will be able to find all the right experts and coordinate people from different UNC System schools, so the GenX response happens as quickly as possible. Democratic opponents say the collaboratory is likely to be more concerned with conservative politics than with solving an environmental crisis.

"Senator Berger is refusing to fully fund our state regulators, instead shoveling money to one of his cronies who helped author some of the most notoriously anti-environment bills in North Carolina's history," Kimberly Reynolds, the executive director of the N.C. Democratic Party, said in a press release. "If the Senate was serious about fixing our GenX contamination, they would fully fund our environment and health regulators – and done it six months ago."

The collaboratory was not mentioned at all in a previous version of the bill that unanimously passed the House last month, but which Berger would not allow to come up for a vote in the Senate. Instead, the House version would've given some of the responsibilities to a group of scientists appointed by Democratic Gov. Roy Cooper's administration, the N.C. Secretaries' Science Advisory Board.

In another change that Democrats saw as a politically motivated shot at Cooper's administration, the Senate version of the bill also got rid of a provision in the House bill that would've paid for DEQ to hire new scientists and buy the equipment its leaders say is necessary to find and study GenX and other "emerging contaminants."

The Senate bill instead told DEQ to find that equipment, called a mass spectrometer, elsewhere.

Lee strongly defended that change. He said it will save money, speed up the process and get some world-class scientists in on the project.

He said the Gillings School of Public Health at UNC-Chapel Hill is already willing to help – a researcher there previously told legislators her lab typically charges about $100 an hour – and that it's the No. 2-rated public health school in the country, behind only Harvard University.

"This gets the samples analyzed as quickly as possible, by the best folks in the world, who are right in our back yard," he said. "... I mean, shame on us for not leveraging the resources of our UNC System sooner."

Will Doran: 919-836-2858, @will_doran

"I would wish [The News & Observer] always to be 'the tocsin' and to devote itself to the policies of equality and justice to the underprivileged. If the paper should at anytime be the voice of self-interest or become the spokesman of privilege or selfishness it would be untrue to its history. — *from the will of Josephus Daniels, Editor and Publisher, 1894-1948*

2/15/18

AF

Delaying action on GenX wrong

BY THE N AND O EDITORIAL BOARD

State Sen. Michael Lee (R-New Hanover) has proposed legislative changes that he says will better address how the contaminant GenX endangers drinking water in the Cape Fear River basin. Upon offering the revisions, he said: "Water quality is not a political issue."

Lee was wrong. In the state Senate water quality *is* a political issue. And while Republicans led by Senate leader Phil Berger play politics with it, people in Wilmington, Fayetteville and other areas continue to worry about whether the water they've been drinking from the Cape Fear River and private wells might contain a toxic contaminant. The chemical GenX is used in Teflon and other products. State officials say the Chemours company discharged GenX into the Cape Fear River for years from a factory it operates just south of Fayetteville.

The state House addressed the problem directly. That often polarized body unanimously passed a bill on Jan. 10. The legislation would provide the state Department of Environmental Quality with resources to assess pollution involving GenX and similar contaminants that can pass through municipal water filtering systems. House Bill 189 by state Rep. Ted Davis, a Wilmington Republican, would allocate $2.3 million to the state DEQ to buy a tool that detect the elusive contaminant – a $500,000 device called a high-resolution mass spectrometer – and hire five new scientists to use it.

Berger said the Senate would not take up the bill. He said polluting companies, not taxpayers, should pay for the GenX response and the spectrometer is an unnecessary expense. He said the state can use spectrometers owned by the Environmental Protection Agency and the UNC system. This is an absurd demand for frugality in the face of a public health issue that has thousands of people buying bottled water and is causing untold commercial losses to Wilmington and its tourist industry.

The Senate's changes to the House bill remove funding for a mass spectrometer. It also specifies that the North Carolina Policy Collaboratory at UNC-CH help with research into GenX and related chemicals. The revised bill also calls for extensive study of how well DEQ has administered the National Pollutant Discharge Elimination System permitting program since 1975. The substitute bill goes to the House, where it is now parked in committee. It may not be taken up until the legislature convenes for its short session in May.

What's really going on? Berger's explanation is an unconvincing concern about a small expense for a state of 10 million people with a $23 billion annual budget.

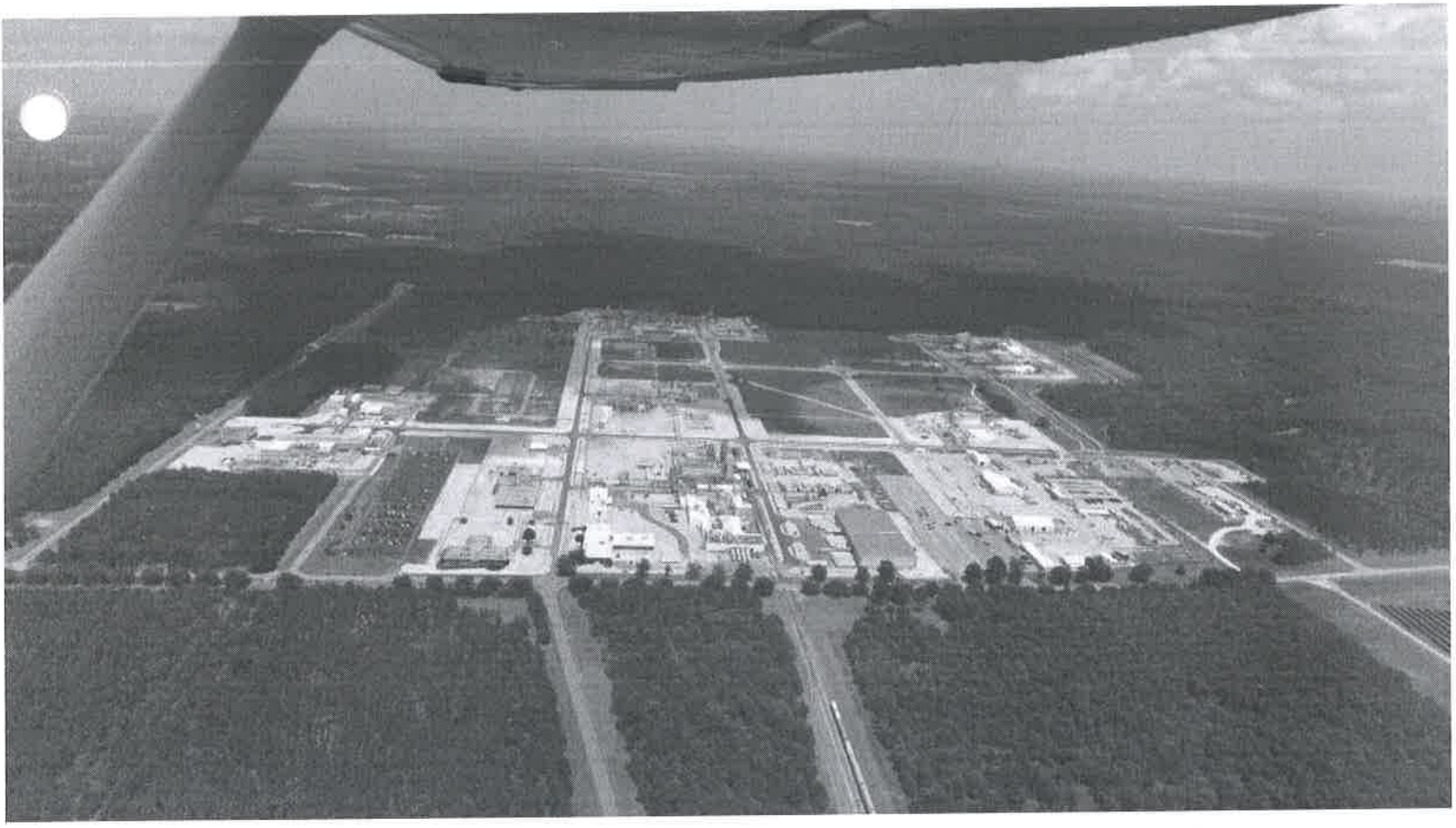
His Senate leadership has been marked by a steadfast commitment to limiting the size of government and reducing state regulations, especially environmental regulations. Providing DEQ with equipment and staff to detect and regulate a new generation of hard-to-detect contaminates could increase state regulation and costs to the companies that discharge those contaminants. His response to the DEQ problem is to delay and study rather than detect and act.

And the Senate proposal to direct DEQ to work with the UNC group, instead of DEQ's Science Advisory Board, is a short-sighted attempt to strip authority away from the executive branch, which is charged with enforcing environmental rules and laws.

The House saw a significant environmental problem and moved responsibly and unanimously. Cooper should take action where Berger and the Senate won't. Cooper should call the legislature back for a special session to address the problem now.

2/15/18

2/13/18



STATE POLITICS

Roy Cooper blasts legislators for putting off pollution bill

BY WILL DORAN
wdoran@newsobserver.com

February 13, 2018 06:46 PM
Updated February 13, 2018 08:32 PM

RALEIGH — State lawmakers' disagreements on how – or whether – to spend more money now or in the future fighting pollution were apparently too tough to deal with for now.

So they decided Tuesday to leave the issue alone for at least another three months.

Gov. Roy Cooper was not pleased, calling the legislature's delay "unconscionable."

Close Ad
Vraylar (cariprazine) capsules 1.5mg·3mg·4.5mg·6mg
See full Prescribing Information, including Boxed Warning
IMPORTANT RISK INFORMATION
What is the most important information I should know about VRAYLAR?
Elderly people with dementia-related psychosis (having lost touch with reality due to confusion

Replay



Governor Roy Cooper
@NC_Governor

Legislators are going home after doing nothing to protect clean drinking water for NC families. North Carolinians deserve action on this, and Republican legislative leaders' failure to act is unconscionable.

2:14 PM - Feb 13, 2018

380 204 people are talking about this

Never miss a local story.

Sign up today for a free 30 day free trial of unlimited digital access.

SUBSCRIBE NOW

In January, the North Carolina House of Representatives unanimously passed a bill that would give extra money to the state's environmental regulators to address a chemical called GenX. But Senate leadership didn't allow an immediate vote on it. The Senate then made several major c

Close Ad

Vraylar
(cariprazine) capsules
1.5mg•3mg•4.5mg•6mg

See full Prescribing Information, including Boxed Warning

IMPORTANT RISK INFORMATION

What is the most important information I should know about VRAYLAR?

Elderly people with dementia-related psychosis (having lost touch with reality due to confusion

That means that now, the earliest that legislators might get back to trying to address GenX will be when they return to Raleigh on May 16 for the "short session" held in election years.

The short session will include debates on many unrelated issues, so it's unclear how much attention GenX will receive then.

Just before the House adjourned Tuesday, Rep. Deb Butler, a Democrat from Wilmington, blasted her colleagues for not trying harder to find a compromise.

"The urgency doesn't really seem to be there," she said.

Why is GenX a problem?

State regulators say a plant near Fayetteville owned by Chemours, which is a spinoff of the chemical company DuPont, secretly dumped pollutants into the river for years.

The N.C. Department of Environmental Quality, which has been hit with massive budget cuts over the last decade, has faced criticism in the legislature for not catching the pollution sooner.

A new class action lawsuit is claiming the companies knew about the health dangers behind the pollution. The lawsuit blames above-average rates of liver disease and various cancers in southeastern North Carolina on that pollution.

The former mayor of Wilmington, Harper Peterson, recently told legislators he doesn't think people should be drinking the city's water.

On Tuesday, DEQ announced it had issued Chemours another "notice of violations," which alleged that the company hasn't done enough to stop pollution or to deal with the fallout. It's the second notice related to GenX; this new one also alleges air pollution is a problem in addition to water pollution.

DEQ and Department of Health and Human Services, both in the Cooper administration, say they need millions of dollars more to buy scientific equipment and hire staffers to dig into pollution issues.

In the House, Republicans and Democrats alike agreed that giving DEQ more funding and flexibility in how to use it was the right move. During the debate last month, Republican

Close Ad
Vraylar
(cariprazine) capsules
15mg·3mg·4.5mg·6mg
See full Prescribing Information, including Boxed Warning
IMPORTANT RISK INFORMATION
What is the most important information I should know about VRAYLAR?
Elderly people with dementia-related psychosis (having lost touch with reality due to confusion

But in the Senate, it was only the Democrats who agreed with that.

Republicans, like Wilmington Sen. Michael Lee, said the House bill had unnecessary spending. Lee said their changes would speed up the process and save money.

In addition to removing proposed new funding for DEQ to buy equipment and instead ordering the agency to borrow or rent the equipment, the Senate also wants to give key duties to the NC Policy Collaboratory – a new group at UNC-Chapel Hill that employs the former science adviser to Senate leader Phil Berger.

Senate Republicans said the collaboratory is well-positioned to coordinate scientists all around the UNC System. But Democrats have voiced concerns that it might instead have a politicized, anti-regulatory agenda.

Cooper's office stayed out of that fray. It was more focused on the fact that the legislature left town with nothing, and no plans to try voting again until May or later.

"It's disgraceful that after months of stalling, Republican legislators have gone home without doing anything to protect clean drinking water for North Carolina families," Cooper spokeswoman Noelle Talley said in a press release Tuesday.

"People in the Cape Fear region have a right to be angry that legislative leaders have failed to do their duty and give state scientists the tools they need to deal with GenX and other emerging contaminants."

Next steps

Between now and May, a House committee on river quality led by Republican Rep. Ted Davis will consider the Senate's changes to the original House bill his committee put forth.

It will start its work next week, with a Feb. 21 meeting in Raleigh.

The question now is which chamber will get its way in the end, or if there will be a compromise between the House and Senate.

Environmentalists weren't overly excited about either version of the bill, but many said the House version was the better starting place.

Close Ad
Vraylar (cariprazine) capsules 1.5mg·3mg·4.5mg·6mg
See full Prescribing Information, including Boxed Warning
IMPORTANT RISK INFORMATION
What is the most important information I should know about VRAYLAR?
Elderly people with dementia-related psychosis (having lost touch with reality due to confusion

Doran: 919-836-2858; Twitter: @will_doran



North Carolina just took its toughest action yet against...



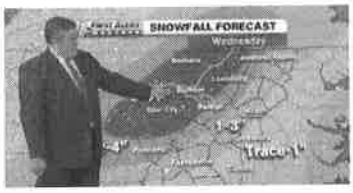
NC sues company accused of polluting Cape Fear River



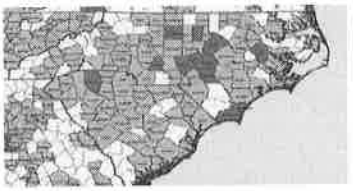
Is NC home to 2 of the top 5 'most polluted' rivers?



Former WRAL anchor Hyland hired as information officer...



Snow expected early Wednesday, plus bitter cold wind...



NC lawmakers might be changing their minds on spending...

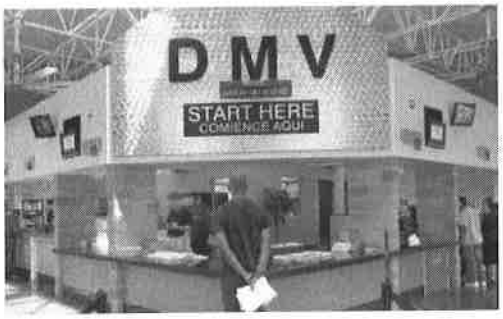


Their water is contaminated, and these Wake...



As NC pollution concerns grow, so do environmental...

COMMENTS



SPONSORED CONTENT

New Rule for North Carolina Drivers

By Comparisons.org — North Carolina Drivers With No Tickets In 3 Years Are In For A Big Surprise

Close Ad

Vraylar (cariprazine) capsules 1.5mg•3mg•4.5mg•6mg

See full Prescribing Information, including Boxed Warning

IMPORTANT RISK INFORMATION

What is the most important information I should know about VRAYLAR?

Elderly people with dementia-related psychosis (having lost touch with reality due to confusion

Judy Lowe (Rep. Ted Davis)

From: Judy Lowe (Rep. Ted Davis)
Sent: Monday, September 18, 2017 02:23 PM
To: Judy Lowe (Rep. Ted Davis)
Subject: <NCGA> House Select Committee on North Carolina River Quality Committee Meeting Notice for Thursday, September 28, 2017 at 9:00 AM
Attachments: Add Meeting to Calendar_LINC_.ics

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Thursday, September 28, 2017
TIME: **9:00 AM**
LOCATION: **643 LOB**
COMMENTS:

This Committee meeting is scheduled to last until the afternoon with an hour break for lunch.

When completed, a copy of the agenda will be provided to the Committee members.

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 2:19 PM on Monday, September 18, 2017.

___ Principal Clerk
___ Reading Clerk – House Chamber

Judy Lowe (Committee Assistant)

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER MCGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

JUDY LOWE
COMMITTEE CLERK

AGENDA
9:00 a.m. Thursday, September 28
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Davis, presiding

2. Introductory remarks by Cochairs
   Representative Davis
   Representative Grange
   Representative Iler

3. Presentation on the regulatory history of the Chemours Fayetteville Works facility including:
   - The permitting and enforcement history of the facility at the State and federal levels
   - All legal action taken by the State relative to the Chemours Fayetteville Works facility
   - Water quality test results for wells adjacent to the Chemours Fayetteville Works facility and efforts to address contamination
   - Investigation into potential air emissions

   (1 hour 30 minutes)
   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

4. Presentation of action plan to implement Section 20(a)(1) of House Bill 56 (GenX Response Measures); report on the GenX contamination of the Cape Fear Public Utility Authority's aquifer storage *(1 hour)*
   Mike Brown, Chairman of the Board
   Cape Fear Public Utility Authority Board

   Frank Styers, Chief Operations Officer
   Cape Fear Public Utility Authority

5. Presentation of action plan to implement Section 20(a)(2) of House Bill 56 (GenX Response Measures) *(30 minutes)*

   Mark Lanier, Assistant to the Chancellor
   University of North Carolina Wilmington

   Dr. Ralph Mead, Professor, Department of Chemistry and Biochemistry
   University of North Carolina Wilmington

Lunch break *(1 hour)*

6. Presentation on the presence and health effects of GenX and related compounds in the Lower Cape Fear River Basin *(1 hour)*

   Mark Benton, Deputy Secretary for Health Services
   Department of Health and Human Services

   Zack Moore, MD, MPH
   State Epidemiologist and Epidemiology Section Chief
   Division of Public Health, Department of Health and Human Services

7. Presentation on emerging compounds and federal regulations, State regulations, and regulatory gaps related to emerging compounds *(1 hour 30 minutes)*

   Tracy Skrabal, Coastal Scientist and Manager of the Southeast Regional Office
   North Carolina Coastal Federation

   Dr. Lee Ferguson, Associate Professor, Department of Civil and Environmental Engineering
   Duke University

8. Commission discussion and announcements

9. Adjourn

ADDITIONAL INFORMATION:

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578 or may visit the Committee's website at:
http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

House Select Committee on North Carolina River Quality

Thursday, September 28, 2017 at 9:00 AM
Room 643 of the Legislative Office Building

MINUTES

The House Select Committee on North Carolina River Quality met at 9:00 AM on September 28, 2017 in Room 643 of the Legislative Office Building. Representatives Davis, Grange, Iler, Co-Chairs, and members Brisson, Dixon, Hall, Harrison, McElraft, Steinburg and Stone attended. The following staff members were also in attendance: Jeff Hudson, Jennifer McGinnis, Chris Saunders, Mariah Matheson and Judy Lowe, Committee Clerk. **Visitor's Registration Sheets (attachment 1)** are filed as a record to the minutes.

Representative Ted Davis, Jr., Senior Chairman, presided. He welcomed the staff, visitors and Sergeants at Arms, Jonas Cherry, Marvin Lee, Dean Marshbourne, and Thomas Terry.

He then asked the Co-Chairs if they had any remarks. Representative Grange was happy to see so many present that are willing to help provide information so that something like this does not happen again. She wanted to make sure that what is accomplished in this Committee is going to be applied throughout the entire state. She noted that the Committee had a very ambitious agenda and she was excited that there was so much participation.

Representative Iler appreciated all those who were in attendance and noted that the Committee needed true information more than anything else and he was grateful for the scientific folks present as well as others who have an interest. He stated it is important to know what is going into the water before it goes in it.

Chairman Davis reviewed the purpose of the Committee and thanked Speaker Tim Moore for establishing it.

The first item on the agenda was an overview and PowerPoint presentation on the regulatory history of the Chemours Fayetteville Works facility given by Ms. Sheila Holman, Assistant Secretary for Environment, Department of Environmental Quality (DEQ) and are **Attachments 2a and b.** Her written remarks are also included in **Attachment 3**.

Ms. Holman began with Regulatory Program Overviews. The Toxic Substances Control Act (TSCA) is implemented by the United States Environmental Protection Agency (U.S. EPA), which oversees the approval of chemical manufacturing in the United States. States can seek Confidential Business Information (CBI) clearance to review information directly from the U.S. EPA, or a company can give notice to U.S. EPA that they consent to a state having access to CBI material. The federal Clean Water Act (CWA) is implemented by DEQ with oversight from U.S. EPA. The federal Safe Drinking Water Act (SDWA) is also implemented by the state and ensures that public water supplies are protective of human health and the environment. The Environmental Management Commission (EMC) establishes rules for surface water and groundwater standards in North Carolina.

Cape Fear River. The recent history of the Cape Fear River data shows that the U.S. EPA used a stepwise prioritization process to identify potential Unregulated Contaminant Monitoring Rule (UCMR) 3 contaminants. An agency and state working group first reviewed the third Contaminant Candidate List (CCL 3) as well as the contaminants considered in the development of CCL 3. The final CCL 3 was comprised of contaminants that were selected through a data-driven process that considered adverse health effects and occurrence. They used CCL 3, along with additional sources of information about other emerging contaminants of potential concern, to establish an initial list of potential UCMR 3 contaminants. 1,4-dioxane, a probable human carcinogen, is found in a variety of products including makeup, paint and soaps and is a byproduct of making/recycling Polyethylene Terephthalate (PET) plastic and polyester products. Results from the study's first year indicated four primary areas of elevated 1,4-dioxane in the upper portion of the Cape Fear River basin. Three of the areas were located immediately downstream of wastewater treatment plants, indicating that discharges from these facilities may be conduits for 1,4-dioxane. The fourth was located along a smaller stream and potential local sources will be explored as the study continues. Results from the second year of the study demonstrated reductions in 1,4-dioxane concentration at almost all monitoring stations. Division of Water Resources (DWR) began another 18 month monitoring of 1,4-dioxane at locations in the Cape Fear River basin, as well as the Neuse and Yadkin river basins, with the objectives of further understanding changes in concentrations, identifying potential sources of the compound, and documenting data that will help the state develop a regulatory strategy.

The history of DuPont/Chemours is included in Ms. Holman's report.

DEQ started sampling the National Pollutant Discharge Elimination System (NPDES) outfall from Chemours into the Cape Fear River on June 19, 2017 and also sampled raw and finished water at public utilities up and downstream locations for six more weeks, ending on July 19, 2017. It was reported that the concentrations of GenX in finished water dropped significantly over the time period as the company had indicated they stopped the discharge of GenX into the wastewater stream in late June.

Based on information Chemours provided, on September 5, 2017 DEQ filed a 60-day notice of intent to suspend the NPDES permit. On behalf of DEQ, the Department of Justice (DOJ) filed a complaint against the company in Bladen County Superior Court. On September 8, 2017 the Court entered a partial consent order. Ms. Holman reported that Chemours is making progress toward addressing the requests in the 60-day letter and DEQ is continuing to work with the company on the situation. DEQ is continuing its study and work to remove 1,4-dioxane from North Carolina river basins; continuing to evaluate Chemours discharges and will continue coordination with the Department of Health and Human Services (DHHS), other states and federal agencies and industry on emerging contaminants.

Following Ms. Holman's presentation, Representative Iler asked for clarification of a few things including who the 1,4-dioxane is attributed to. There is no data to support it is coming from the site.

Representative Grange stated that she was concerned with the timeline of this and why there was no indication of monitoring earlier and asked what about testing and sampling at other large industrial sites?

Representative Dixon noted the presentation started with recent history and this is the first time this group of stuff has been identified as a potential problem. Things were going well and then something happened. These circumstances occurred with DEQ fully funded and capable. If the press makes it political, i.e. funding, he will not sit by idly.

Representative McElraft stated there was a permit in 2009 for C8 chemical. The document was a consent order reached with U.S. EPA to manufacture GenX instead of C8 but in a closed loop system. She asked if there is any testing done before discharge is initially approved. The response was that there are health standards and specific limits and monitoring requirements. Representative McElraft indicated her surprise that they don't know there is a discharge from Chemours.

Representative Stone said it is important to get benchmarks and asked if it was common to issue a Notice of Violation (NOV) for an unregulated compound.

It was explained that the NOV is used for a direct violation that affects the environment.

He also asked if it is a requirement to list the compounds by name of the constituent chemicals.

The response was that the question could not be answered because of litigation.

Representative Stone then asked if DEQ ever prohibited a zero discharge on wastewater. A further question was whether the treatment was consistent. Representative Stone asked if DEQ was looking at air quality as well. It is important to get to the bottom of this so the public knows what is going on.

Representative Harrison thought there was statutory authority to monitor and regulate effectively. She asked how many staff members are available to handle NPDES permits.

The response was that there are 9 full time employees (FTE's) for permitting but there is a 41% backlog and 220 major NPDES permits. There is also no real regulation of GenX in the Division of Air Quality; it is not qualified as air toxin and thus cannot be regulated. There is statutory authority to form safety thresholds but data and technical information is lacking to make decisions. There are plans to require reporting of emerging contaminants, and that is done for some, but they are looking to expand. The U.S. EPA set a health advisory in 2017 for levels of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS).

She asked about the backlog of permits and permits that have expired.

Ms. Holman said there was a backlog and the department would like more resources.

Representative Brisson commented on problems with Bladen and Cumberland County groundwater, but related to underground storage tanks (USTs). He noted that technology has made it possible to detect smaller concentrations and dozens of new chemicals.

The next item was presented by Mike Brown, Chairman of the Board of the Cape Fear Public Utility Authority (CFPUA), titled CFPUA Action Plan to Implement

Gen-X Response Measures (**Attachment 4).** He stated that the CFPUA has been operational since 2008, has 68,000 customer accounts, and serves roughly 200,000 people with two plants; Sweeney and the smaller Richardson Nanofiltration Plant. They buy 23 million gallons from the Lower Cape Fear.

Mr. Frank Styers, Chief Operating Officer, also gave part of the Plan. He indicated that inflow has been in service since the 1940s. Granular activated carbon (GAC) pilot testing has shown to absorb compounds, but has a limited life. Ion-exchange resin testing has been specifically manufactured to remove PFOS with negatively charged compounds. Fourteen other compounds are being evaluated. GenX water was sent to Pittsburgh for accelerated column testing with results in October. So far, $90,000 has been spent with testing and monitoring. The overview of costs is included as a summary in the slide presentation in the attachment.

Mr. Styers stated that the CFPUA is partnering with the University of North Carolina Wilmington (UNCW) in developing tests to identify what is in the water. The study will also include where the compounds are, possibly the river sediment, and evaluate compounds in finished water; totaling $300,000. Aquifer storage and recovery (ASR) is not yet permitted and approved. The ASR program cost estimates are $600,000 including engineering, construction, testing and monitoring. The summary of anticipated short term costs is as follows: water treatment evaluation, $90,000; UNCW support, $300,000; ASR remediation, $600,000, and ongoing GenX monitoring, $85,000 for a total cost of $1,075,000. These costs do not include permanent upgrades to Sweeney.

Chairman Davis called for questions and comments from the Committee members.

Representative Stone asked Mr. Styers about testing for perfluoro-2-methoxyacetic acid (PFMOAA).

He responded that they are testing for all known compounds.

Representative McElraft asked if they were testing at the plant for 1,4-Dioxane.

He indicated that it was not currently being done but they have done it in the past and have a good removal percentage.

Representative Harrison noted 14 pro-fluorinated compounds and asked if there were others.

My Styers stated that one test covers the spectrum of all 14.

Representative Grange commended the CFPUA in addressing the issue and thought North Carolina might be a leader in the nation tackling the problem.

The third presentation on the agenda was an overview by Mark Lanier, Assistant to the Chancellor and Assistant Secretary of the Board of Trustees at UNCW. (**Attachment 5**) It would be conducted under contract with CFPUA to include the collection and analysis of sediments from the Cape Fear River from seven locations, ranging from Southport, in Brunswick County, to upstream of the Chemours facility, which is on the border of Bladen and Cumberland counties in order to have a better understanding of the concentration of various chemicals in the sediments; biodegradation studies of GenX in the sediments over the timeframe allowed; possible work at UNCW's Center for Marine Science regarding bioaccumulation in oysters or other organisms in the ecosystem; and possible work by others at UNCW in regard to potential impacts on humans and human behaviors, such as analysis of the use and effectiveness of home water filtration systems. He indicated the University would be providing the services outside of the dollars appropriated and the citizens of North Carolina would benefit from all of this research.

Mr. Lanier's remarks were followed by the UNCW Water Quality Research Plans (related to HB 56 Amend Environmental Laws/S.L. 2017-209) and given by Dr. Ralph Mead, Professor, Department of Chemistry and Biochemistry at UNCW. See **Attachment 6.** The research plans will work on the existing contract with CFPUA to analyze both raw and treated water with the purpose of providing its customers the highest quality water possible. The proposed work will be built upon previous published research at UNCW and will focus on the goals of establishing a method for the analysis of per- and polyfluoroalkyl substances (PFAS) in raw and finished drinking water using published methodology. When the University is confident in the analytical methodology, a sampling campaign of raw and finished drinking water will commence. They will also develop and implement the analysis of sediments, as in HB 56, conduct biodegradation studies in sediments, bioaccumulation in ecosystem and economic impacts and household filtration effectiveness and household risk perception. He shared that determining human toxicity requires high-resolution spectrometry and takes a great deal of time to identify unknowns. The C8 and GenX are completely different organic compounds with different molecular structure. This will be accomplished over a one-year time frame beginning September 1, 2017 and ending August 31, 2018.

Representative Stone stated that PFOA and GenX are different and are they being overly connected. These are the holes in the research in GenX because there is a good amount of research on C8.

Following Dr. Mead's presentation, the Committee recessed for a lunch break.

The Committee resumed with a presentation on the Health Effects of GenX and Related Compounds in the Lower Cape Fear River Basin. Mr. Mark Benton, Deputy Secretary for DHHS, Division of Public Health (DPH) stated there were three challenges in setting a health goal as follows; (1) is there research, (2) is it correct and (3) is the research readily available? He explained that not all of them are easily accessible to state agencies.

His remarks were followed by Zack Moore, MD, MPH, State Epidemiologist, DHHS, DPH (**Attachment 7).** The public health role is to determine the risk to human health, risk assessments, and health based guidance to interested parties. They don't solely rely on their own data and standards and it is not the norm to set State specific health goals. The level isn't safe versus dangerous but rather the level of exposure for 70 years to a bottle-fed infant. Some health information isn't available in the public domain (confidential business information), but DHHS has received it from Chemours. Potential health effects to humans are not well understood for PFAS; PFOA and PFOS do have some research (U.S. EPA set lifetime health advisory at less than 70 parts per trillion (ppt) in 2017) on liver, thyroid, pancreas and hormone issues. GenX, a replacement for PFOA was unintentionally produced as a by-product for decades. There are no known human effects yet. A European chemical agency has looked into GenX (no effect level) in a 2-year study in rats which is what was used for the 71,000 ppt initial threshold. The U.S. EPA suggested other health studies that give a better idea of human health effects and that is what led to the 100-fold decrease. It also changed the assumption that not all exposure would come from water and assumed that water would only be 20% of the exposure. Issues accurately quantifying exactly how much is in the water have no lab standards. Currently, DHHS is working with the Center for Disease Control (CDC) and the U.S. EPA for a long-term Public Health Assessment. The analyzed data on the NC Cancer Registry did not reveal any trends of concern.

Following the presentation, Chairman Davis asked how the effect on humans would be determined as humans differ from animals.

The response was that there is only animal data for GenX, and there is no information for PFMOAA and Nafion byproducts 1 and 2. Most of the DHHS work is on

drinking water from wells; they do not randomly test but evaluate after something has been found. The State only had one toxicologist and the position had been vacant for 6 months before the week of the Star News article on GenX.

Representative Iler asked who the Division was alerted by to start investigating. Was it local health departments or DEQ?

Dr. Moore responded that it was the Brunswick County Health Department on June 8, 2017 as a result of a newspaper article.

Representative McElraft asked what was the dose in which the European chemical agency found health effects.

Dr. Moore said 1mg/1kg was used as a starting point for a controlled laboratory study.

Representative Harrison asked if other states are working to provide guidance and set standards for PFOA and others.

New Jersey has a strong environmental toxicology program, but no standards. As to the question of whether PFOA is an endocrine disrupter, there is insufficient evidence to make that determination. The central question being sought with U.S. EPA involves research into the exposure of all together at the same time. Dr. Moore stated that his division does not have a regulatory role, but does with private drinking well inspection.

Representative Grange stated that citizens view health goals as health standards and what confidence does the public have in the health goal that was decreased greatly from the initial assessment. The ways that the levels are interpreted are not the way they are meant.

Representative Stone referred to a July 14, 2017 DHHS FAQ document which doesn't suggest whether 140 ppt is a safe level for drinking water.

Dr. Moore explained that a blanket statement for all levels cannot be made, but these levels are for a lifetime of exposure. West Virginia set a threshold of 17,000 ppt for discharges in waterways but this is not finished water for drinking. DHHS has no mechanism for peer review.

Representative McElraft then asked if any epidemiology studies were done because you can't just look at higher cancer rates and assume that GenX is the cause.

Dr. Moore responded that the studies need to be done correctly so DHHS does not do them; they are sent to academic partners.

Representative Dixon inquired about establishing health standards to see if parents are giving proper amounts of water to children. The assumption is critical to the overall conclusion. There is a gap between actuality and reality so it is important to see if news releases are accurate. Representative Dixon stated that the news outlets are unconcerned with reporting the news; only interested in producing the news.

Dr. Moore responded that he can't make a blanket statement. In further discussion, he added that the DHHS previously had two toxicologists; now has only one.

Representative McElraft inquired about the animal studies source.

Dr. Moore promised to get back to her with the source.

She added that it is necessary to be more certain before putting numbers out.

Representative Iler indicated that the budget for DHHS is over 5.253 million dollars. He also had some other budget figures.

Representative Dixon stated that political games are being played.

The next presentation was from Tracy Skrabal, Coastal Scientist and Manager of the Southeast Regional Office of the North Carolina Coastal Federation. (**Attachment 8).** She explained that her comments will focus on the issue of contaminants in our surface waters. She outlined the Federation's priorities for any legislative response to the GenX issue. The first one was that what happened in the Cape Fear River with GenX should never occur again in any North Carolina river or drinking water supply. To achieve this goal will require the development of a permanent, well-funded water monitoring program that allows regulator, local governments and the general public to have the information they need to be confident we know what is in our water and are taking the appropriate steps to ensure it is clean and safe.

Representative Davis asked if there are gaps in state and federal regulations that can be addressed by the state.

Ms. Skrabal responded that the existing regulations are sufficient but the gaps are in capabilities, technologies, research and infrastructure.

Representative Grange stated she identified a gap in the earlier U.S. EPA presentation. The consent order from 2009 did not apply to byproducts.

Representative Dixon commented that the burden of proof for what is discharged is up to the person applying for the permit. He asked if that was legally binding.

The response was that under a CWA degradation clause, it is. Ms. Culpepper informed the Committee that the burden lies with the permittee under the NPDES permit structure. The permit application indicates where the discharge is located. The points of compliance for the permit do not lie at the production line, but have been sampled during DEQ investigation.

Representative Dixon stated that there needs to be more vigorous tests at the discharge point. He further noted that this current majority has not been caught flat-footed.

Following other comments from Ms. Skrabal, which are included in **Attachment 8,** she introduced Dr. Lee Ferguson, Associate Professor, Department of Civil and Environmental Engineering at Duke University, to make his presentation to the committee. It is titled "Emerging Contaminants in NC Rivers: Strategies for Protecting Water Quality" **(Attachment 9).** Dr. Ferguson began by stating that the only way to avoid another GenX situation is "holistic emerging contaminant monitoring" but this is not routine and most state labs do not have the capability. A top-down method of prioritization of the chemicals means to know what chemicals are used in commerce and monitor for those in the waterways. Roughly 85,000 chemicals are used in commerce, roughly only 10,000 have been tested for toxicity. At 25,000 lbs. per year, companies must disclose to U.S. EPA, except there are some chemicals for which production volume is CBI. Those that are produced in such a large volume are the ones we want to know most about but much of it is protected by CBI.

The bottom-up prioritization is known-knowns, known-unknowns, and unknown-unknowns. Most of the instrumentation that is needed is in research labs but not in state or contract labs. Most companies don't have these either. The California state water-board monitoring system (non-targeted analysis) measures for specific non-regulated contaminants. How is it paid for? A regional monitoring program from a non-profit ($3.5 million) is paid from dischargers, permit fees, etc.

The Rhine River is an example of a water supply for 20 million people. Their monitoring system samples the water every day and assesses the compounds that are unregulated. The technology is very specific and very costly. Daily monitoring allows for immediate discovery.

Representative Dixon asked how long the Rhine monitoring system has been in place.

It has been there since the l980's after a large chemical spill.

Representative Grange asked if GenX is in the list of 97 targeted compounds.

It is not and had to be discovered in the Cape Fear River through non-targeting.

Representative McElraft wondered if the California advisory board detected GenX.

The response was "no" but PFOS has been on the discovery panel for about 10 years. C8 was found in relatively large levels, but pro-fluorinated compounds are very prevalent with airports, military bases, etc. The first sample in GenX was in 2015 in the Cape Fear River.

Representative Harrison asked if PFAS are on SDWA list.

The response was "no". She also asked if the number of chemicals will be updated with the newly passed TSCA reform.

The response was in the affirmative but a much larger burden of CBI protection; less will be protected (currently reviewed by U.S. EPA).

PFAS and PFOS bind to sediment and organisms in the environment so when the discharge stops, there isn't necessarily an immediate drop.

As the questions and answers ended, Chairman Davis requested that any questions be sent to the Committee Assistant, Judy Lowe.

The meeting was adjourned at 4:10 PM.

The next meeting of the Committee is scheduled for Thursday, October 26, 2017 and will begin at 9:30 AM.

Representative Ted Davis, Jr., Sr. Chair,
Presiding

Judy Lowe, Committee Clerk

Attachments:

1. Visitor Registrations Sheets
2. Regulatory History of the Chemours Fayetteville Works Facility-Sheila Holman
3. Written Remarks—Sheila Holman
4. CFPUA Action Plan to Implement GenX Response Measures—Mike Brown and Frank Styers
5. Action Plan to Implement Section 20 (a)(2) of House Bill 56—GenX Response Measure—Mark Lanier
6. UNCW Water Quality Research Plans—Dr. Ralph Reed
7. Health Effects of GenX and Related Compounds in the Lower Cape Fear River Basin—Mark Benton and Zack Moore, MD
8. North Carolina Coastal Federation Comments to House Select Committee on River Quality—Tracy Skrabal
9. Emerging Contaminants in NC Rivers: Strategies for Protecting Water Quality—P. Lee Ferguson, Ph.D.

Attachment 1

VISITOR REGISTRATION SHEET

Hse Committee N.C. River Quality — 9/28/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Matthew Starr	Riverkeeper
Tom BEAN	EDF, NCWF
BRETT SHEINBAUM	GRADUATE STUDENT, OREGON STATE UNIVERSITY
Caroline Outler	RES, Raleigh
Lindsay Dowling	FSP
Tommy Stevens	Stevens Lobby
ROBERT RUBIN	NCSU - BAE RETIRED FEMC
John Merrill	DLA Piper
Bryan Gruber	NCFA
Ben Popken	DHHS
MG Mallia Abill	SELC

VISITOR REGISTRATION SHEET

Hse Committee N.C. River Quality — 9/28/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Mike Giles	N.C Coastal Federation 309 W. Salisbury St. Wrightsville Beach NC
Rob Lamm	RLA
Sarah Collins	NCLM
Chris Anderson	[illegible]
[illegible]	HELMS
Cabry Keyes	DP
Phoebe Landon	MWC
Jon Carr	NC Rural Water Assoc.
David McGowan	NCPC
TYLER NEWMAN	BASE
Kian Mcward	CWM

VISITOR REGISTRATION SHEET

Hse Committee N.C. River Quality — 9/28/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Cassie Gavin	Sierra Club
Molly Diggins	Sierra Club
Brian Powell	NC Conservation Network

VISITOR REGISTRATION SHEET

Hse Committee N.C. River Quality — 9/28/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Doug Lassiter	NCSTA
Susan Vick	Duke Energy
Fabian Robinson	NCRMA
Preston Howard	NCMA
Steward Webb	NCRBA

Attachment 2a



Nothing Compares
NORTH CAROLINA

House Select Committee on North Carolina River Quality

September 28, 2017



Emerging Compounds

- Regulatory Program Overview
- Cape Fear River
- Next Steps



Regulatory Program Overviews



- Toxic Substance Control Act

- Clean Water Act
  - NPDES permit (wastewater)

- Federal
- Safe Drinking Water Act
  - Contaminant Candidate List
  - Unregulated Contaminant Monitoring Rule

ongoing processes

- State Surface water and Groundwater Standards

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.

1,4-Dioxane
Regulatory Framework

Safe Drinking Water Act - Unregulated Contaminant

- No EPA established maximum contaminant level for drinking water
  - 2012 Drinking Water Standards and Health Advisory
    - 1 in 1,000,000 estimated lifetime cancer risk at 0.3 µg/L
    - 1 in 10,000 estimated lifetime cancer risk at 35 µg/L

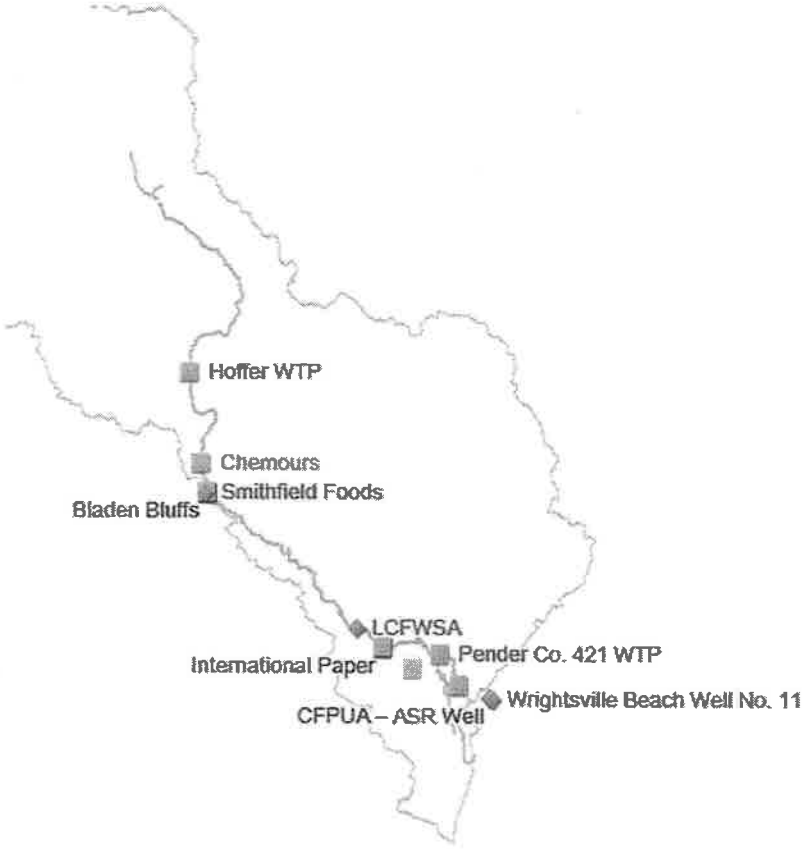
- NC calculated surface water criteria to protect human health (15A NCAC 02B.0208) based on 1 in 1 million cancer risk.
  - 0.35 µg/L in water supply waters (except WS-V, Jordan)
  - 80 µg/L in non-water supply waters

- NC groundwater standard = 3.0 µg/L (outdated)

DuPont/Chemours

- DuPont began chemical manufacturing at the plant along the border of Cumberland and Bladen Counties in 1971.
- Around1980 DuPont began manufacturing products using fluorinated compounds.
- GenX manufacturing began in 2015? GenX has been a byproduct of the vinyl ether production line, and the wastewater discharged through the NPDES outfall into the Cape Fear River.
- DuPont transitions site ownership to Chemours. The NPDES permit includes receives wastewater from tenants at the property, Kuraray and DuPont.

DEQ Sampling
June 19 – August 4, 2017

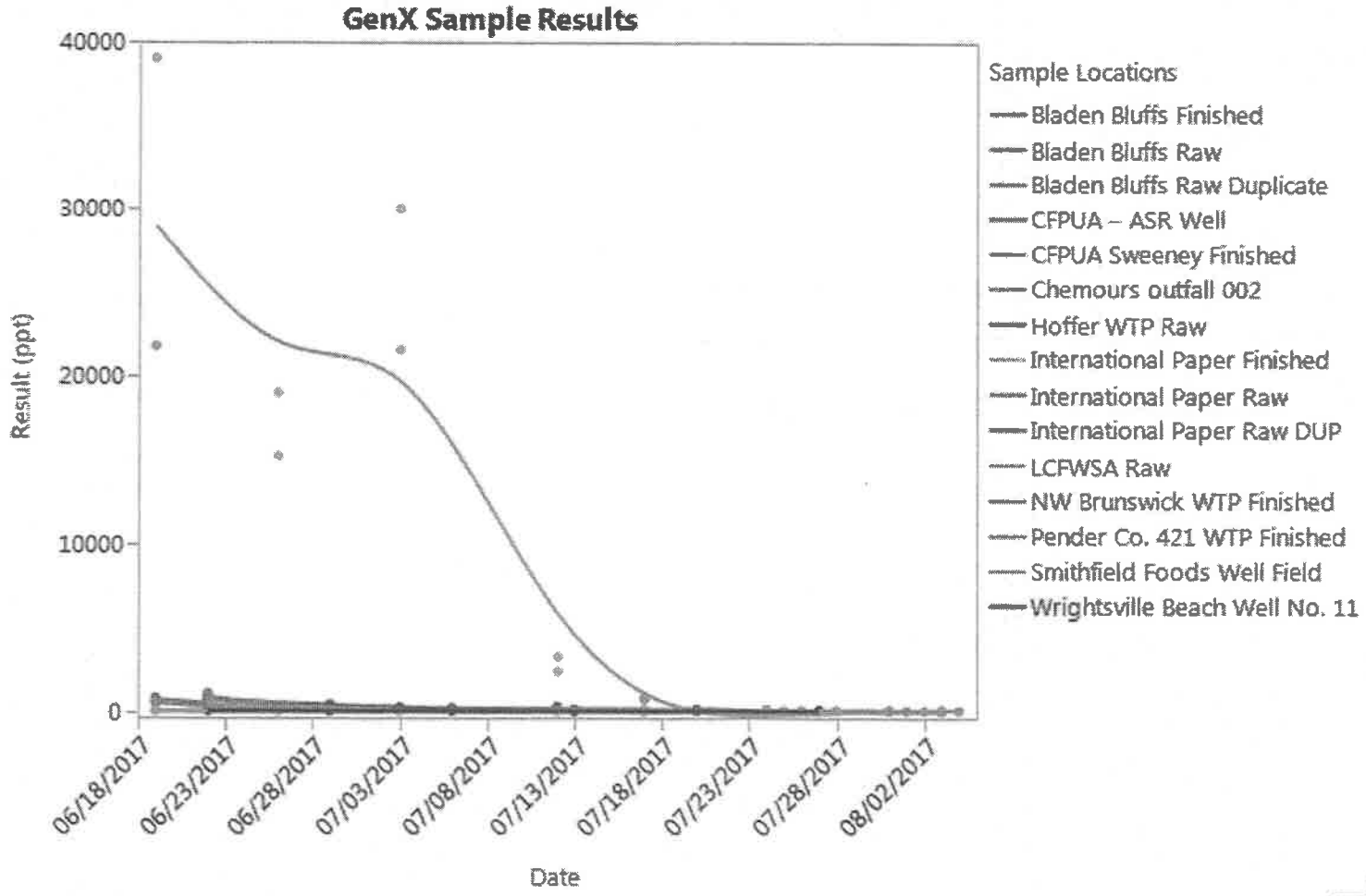


- Weekly sampling at the Chemours NPDES outfall 002.

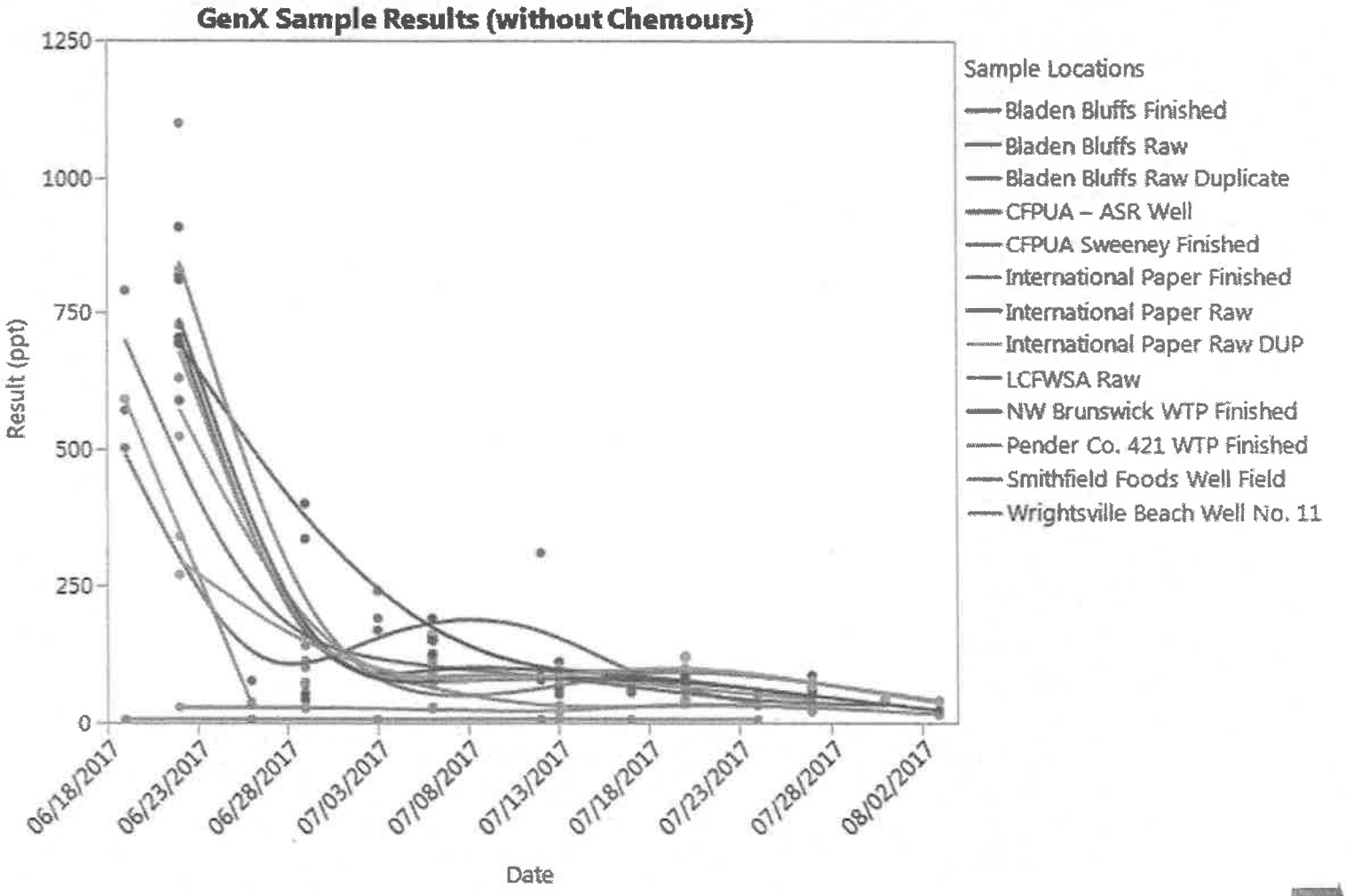
Began sampling in June, 18
2 labs analyzed

- Weekly sampling of raw water and finished drinking water upstream and downstream of the Chemours facility.

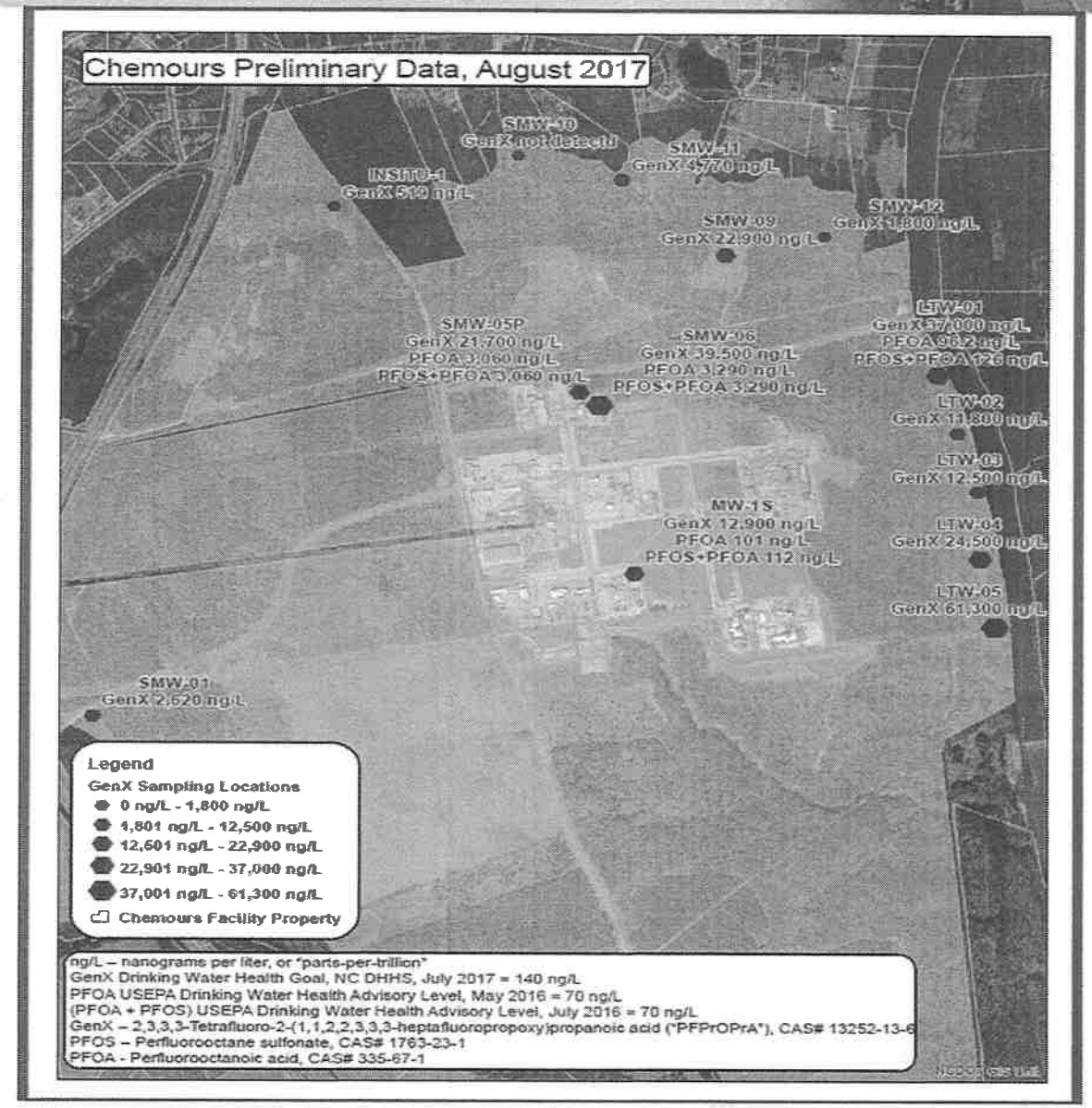
Cape Fear River - Sampling



Cape Fear River - Sampling



Groundwater Data at Chemours



Chemours Compliance History



- No NPDES permit violations at the Outfall 002 discharge
- Occasional Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) exceedances at an internal outfall 001 since 2001
- Bioassay tests taken by DWR in 2000 and 2011 indicated compliance
- Since 2000, Chemours has passed 74 out of 75 chronic Whole Effluent Toxicity (WET) tests. The one WET test failure occurred in Feb. 2012 and the facility passed the following two consecutive months.
- The permit renewal application was submitted 6 months prior to permit expiration as required. The permit expired on Oct. 31, 2016 and the renewal application was received on May 3, 2016. The existing permit is administratively continued until a renewal permit decision is made.

Actions Taken

- NOV for Groundwater Violation
- 60-Day Notice of Intent to Suspend Permit
- Complaint in Bladen County Superior Court
- Partial Consent Order Entered

Next Steps

- DEQ is continuing its study and work to remove 1,4-dioxane from North Carolina river basins.
  - Working with local governments as they investigate potential sources and seeking alternatives to eliminate the discharge.
  - Certifying laboratories for wastewater analysis, and including monitoring requirements in NPDES permits and discharge limits as appropriate.

- DEQ is continuing to evaluate Chemours discharges
  - Currently sampling the plant wastewater effluent daily and the drinking water plants weekly.
  - Further sampling of private wells for PFOA/PFOS/GenX concentrations.
  - Evaluating data and information Chemours is supplying in response to the 60-day notice for the NPDES permit renewal, the NOV issued for the state groundwater violation, and inquiry into air quality conditions.

- Continue coordination with DHHS, other states and federal agencies and industry on emerging contaminants.

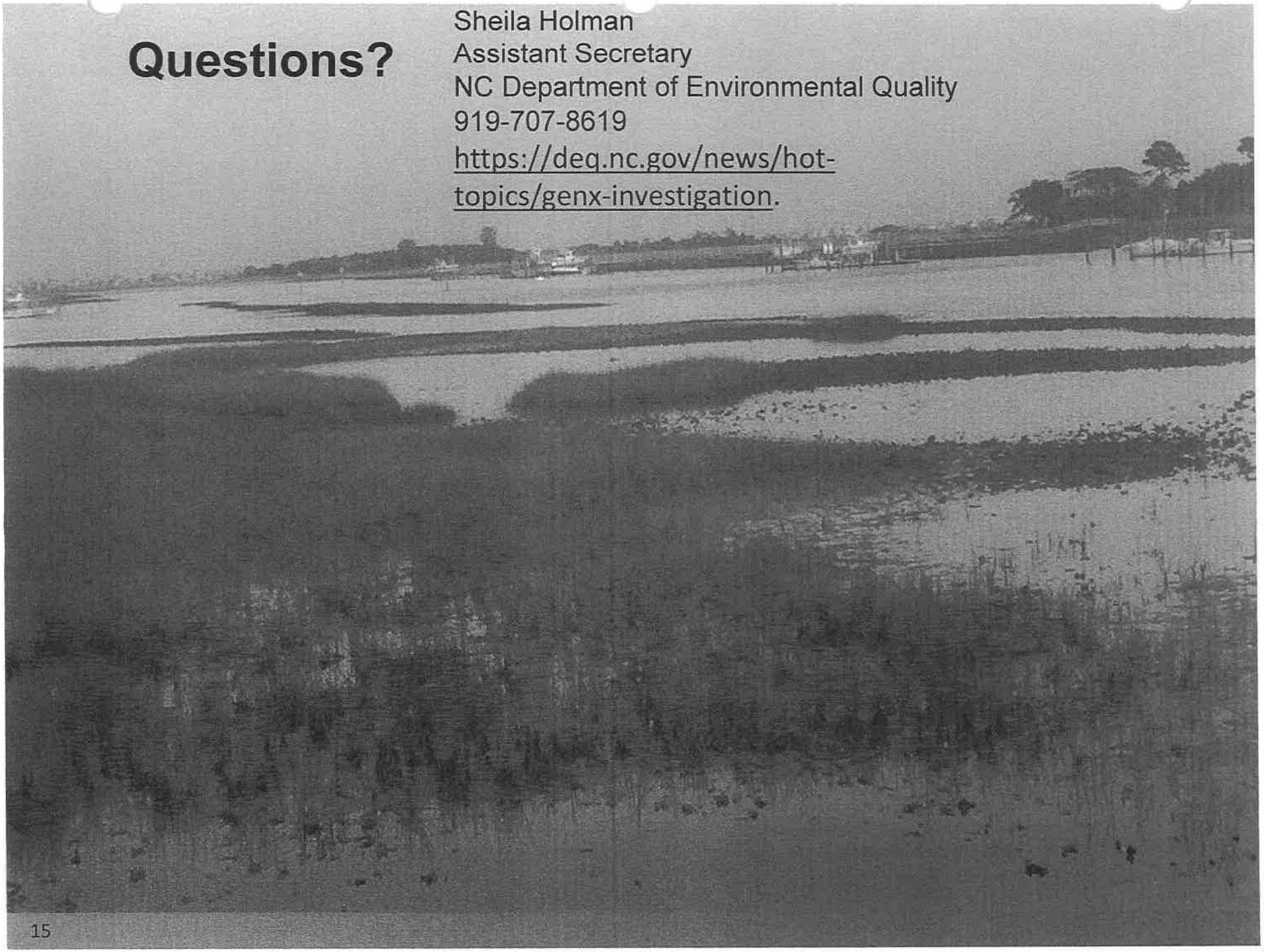
Next Steps – Emerging Compounds



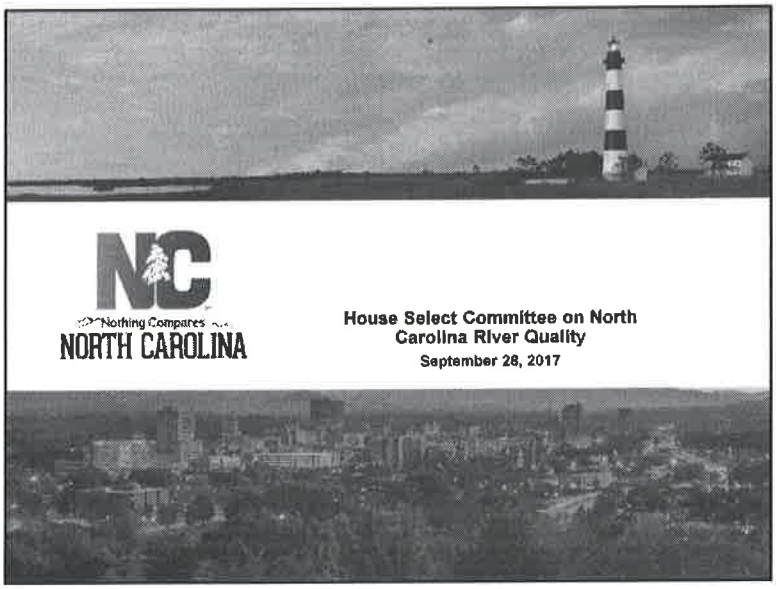
- Secretaries' Science Advisory Board
- UCMR
- NPDES Permitting – Disclosure Requirements
- Lab Test Standards
- Health Risk Information
- General Public Education

Questions?

Sheila Holman
Assistant Secretary
NC Department of Environmental Quality
919-707-8619
https://deq.nc.gov/news/hot-topics/genx-investigation.



Attachment 2b



Sheila Holman Power Point

Emerging Compounds

- Regulatory Program Overview
- Cape Fear River
- Next Steps



Regulatory Program Overviews



- Toxic Substance Control Act
- Clean Water Act
  - NPDES permit (wastewater)
- Safe Drinking Water Act
  - Contaminant Candidate List
  - Unregulated Contaminant Monitoring Rule
- State Surface water and Groundwater Standards

NC

- EPA implements the Toxic Substance Control Act which oversees the approval of chemical manufacturing in the US. Information on health studies are submitted with registration materials prior to approval to manufacture. Some information is considered trade secret or labeled as Confidential Business Information or CBI. States can seek CBI clearance to review information directly from EPA, or a company can give notice to EPA that they consent to a state having access to CBI material.

- The federal Clean Water Act is implement by DEQ with oversight from EPA. The National Pollutant Discharge Elimination System or NPDES permit issued by the state sets expectations for wastewater discharge from companies.

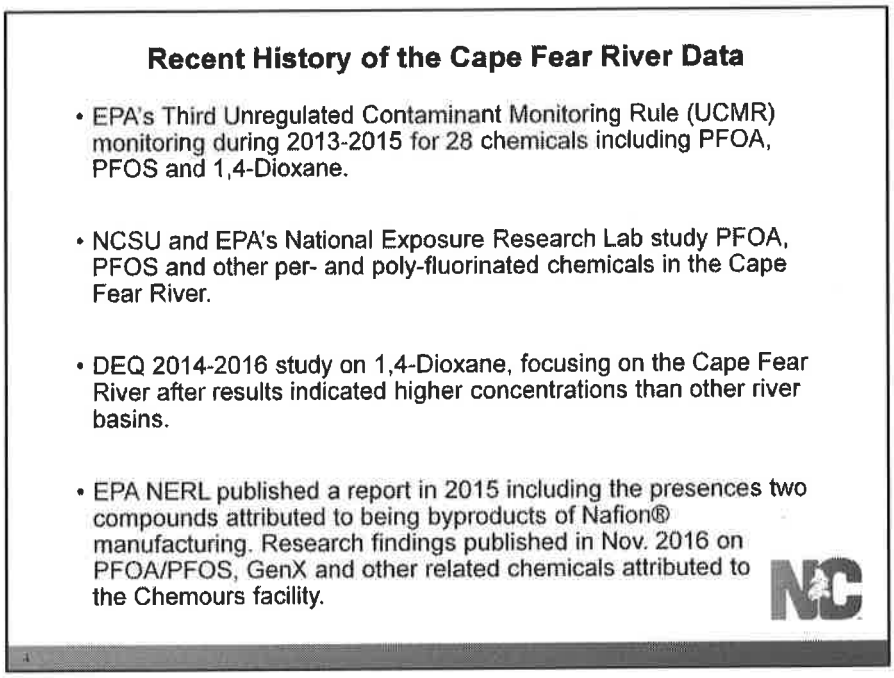
- The federal Safe Drinking Water Act is also implemented by the state and ensures our public water supplies are protective of human health and the environment.
  - Federal work done through the CCL and UCMR process help determine national priorities for addressing emerging contaminants in the nation's water supplies.

From EPA's Fact Sheet on the Fourth UCMR (UCMR 4):

"The 1996 amendments to the Safe Drinking Water Act (SDWA) require that once every five years, the U.S. Environmental Protection Agency (EPA) issue a new list of no more than 30 unregulated contaminants to be monitored by public water systems (PWSs). The Unregulated Contaminant Monitoring Rule (UCMR) provides EPA and other interested parties with scientifically valid data on the occurrence of contaminants in drinking water. This national survey is one of the primary sources of information on

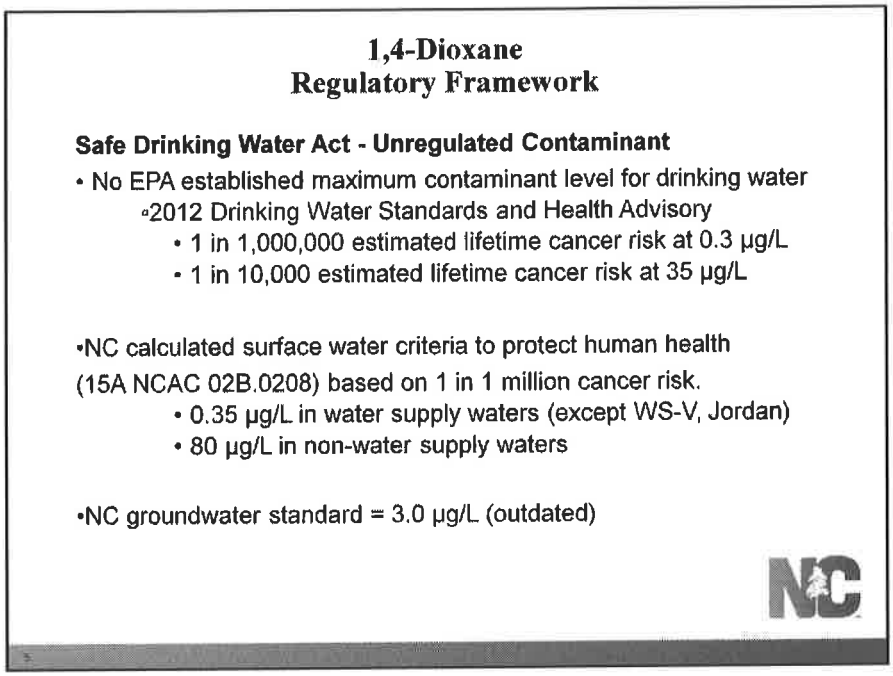
occurrence and levels of exposure that the Agency uses to develop regulatory decisions for contaminants in the public drinking water supply.
The EPA selected the UCMR 4 contaminants using a stepwise prioritization process. The first step identified contaminants that were not monitored under UCMR 2 or UCMR 3; may have significant occurrence nationally; and have a completed, validated drinking water method. The next step focused on contaminants associated with one or more of the following considerations: an available health assessment to facilitate regulatory determinations; high public concern; critical health endpoints (e.g., likely or suggestive carcinogen); active use (e.g., pesticides); and/or an occurrence data gap. During the final step, EPA considered workgroup and stakeholder input; looked at cost-effectiveness of analytical methods (i.e., can a single method address multiple contaminants of interest); considered implementation factors (e.g., laboratory capacity); and further evaluated health, occurrence and persistence/mobility data to identify the list of 30 UCMR 4 contaminants. "

- The Environmental Management Commission establishes rules that set surface water and groundwater standards in North Carolina.



EPA used a stepwise prioritization process to identify potential UCMR 3 contaminants. An agency and state working group first reviewed the third Contaminant Candidate List (CCL 3), as well as the contaminants considered in the development of CCL 3. The final CCL 3 was comprised of contaminants that were selected through a data-driven process that considered adverse health effects (potency and severity) and occurrence (prevalence and magnitude). EPA used CCL 3, along with additional sources of information about other emerging contaminants of potential concern, to establish an initial list of potential UCMR 3 contaminants.
https://www.epa.gov/sites/production/files/2015-10/documents/ucmr3_factsheet_general.pdf

1,4-dioxane, a probable human carcinogen, is found in a variety to products (makeup, paint, soaps) and a byproduct of making/recycling PET plastic and polyester products



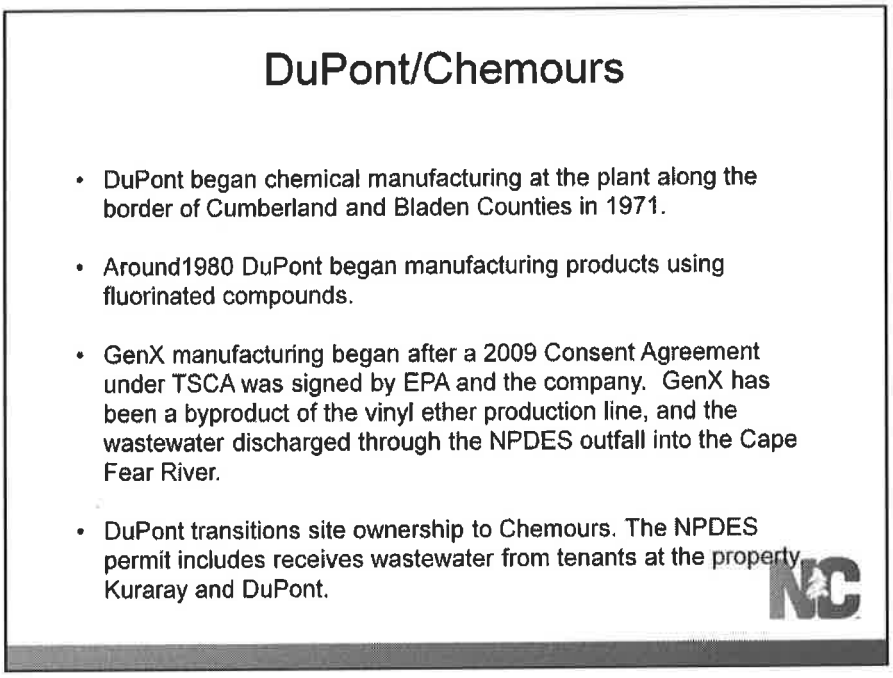
In August 2015, North Carolina had ~ 70 PWSs with detectable levels of 1,4-dioxane ~17 PWSs with levels in excess of the NC calculated surface water criteria to protect human health (0.35 ug/L)

INSERT CURRENT DATA

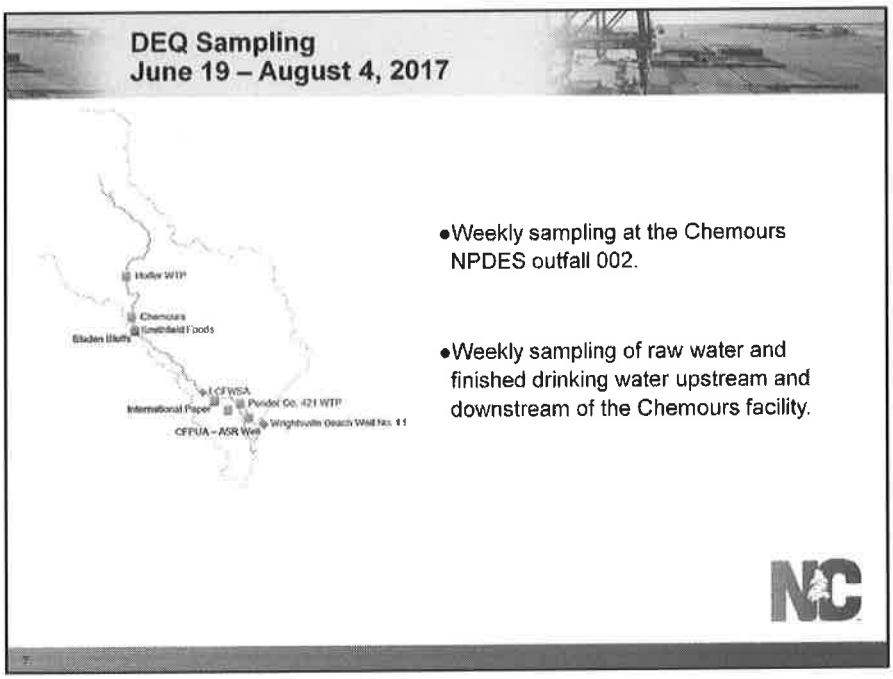
Removal is difficult/expensive

Results from the study's first year indicated four primary areas of elevated 1,4-dioxane in the upper portion of the Cape Fear River basin. Three of these areas were located immediately downstream of wastewater treatment plants, indicating that discharges from these facilities may be conduits for 1,4-dioxane. The fourth was located along a smaller stream and potential local sources will be explored as the study continues. Results from the study's second year demonstrated reductions in 1,4-dioxane concentration at almost all monitoring stations.

DWR began another 18 month monitoring of 1,4-dioxane at locations in the Cape Fear River basin as well as the Neuse and Yadkin river basins, with the objectives of further understanding changes in concentrations, identifying potential sources of the compound, and documenting data that will help the state develop a regulatory strategy.



- Vinyl Ether production line generating GenX as a byproduct.
- GenX manufacturing is said to be in a closed loop system with no wastewater discharge.
- To our knowledge Kuraray and DuPont do not release fluorinated compounds into the wastewater discharge.
- Dupont received its first waste load allocation(WLA) in 1976, followed by WLA's in 1984, 1985, 1986, 1989 and 1992. The first NPDES permit was issued in 1996, followed by several permit renewals, with the most recent permit being issued in 2012. Chemours submitted a permit renewal application in April 2016, and the NDPES permit expired Oct. 2016, at which point it was administratively continued until a new permit decision is made. The facility also holds a hazardous waste Treatment, Storage and Disposal permit which includes groundwater monitoring, as well as an air quality permit.

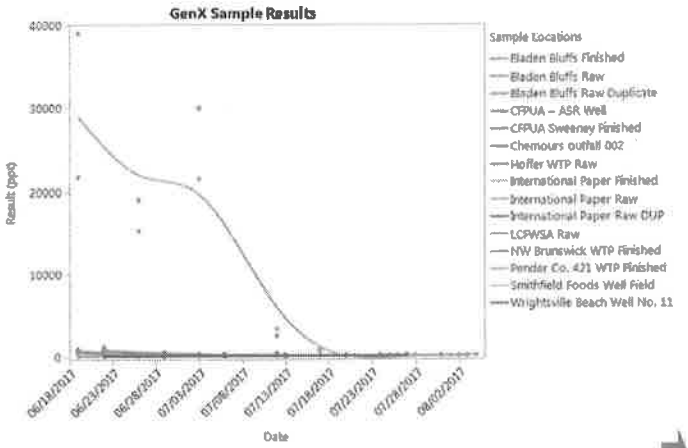


DEQ started sampling the NPDES outfall from the Chemours facility into the Cape Fear River on June 19th and has sampled raw and finished water at public utilities up and down stream locations for a total of 6 weeks (June 19-July 28). The concentrations of GenX in finished water dropped significantly over this time period, as the company had indicated they stopped the discharge of GenX into the wastewater stream in late June.

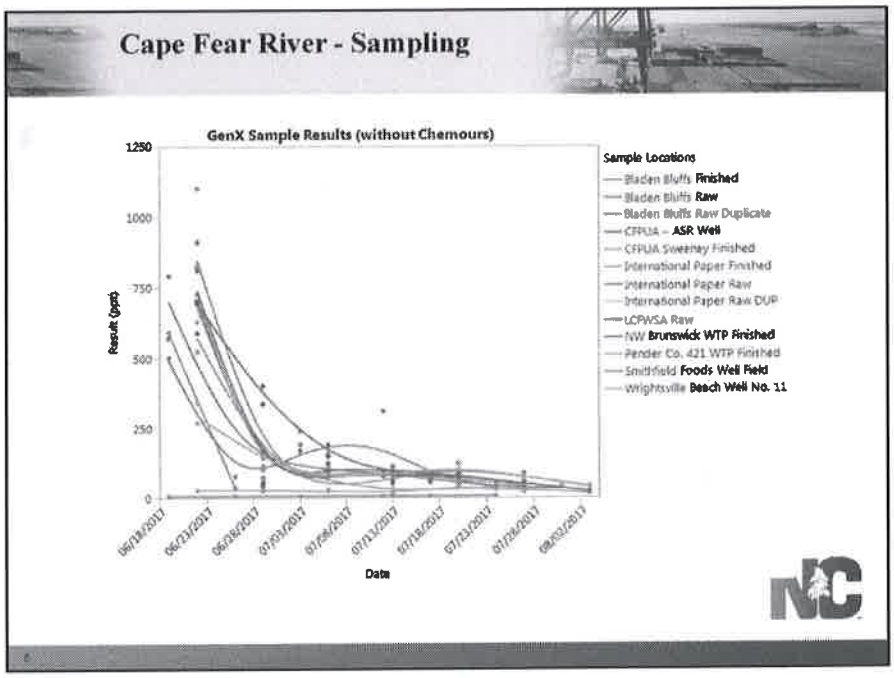
Test results from the Chemours NPDES outfall initially were in the 30,000's ppt range, though EPA and a contract lab used by Chemours (Test America) both indicated they maxed out their calibration curves and the actual value probably was higher. Downstream finish water values ranged from 910 ppt to 690 ppt. The latest set of values analyzed indicate the Chemours outfall is at or below 60 ppt, and the finished water is less than 45 ppt.

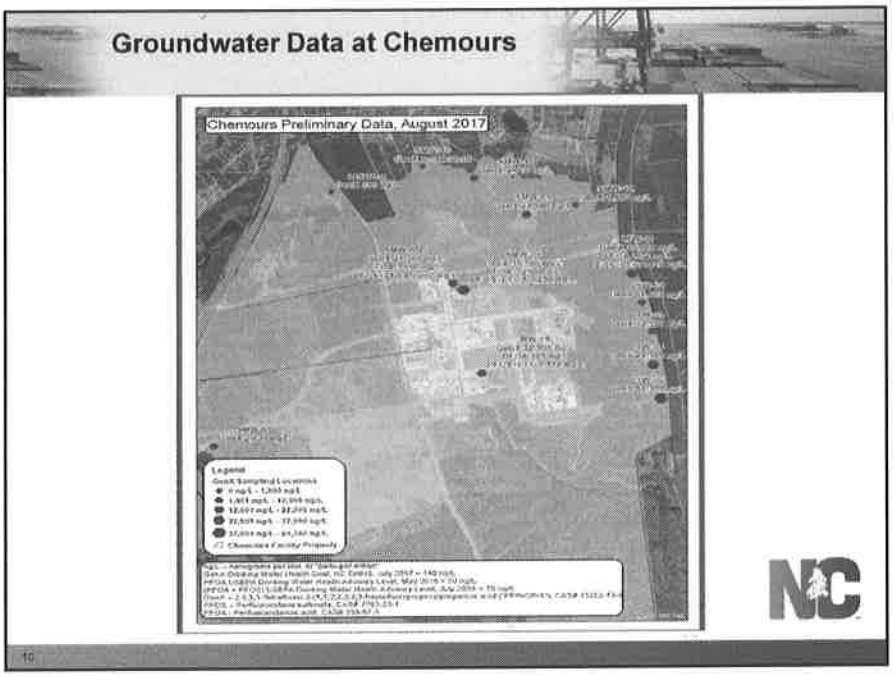
EPA provided results of non-targeted chemical analysis to DEQ and DHHS on August 28th for the Chemours outfall and the Sweeney Water Plant, which indicated 3 compounds were trending down in concentration similar to the trend for GenX, but two were not. These two were attributed to byproducts from the Nafion® manufacturing area and continue to be of subject in our ongoing investigation.

Cape Fear River - Sampling



Cape Fear River - Sampling



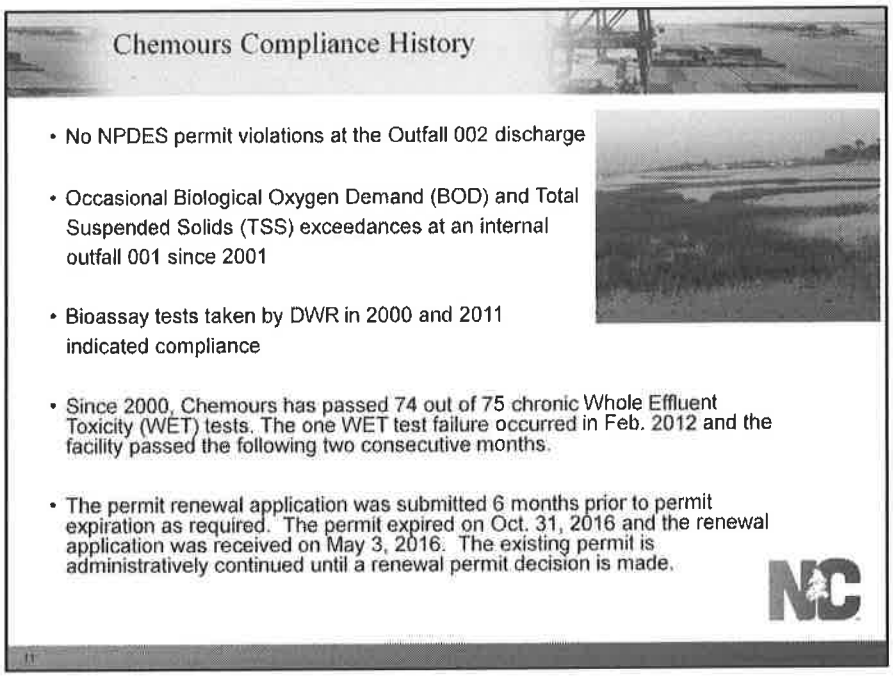


DEQ also began sampling groundwater at the facility in early August. The results of the groundwater samples showed levels of GenX in 13 of the 14 wells above the practical quantitation limit of 10 ppt. The PQL is established by the lab test standard for GenX. The concentrations ranged from 513 ppt to 61300 ppt. Since these levels were above the PQL and constituted a violation of the 2L rules, an NOV was issued.

Chemours and DEQ have begun testing the private wells near the facility due to the groundwater sampling results. Chemours has received preliminary test results for 45 residential wells for people living near the facility. GenX was detected in 19 homes with at levels above the state's provisional public health goal and were supplied with bottled water and health information about GenX. Most of the 19 wells with elevated GenX levels are north of the facility.

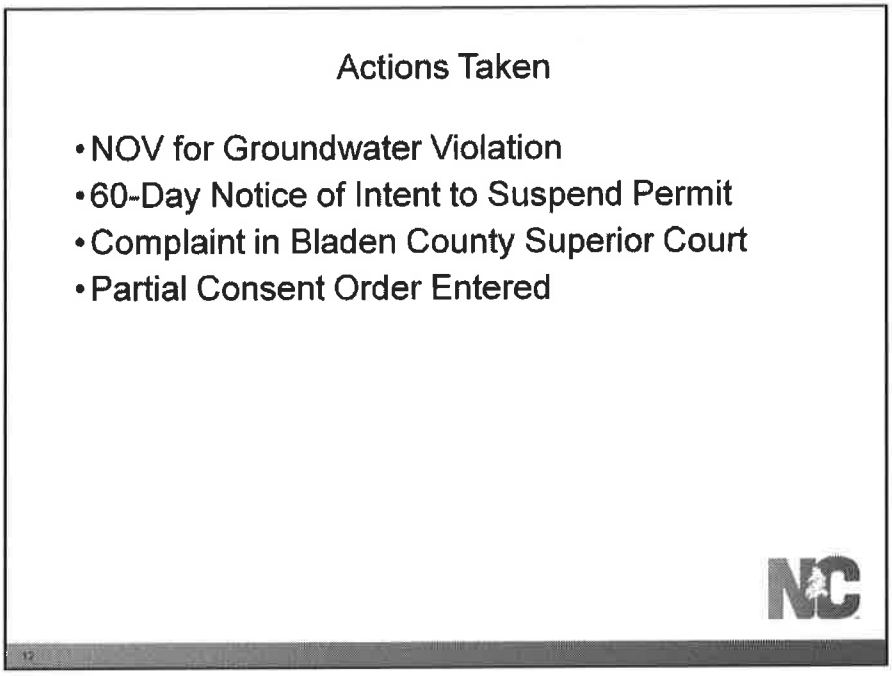
Out of an abundance of caution, the state directed the company to supply bottled water to residents after receiving word of preliminary test results. Making sure people have clean drinking water is our top priority.

DEQ has continued collecting water samples for residential wells nearest the facility. Samples have been taken for 31 residential wells in Bladen and Cumberland counties. The state will sent samples to Gel Laboratories in Charleston, S.C. for analysis and use the results of testing to determine if people need alternative sources of water and if GenX or the two other fluorinated compounds produced at the facility have moved into the surrounding community. If tests reveal levels of any of the fluorinated compounds above established health goals, the state will direct Chemours to provide affected homes with alternative water and health information on the compounds.



DWM - It looks like Chemours had one ticket NOV (found onsite and corrected) in July of 2015 for the storage of waste.

DAQ – No violations in the last five years. NOV was issued in 2007 for failure to submit part two of a permit application. Civil penalty assess in 2009 for operating equipment without a permit.



DEQ also began sampling groundwater at the facility in early August. The results of the groundwater samples showed levels of GenX in 13 of the 14 wells above the practical quantitation limit of 10 ppt. The PQL is established by the lab test standard for GenX. The concentrations ranged from 513 ppt to 61300 ppt. Since these levels were above the PQL and constituted a violation of the groundwater rules (15A NCAC 2L.0202(c)), an NOV was issued last week. Additionally, DEQ will conduct a community meeting tonight in St. Paul's to discuss private well sampling that will begin tomorrow. Chemours has begun testing the private wells near the facility due to the groundwater sampling results.

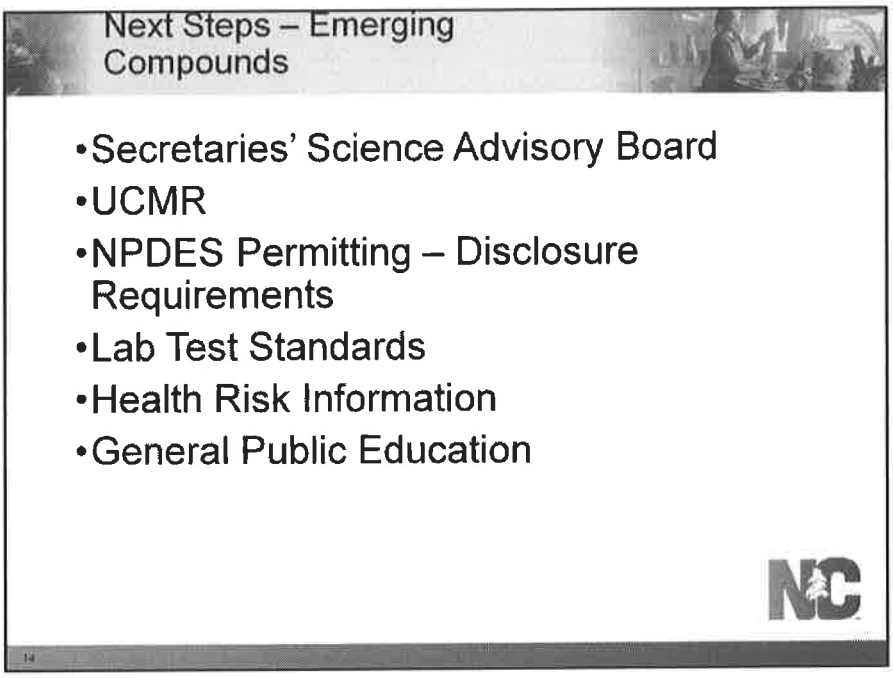
DEQ requested information from the company regarding the various by-products in the wastewater discharge as the investigation has progressed, and as the review of the NPDES permit application has continued. These requests were made on July 21, August 16 and August 18.

On September 5th, based on the information Chemours provided, DEQ issued a 60-day notice of intent to suspend the NPDES permit. Additionally, on September 7th and on behalf of DEQ, DOJ filed a complaint against the company in Bladen County Superior Court. The 60-day notice letter and the complaint should be read in tandem as this represents an integrated strategy to achieve the appropriate outcome. DEQ is exploring both administrative and legal options for addressing the situation. On Friday,

September 8th, the court entered a partial consent order in this matter. Chemours is making progress toward addressing those requests in the 60-day letter. DEQ continues to work with the company on this situation. Just yesterday, DEQ and EPA staff were on site at the facility to collect samples from each of the process areas of the plant. Thanks to EPA ORD staff who will analyze the samples for DEQ.
DEQ is committed to developing a sound NPDES permit for this facility based on as much information as we can gather, and grounded in the statutes and rules to protect public health and the environment.

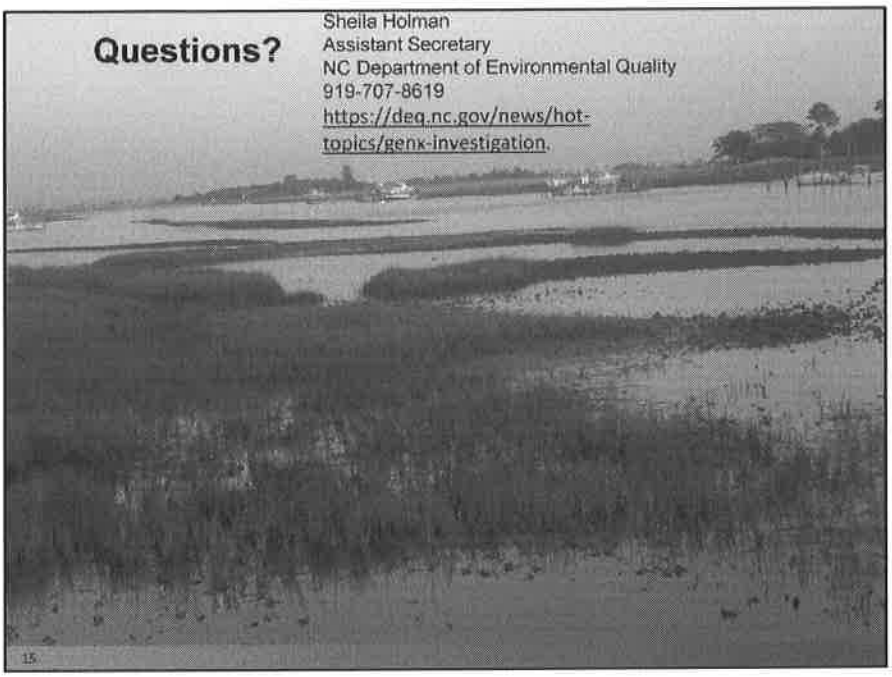
Next Steps

- DEQ is continuing its study and work to remove 1,4-dioxane from North Carolina river basins.
  - Working with local governments as they investigate potential sources and seeking alternatives to eliminate the discharge.
  - Certifying laboratories for wastewater analysis, and including monitoring requirements in NPDES permits and discharge limits as appropriate.
- DEQ is continuing to evaluate Chemours discharges
  - Currently sampling the plant wastewater effluent daily and the drinking water plants weekly.
  - Further sampling of private wells for PFOA/PFOS/GenX concentrations.
  - Evaluating data and information Chemours is supplying in response to the 60-day notice for the NPDES permit renewal, the NOV issued for the state groundwater violation, and inquiry into air quality conditions.
- Continue coordination with DHHS, other states and federal agencies and industry on emerging contaminants.



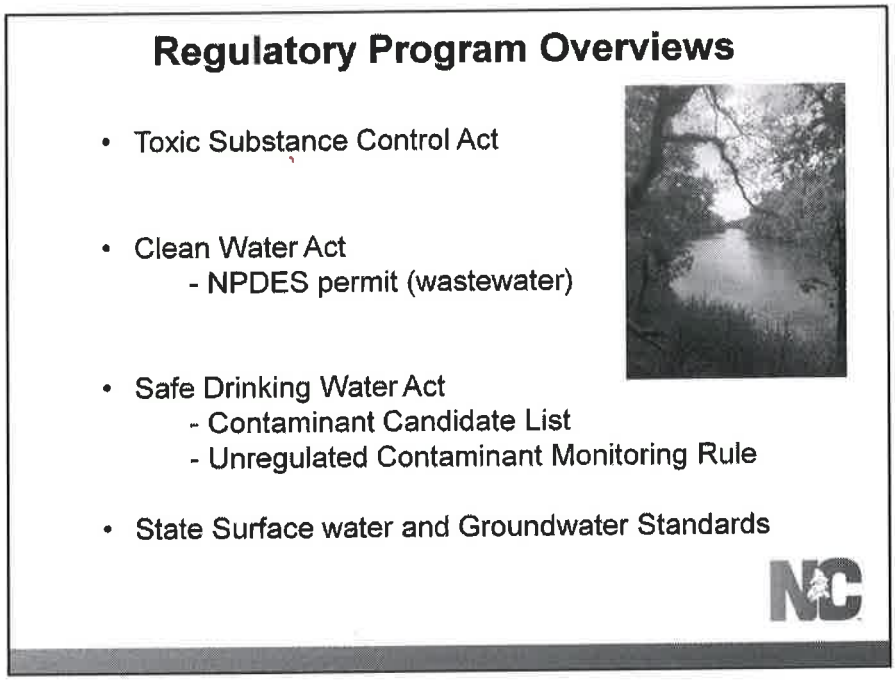
As we have improvements in analytical tools and can see chemicals at even smaller and smaller concentrations, we are moving into new areas with emerging contaminants in our air, our water and our other natural resources.

DEQ is committed to engaging business and industries as well as environment and health advocates in conversations on how we move forward. We don't have all the answers, and we're learning more questions than answers at times. One good thing is that we are not in this all alone. Other states, other countries are facing similar challenges which we can learn from. Economic prosperity does not have to be at odds with environmental and human health protection. Sound policies that safeguard our natural resources bring us economic prosperity here in North Carolina.


Questions?
Sheila Holman
Assistant Secretary
NC Department of Environmental Quality
919-707-8619
https://deq.nc.gov/news/hot-topics/genx-investigation.
15

Attachment 3

Sheila Holman written remarks



- EPA implements the Toxic Substance Control Act which oversees the approval of chemical manufacturing in the US. Information on health studies are submitted with registration materials prior to approval to manufacture. Some information is considered trade secret or labeled as Confidential Business Information or CBI. States can seek CBI clearance to review information directly from EPA, or a company can give notice to EPA that they consent to a state having access to CBI material.

- The federal Clean Water Act is implement by DEQ with oversight from EPA. The National Pollutant Discharge Elimination System or NPDES permit issued by the state sets expectations for wastewater discharge from companies.

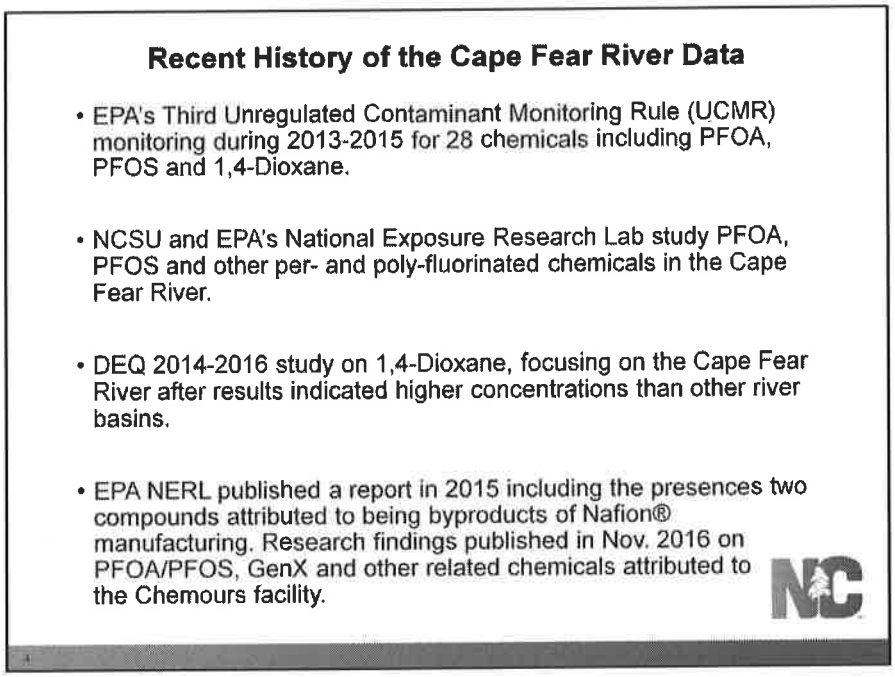
- The federal Safe Drinking Water Act is also implemented by the state and ensures our public water supplies are protective of human health and the environment.
    - Federal work done through the CCL and UCMR process help determine national priorities for addressing emerging contaminants in the nation's water supplies.

From EPA's Fact Sheet on the Fourth UCMR (UCMR 4):

"The 1996 amendments to the Safe Drinking Water Act (SDWA) require that once every five years, the U.S. Environmental Protection Agency (EPA) issue a new list of no more than 30 unregulated contaminants to be monitored by public water systems (PWSs). The Unregulated Contaminant Monitoring Rule (UCMR) provides EPA and other interested parties with scientifically valid data on the occurrence of contaminants in drinking water. This national survey is one of the primary sources of information on

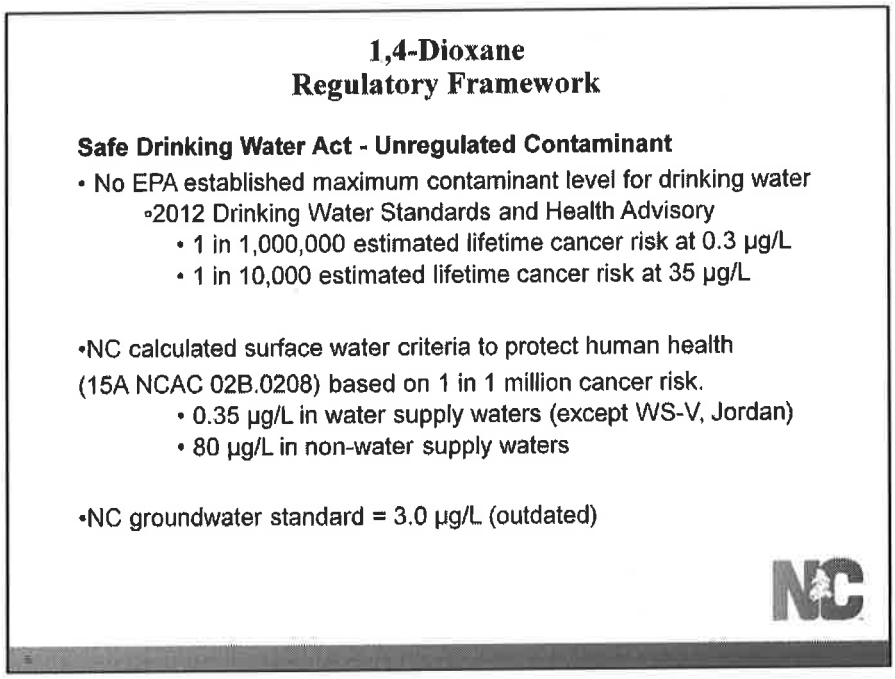
occurrence and levels of exposure that the Agency uses to develop regulatory decisions for contaminants in the public drinking water supply.
The EPA selected the UCMR 4 contaminants using a stepwise prioritization process. The first step identified contaminants that were not monitored under UCMR 2 or UCMR 3; may have significant occurrence nationally; and have a completed, validated drinking water method. The next step focused on contaminants associated with one or more of the following considerations: an available health assessment to facilitate regulatory determinations; high public concern; critical health endpoints (e.g., likely or suggestive carcinogen); active use (e.g., pesticides); and/or an occurrence data gap. During the final step, EPA considered workgroup and stakeholder input; looked at cost-effectiveness of analytical methods (i.e., can a single method address multiple contaminants of interest); considered implementation factors (e.g., laboratory capacity); and further evaluated health, occurrence and persistence/mobility data to identify the list of 30 UCMR 4 contaminants. "

- The Environmental Management Commission establishes rules that set surface water and groundwater standards in North Carolina.



EPA used a stepwise prioritization process to identify potential UCMR 3 contaminants. An agency and state working group first reviewed the third Contaminant Candidate List (CCL 3), as well as the contaminants considered in the development of CCL 3. The final CCL 3 was comprised of contaminants that were selected through a data-driven process that considered adverse health effects (potency and severity) and occurrence (prevalence and magnitude). EPA used CCL 3, along with additional sources of information about other emerging contaminants of potential concern, to establish an initial list of potential UCMR 3 contaminants.
https://www.epa.gov/sites/production/files/2015-10/documents/ucmr3_factsheet_general.pdf

1,4-dioxane, a probable human carcinogen, is found in a variety to products (makeup, paint, soaps) and a byproduct of making/recycling PET plastic and polyester products



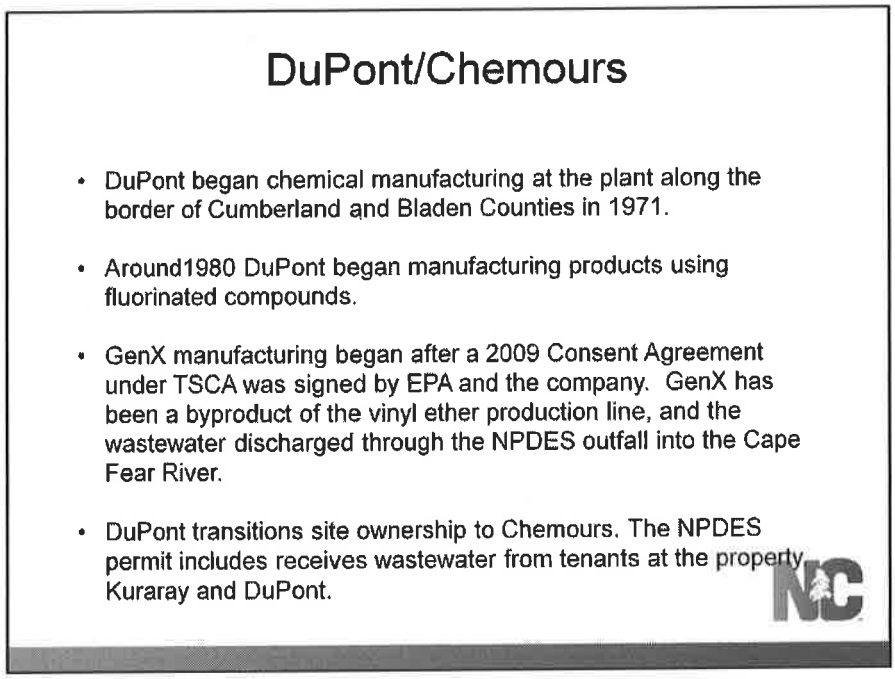
In August 2015, North Carolina had ~ 70 PWSs with detectable levels of 1,4-dioxane ~17 PWSs with levels in excess of the NC calculated surface water criteria to protect human health (0.35 ug/L)

INSERT CURRENT DATA

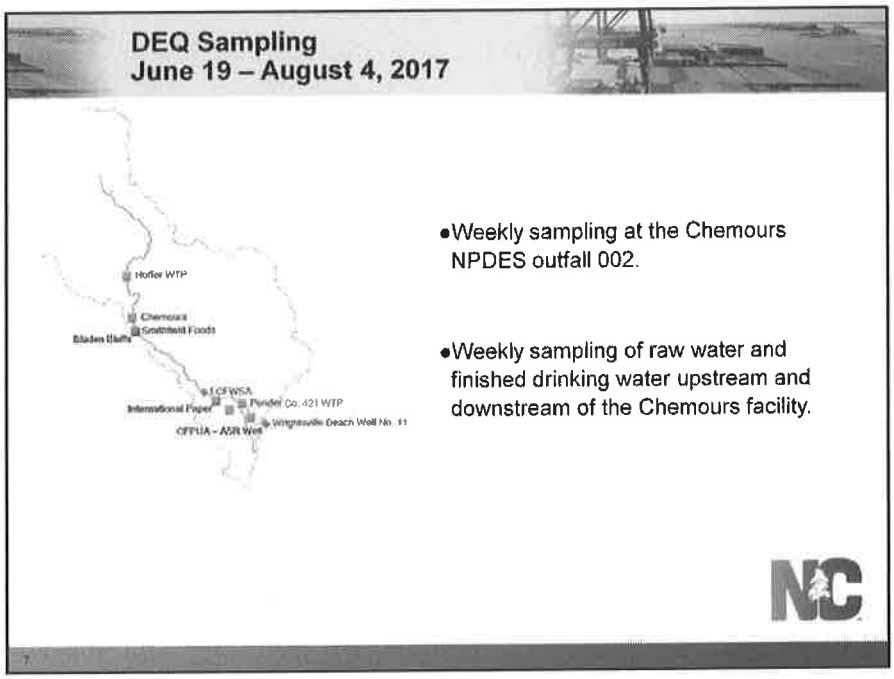
Removal is difficult/expensive

Results from the study's first year indicated four primary areas of elevated 1,4-dioxane in the upper portion of the Cape Fear River basin. Three of these areas were located immediately downstream of wastewater treatment plants, indicating that discharges from these facilities may be conduits for 1,4-dioxane. The fourth was located along a smaller stream and potential local sources will be explored as the study continues. Results from the study's second year demonstrated reductions in 1,4-dioxane concentration at almost all monitoring stations.

DWR began another 18 month monitoring of 1,4-dioxane at locations in the Cape Fear River basin as well as the Neuse and Yadkin river basins, with the objectives of further understanding changes in concentrations, identifying potential sources of the compound, and documenting data that will help the state develop a regulatory strategy.



- Vinyl Ether production line generating GenX as a byproduct.
- GenX manufacturing is said to be in a closed loop system with no wastewater discharge.
- To our knowledge Kuraray and DuPont do not release fluorinated compounds into the wastewater discharge.
- Dupont received its first waste load allocation(WLA) in 1976, followed by WLA's in 1984, 1985, 1986, 1989 and 1992. The first NPDES permit was issued in 1996, followed by several permit renewals, with the most recent permit being issued in 2012. Chemours submitted a permit renewal application in April 2016, and the NDPES permit expired Oct. 2016, at which point it was administratively continued until a new permit decision is made. The facility also holds a hazardous waste Treatment, Storage and Disposal permit which includes groundwater monitoring, as well as an air quality permit.

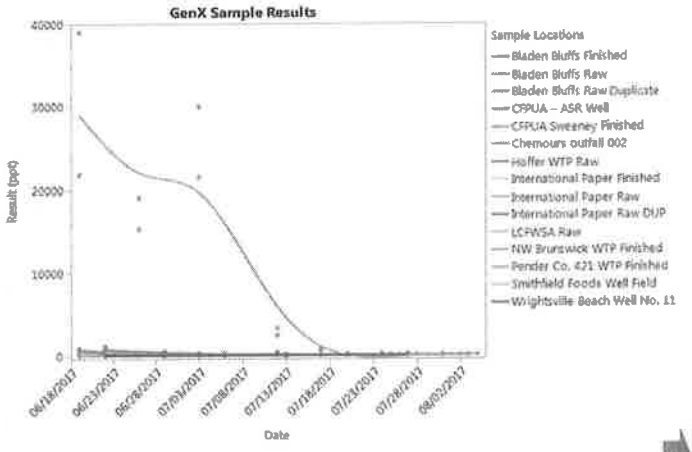


DEQ started sampling the NPDES outfall from the Chemours facility into the Cape Fear River on June 19th and has sampled raw and finished water at public utilities up and down stream locations for a total of 6 weeks (June 19-July 28). The concentrations of GenX in finished water dropped significantly over this time period, as the company had indicated they stopped the discharge of GenX into the wastewater stream in late June.

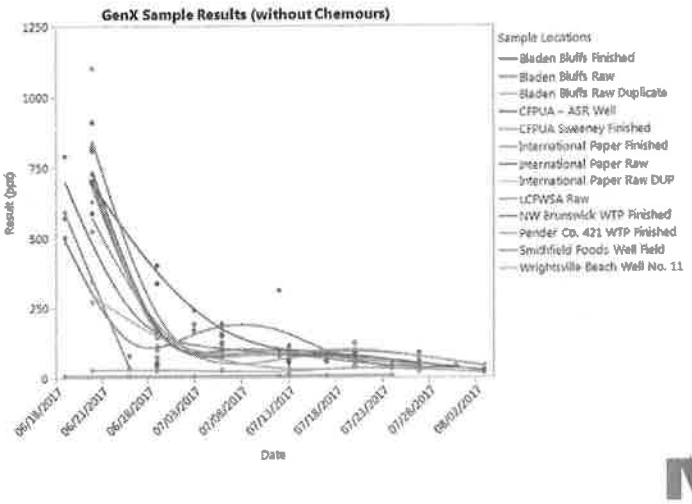
Test results from the Chemours NPDES outfall initially were in the 30,000's ppt range, though EPA and a contract lab used by Chemours (Test America) both indicated they maxed out their calibration curves and the actual value probably was higher. Downstream finish water values ranged from 910 ppt to 690 ppt. The latest set of values analyzed indicate the Chemours outfall is at or below 60 ppt, and the finished water is less than 45 ppt.

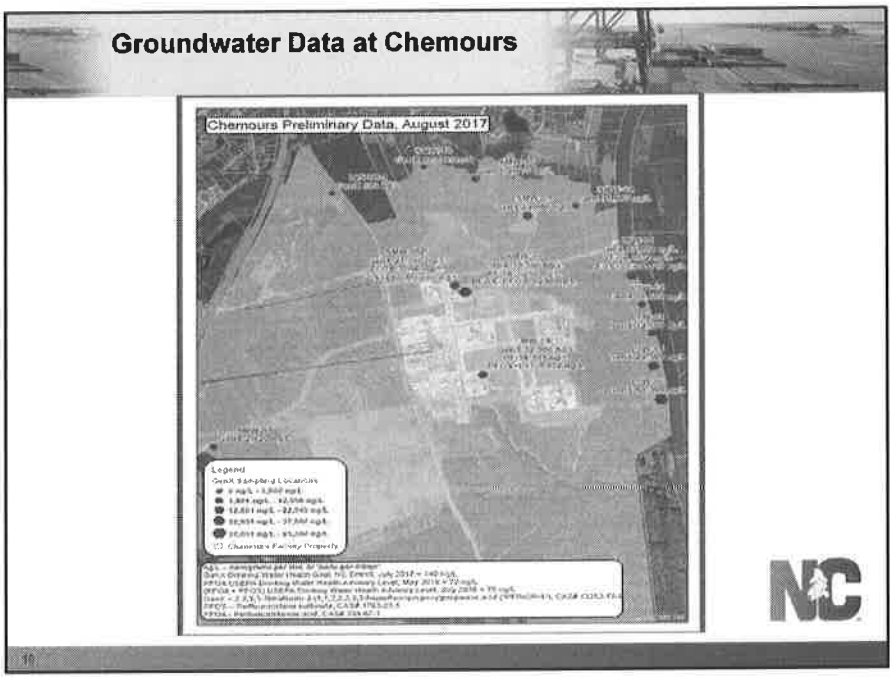
EPA provided results of non-targeted chemical analysis to DEQ and DHHS on August 28th for the Chemours outfall and the Sweeney Water Plant, which indicated 3 compounds were trending down in concentration similar to the trend for GenX, but two were not. These two were attributed to byproducts from the Nafion® manufacturing area and continue to be of subject in our ongoing investigation.

Cape Fear River - Sampling



Cape Fear River - Sampling



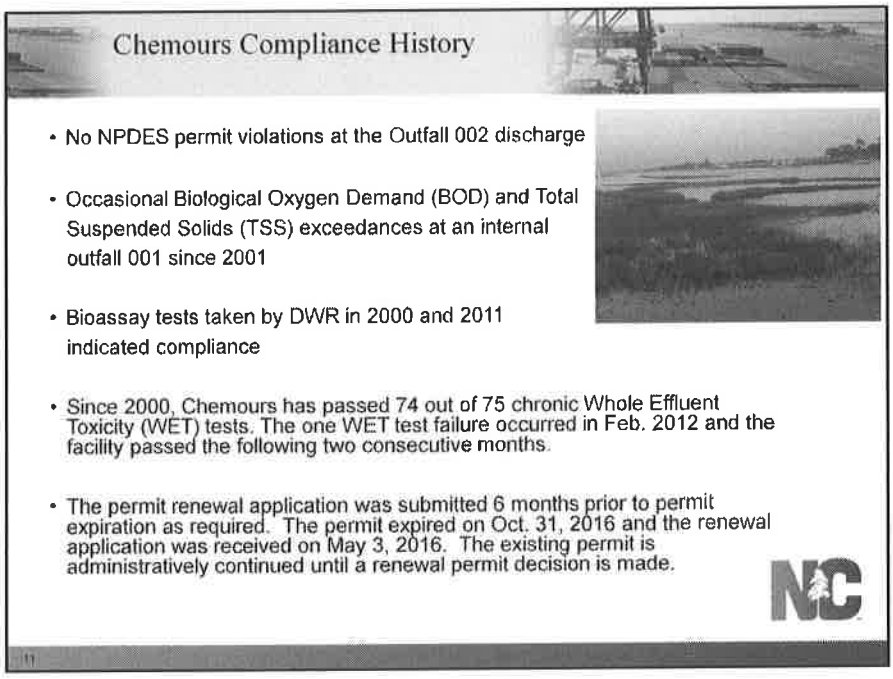


DEQ also began sampling groundwater at the facility in early August. The results of the groundwater samples showed levels of GenX in 13 of the 14 wells above the practical quantitation limit of 10 ppt. The PQL is established by the lab test standard for GenX. The concentrations ranged from 513 ppt to 61300 ppt. Since these levels were above the PQL and constituted a violation of the 2L rules, an NOV was issued.

Chemours and DEQ have begun testing the private wells near the facility due to the groundwater sampling results. Chemours has received preliminary test results for 45 residential wells for people living near the facility. GenX was detected in 19 homes with at levels above the state's provisional public health goal and were supplied with bottled water and health information about GenX. Most of the 19 wells with elevated GenX levels are north of the facility.

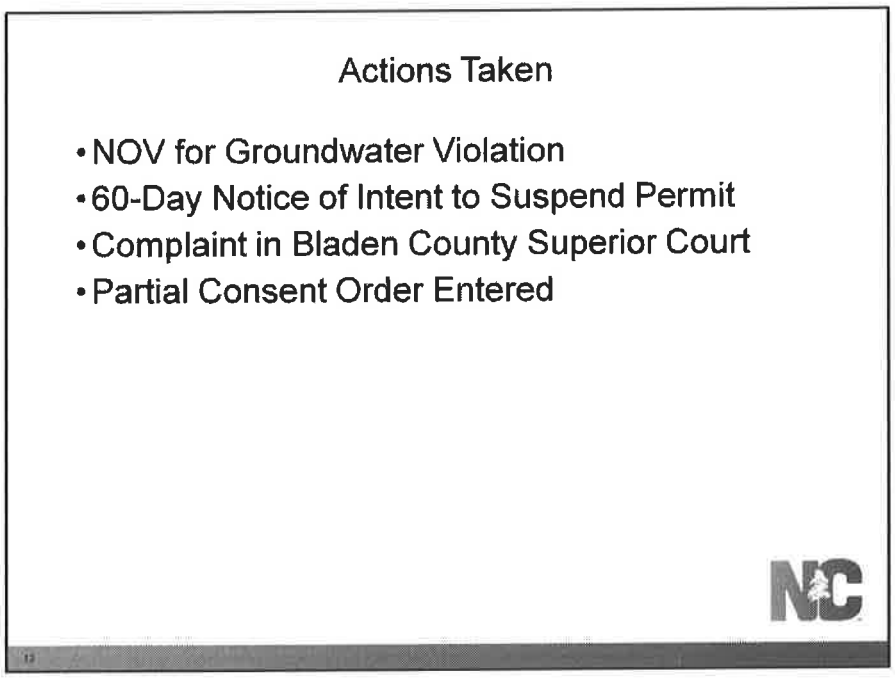
Out of an abundance of caution, the state directed the company to supply bottled water to residents after receiving word of preliminary test results. Making sure people have clean drinking water is our top priority.

DEQ has continued collecting water samples for residential wells nearest the facility. Samples have been taken for 31 residential wells in Bladen and Cumberland counties. The state will sent samples to Gel Laboratories in Charleston, S.C. for analysis and use the results of testing to determine if people need alternative sources of water and if GenX or the two other fluorinated compounds produced at the facility have moved into the surrounding community. If tests reveal levels of any of the fluorinated compounds above established health goals, the state will direct Chemours to provide affected homes with alternative water and health information on the compounds.



DWM - It looks like Chemours had one ticket NOV (found onsite and corrected) in July of 2015 for the storage of waste.

DAQ – No violations in the last five years. NOV was issued in 2007 for failure to submit part two of a permit application. Civil penalty assess in 2009 for operating equipment without a permit.



DEQ also began sampling groundwater at the facility in early August. The results of the groundwater samples showed levels of GenX in 13 of the 14 wells above the practical quantitation limit of 10 ppt. The PQL is established by the lab test standard for GenX. The concentrations ranged from 513 ppt to 61300 ppt. Since these levels were above the PQL and constituted a violation of the groundwater rules (15A NCAC 2L.0202(c)), an NOV was issued last week. Additionally, DEQ will conduct a community meeting tonight in St. Paul's to discuss private well sampling that will begin tomorrow. Chemours has begun testing the private wells near the facility due to the groundwater sampling results.

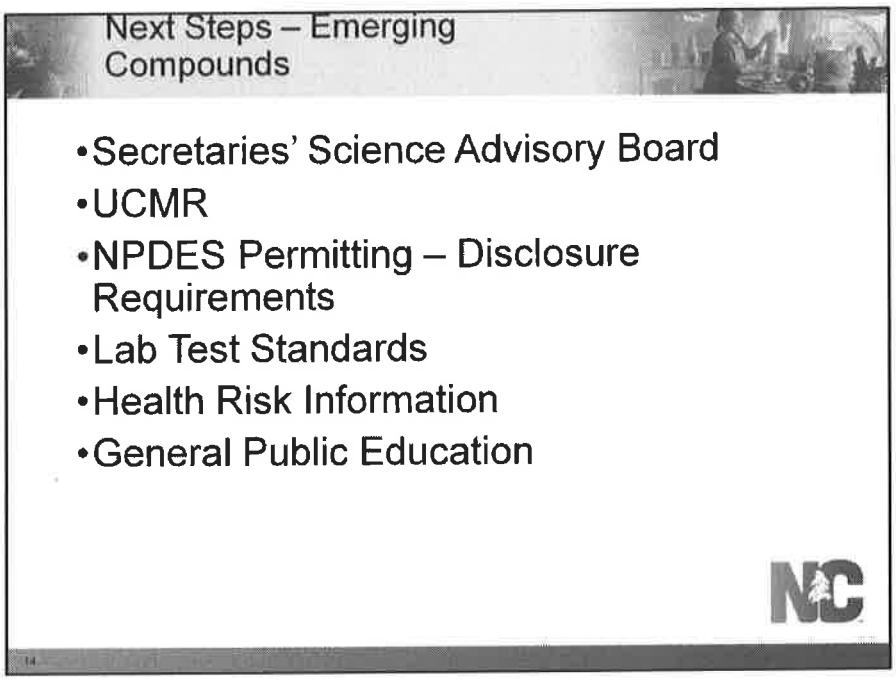
DEQ requested information from the company regarding the various by-products in the wastewater discharge as the investigation has progressed, and as the review of the NPDES permit application has continued. These requests were made on July 21, August 16 and August 18.

On September 5th, based on the information Chemours provided, DEQ issued a 60-day notice of intent to suspend the NPDES permit. Additionally, on September 7th and on behalf of DEQ, DOJ filed a complaint against the company in Bladen County Superior Court. The 60-day notice letter and the complaint should be read in tandem as this represents an integrated strategy to achieve the appropriate outcome. DEQ is exploring both administrative and legal options for addressing the situation. On Friday,

September 8th, the court entered a partial consent order in this matter. Chemours is making progress toward addressing those requests in the 60-day letter. DEQ continues to work with the company on this situation. Just yesterday, DEQ and EPA staff were on site at the facility to collect samples from each of the process areas of the plant. Thanks to EPA ORD staff who will analyze the samples for DEQ.
DEQ is committed to developing a sound NPDES permit for this facility based on as much information as we can gather, and grounded in the statutes and rules to protect public health and the environment.

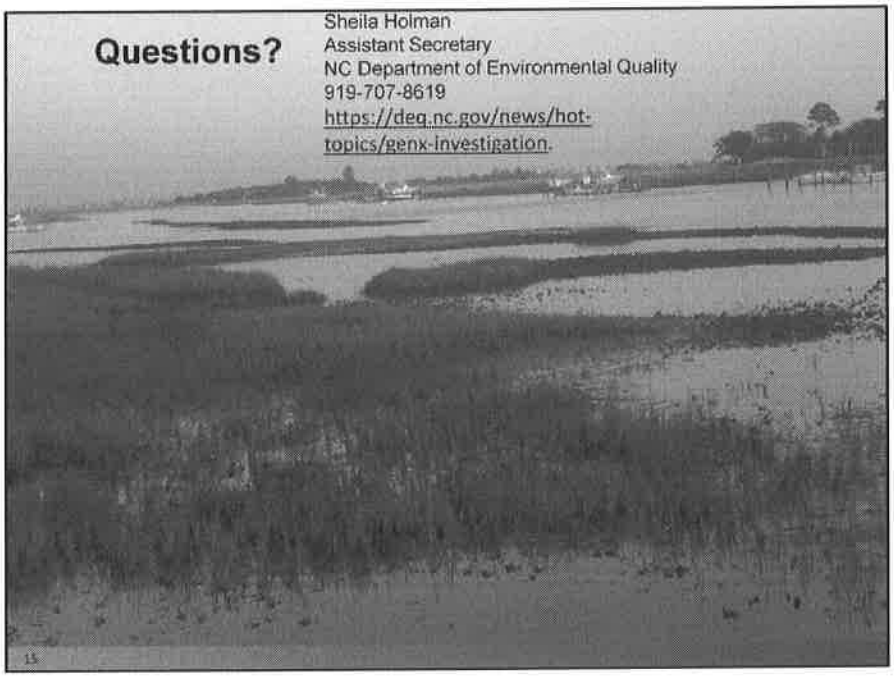
Next Steps

- DEQ is continuing its study and work to remove 1,4-dioxane from North Carolina river basins.
  - Working with local governments as they investigate potential sources and seeking alternatives to eliminate the discharge.
  - Certifying laboratories for wastewater analysis, and including monitoring requirements in NPDES permits and discharge limits as appropriate.
- DEQ is continuing to evaluate Chemours discharges
  - Currently sampling the plant wastewater effluent daily and the drinking water plants weekly.
  - Further sampling of private wells for PFOA/PFOS/GenX concentrations.
  - Evaluating data and information Chemours is supplying in response to the 60-day notice for the NPDES permit renewal, the NOV issued for the state groundwater violation, and inquiry into air quality conditions.
- Continue coordination with DHHS, other states and federal agencies and industry on emerging contaminants.



As we have improvements in analytical tools and can see chemicals at even smaller and smaller concentrations, we are moving into new areas with emerging contaminants in our air, our water and our other natural resources.

DEQ is committed to engaging business and industries as well as environment and health advocates in conversations on how we move forward. We don't have all the answers, and we're learning more questions than answers at times. One good thing is that we are not in this all alone. Other states, other countries are facing similar challenges which we can learn from. Economic prosperity does not have to be at odds with environmental and human health protection. Sound policies that safeguard our natural resources bring us economic prosperity here in North Carolina.


Questions?
Sheila Holman
Assistant Secretary
NC Department of Environmental Quality
919-707-8619
https://deq.nc.gov/news/hot-topics/genx-investigation.
15

Attachment 4

Mike Brown, Chairman of the Board
Cape Fear Public Utility Authority
and
Frank Styers - C.O.O.

Cape Fear
Public Utility Authority
Stewardship. Sustainability. Service.

CFPUA Action Plan to Implement Gen-X Response Measures

September 28, 2017

Cape Fear Public Utility Authority

1. Became operational July 1, 2008
2. Service area includes approximately 68,000 customer accounts
3. Michael E Richardson Nanofiltration Plant operational 2009, permitted capacity 6 mgd, supplied by 25 wells
4. Sweeney WTP upgraded 2012, permitted capacity of 35 mgd, surface water facility
5. 23 mgd raw water purchase agreement with LCFWASA

Gen-X Response Measures

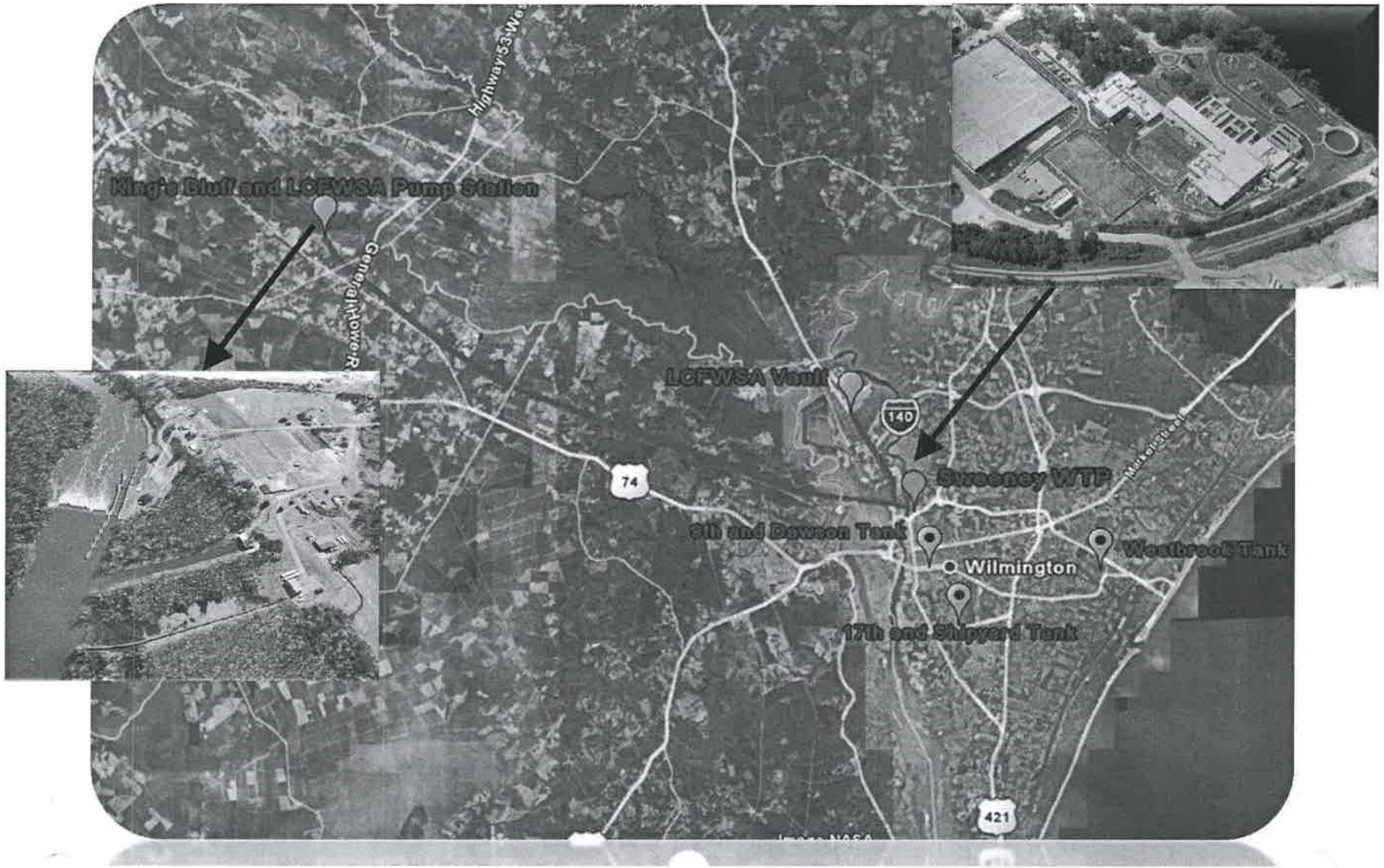
1. Water treatment alternative evaluation for removing PFASs, Gen-X and emerging compounds

2. UNCW Support

3. Aquifer Storage and Recovery Program

FS1

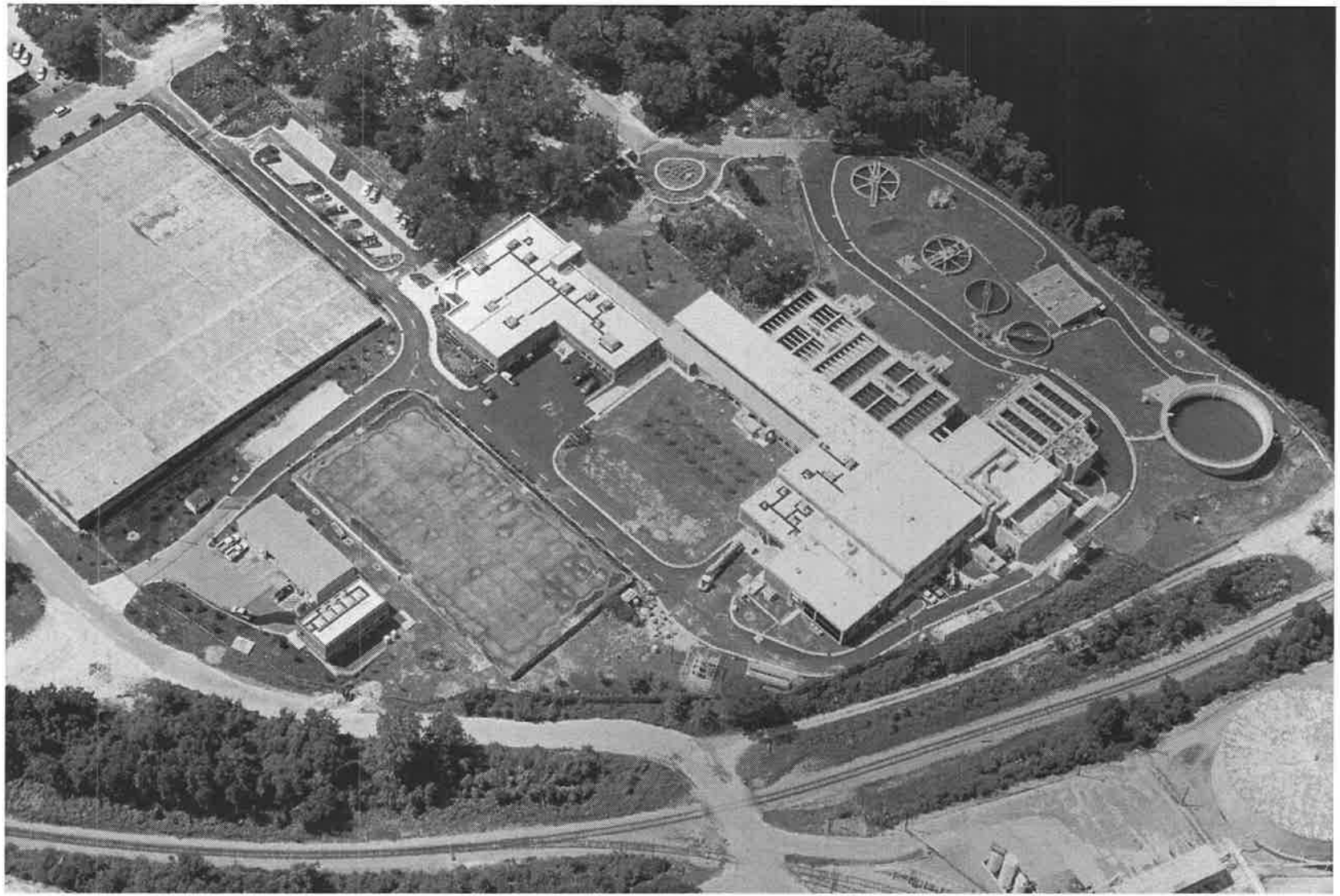
Raw Water System



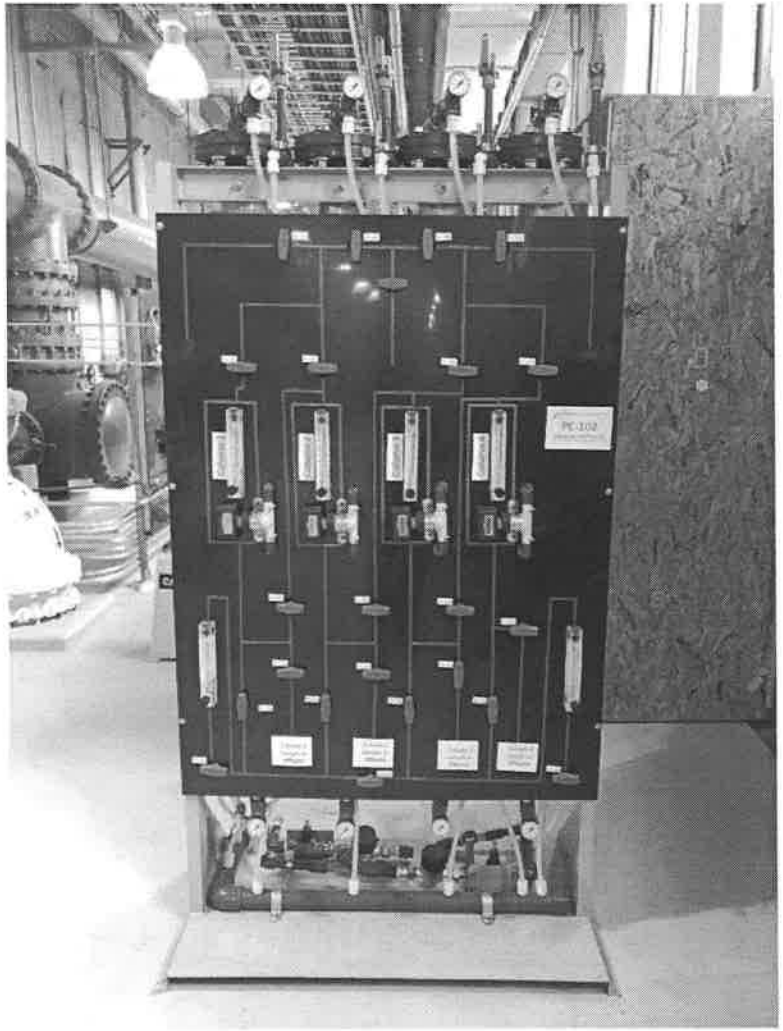
Slide 4

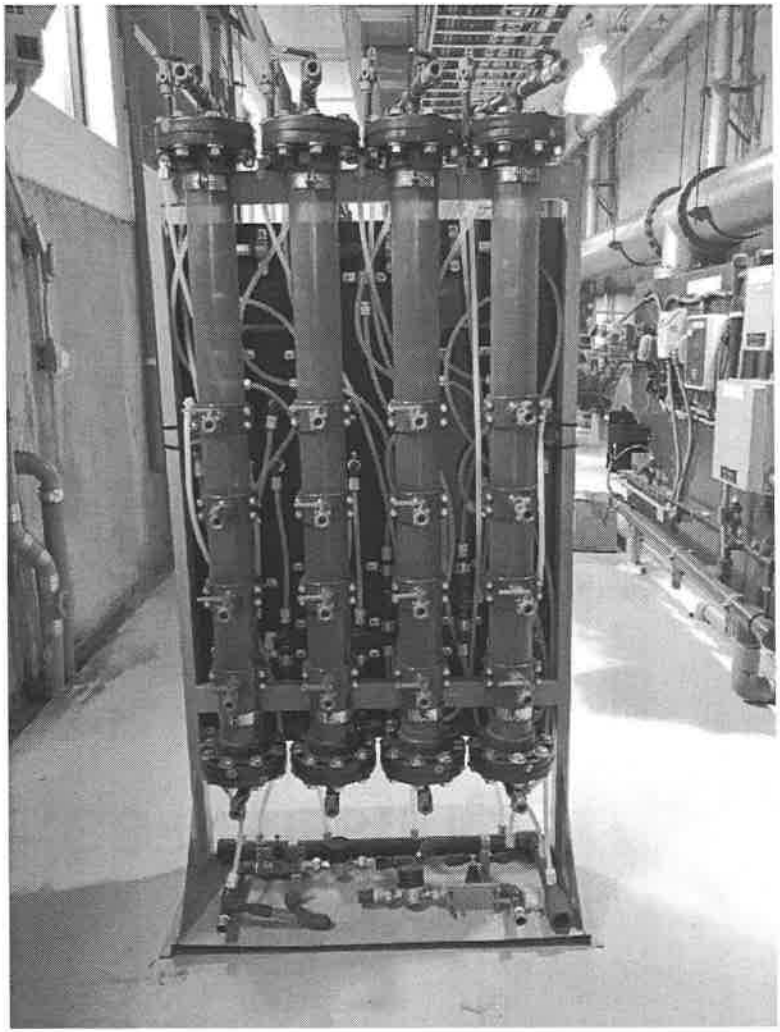
FS1 Frank Styers, 09/24/2017

Sweeney Water Treatment Plant

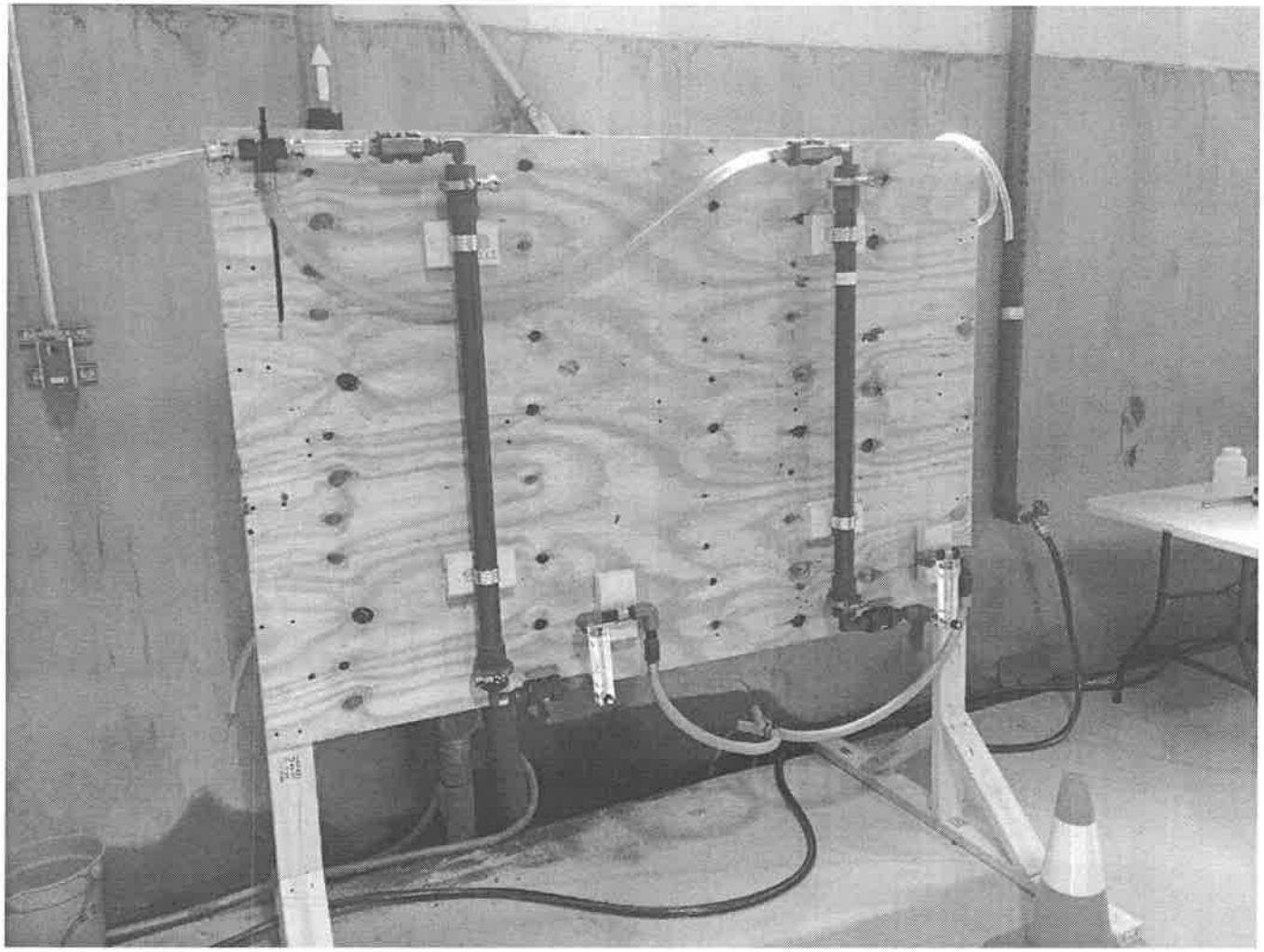


GAC Pilot Testing

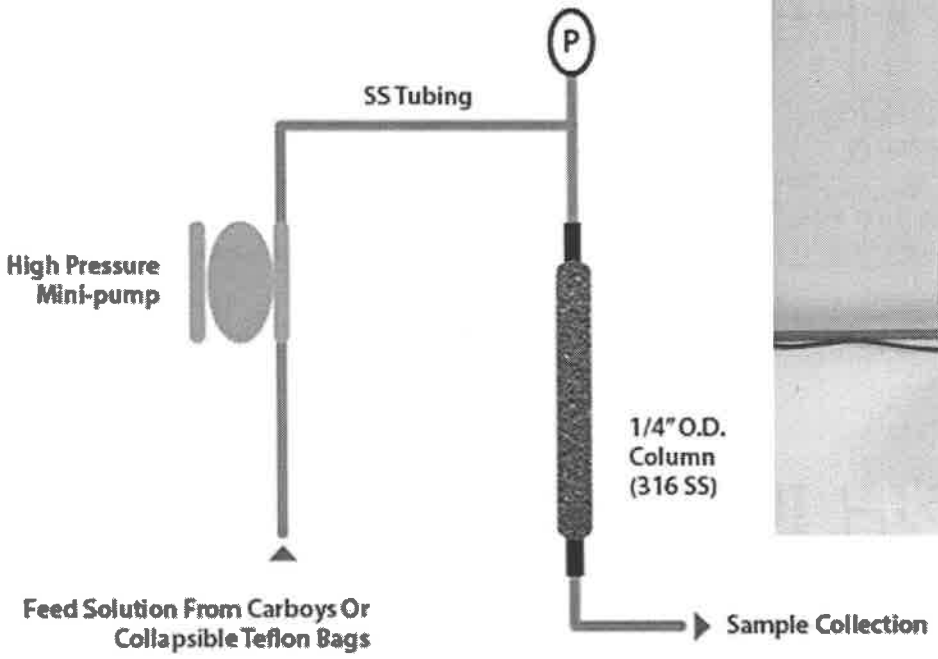


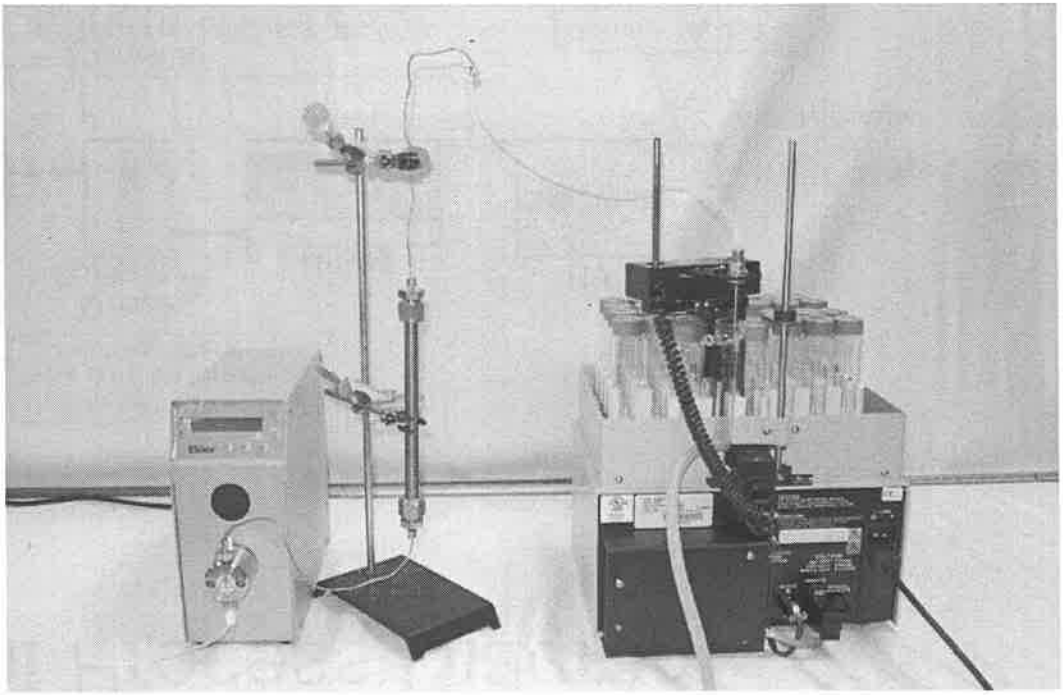


Ion-Exchange Resin Testing

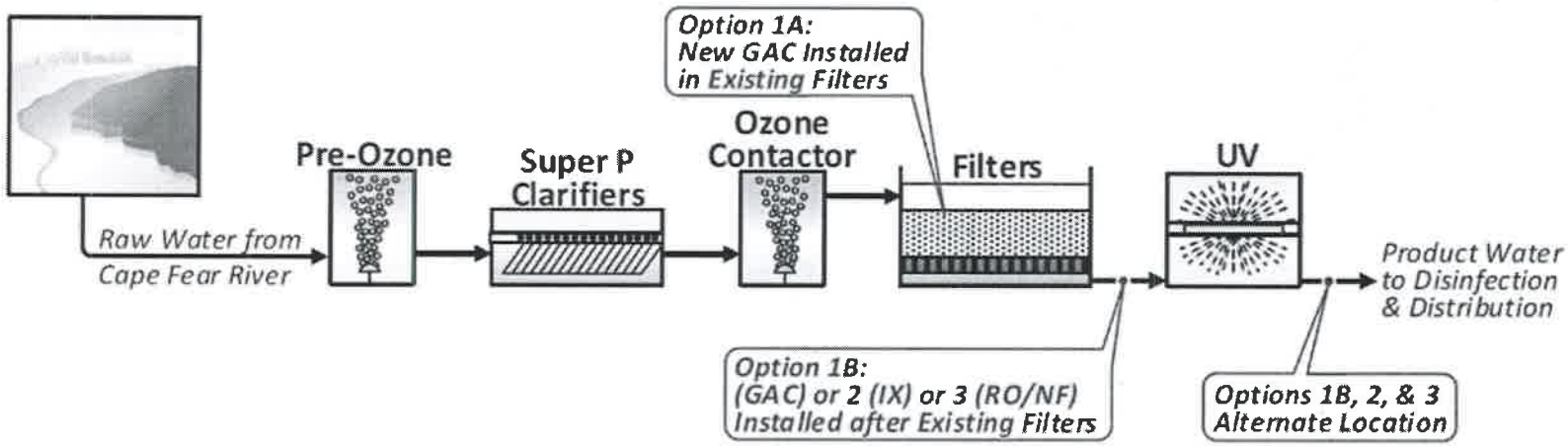


Accelerated Column Test (ACT)





Location of Options on Treatment Process Diagram



Process diagram of Sweeny Plant

Treatment Evaluation Cost Estimates

• Treatment Option Evaluation	$ 50,000
• Testing costs	$ 40,000
• **Total**	**$ 90,000**

Summary

DESCRIPTION	GAC in Existing Filters	OPT 1-B, GAC Contactors Post-Filtration	Deep Bed Version of 1B	RO/NF Post-Filtration
Initial Cost	$1.7 million	$28 million	$32 million	$113 million
Annual Operating Costs	$2.0 million minimum	$3.3 million to $6.3 million	$3.4 million to $6.4 million/yr	$3.3 million/yr

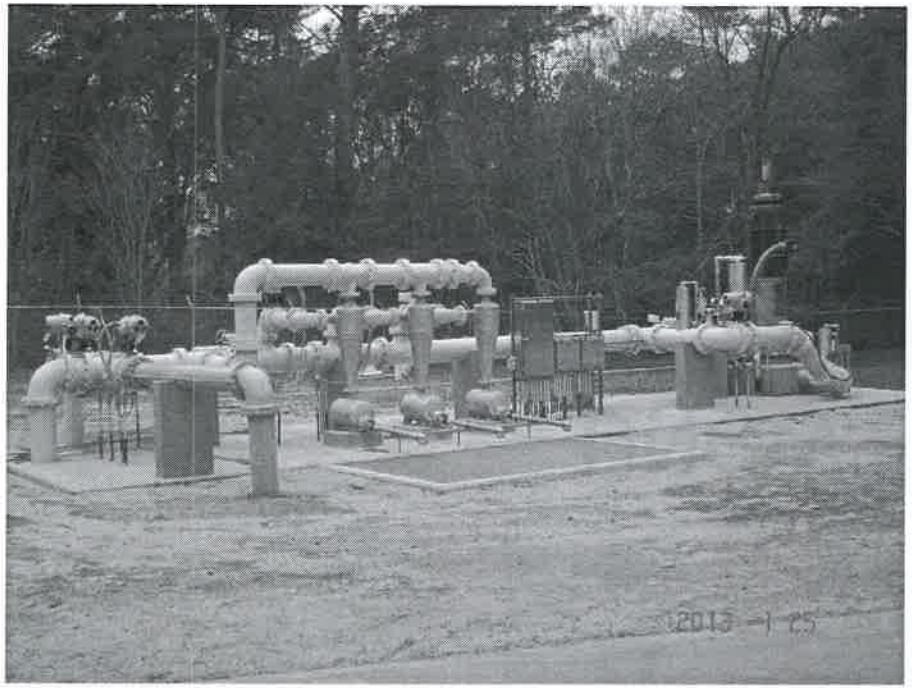
- GAC operating costs are based on 6,000 to 12,000 Bed Volumes (BV) based on experience elsewhere with PFAS removal, but not Gen-X. Site specific GAC testing is being conducted to determine the correct BV to assume for treating Cape Fear River water.
- Option 1A's initial cost includes an initial load of GAC media and one-time replacement of sand and gravel. (e) The options would have higher initial costs if standby filters/contactors were added to provide full capacity when units are off-line during GAC replacement events.
- A detailed cost opinion was not prepared for Ion Exchange (IX); however, it is the engineer's opinion that TPW for IX would be roughly in line with Post GAC. As a contingency CFPUA is conducting IX testing.

UNCW Support

• Identify Compounds in raw water	$ 75,000
• Study river sediment & other compounds	$ 150,000 (FUTURE)
• Evaluate compounds in finished water	$ 75,000 (FUTURE)
• **Total**	**$ 300,000**

Aquifer Storage and Recovery (ASR)

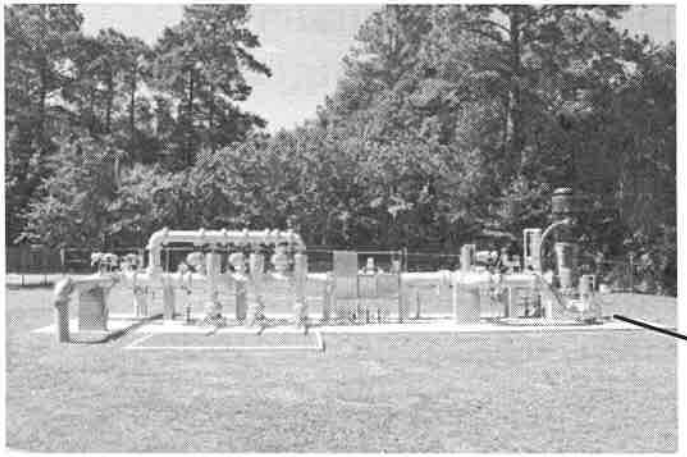
- Cost effective seasonal storage of finished water
- Capacity – 3/4 MGD
- Store water in PeeDee Aquifer at 140 to 185 ft.

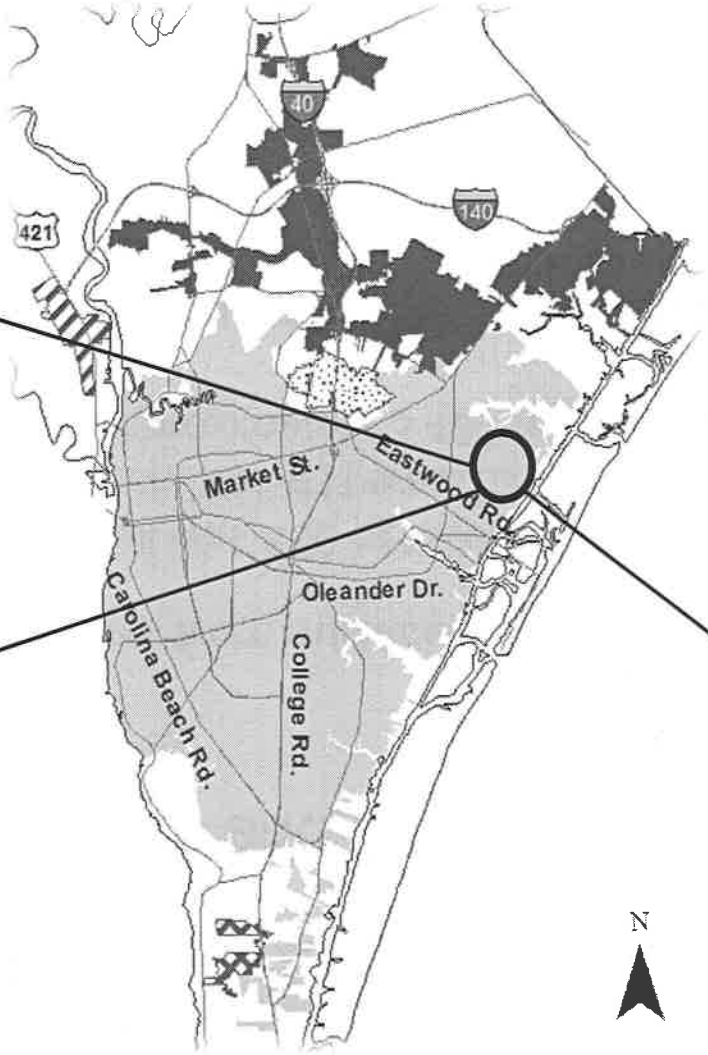


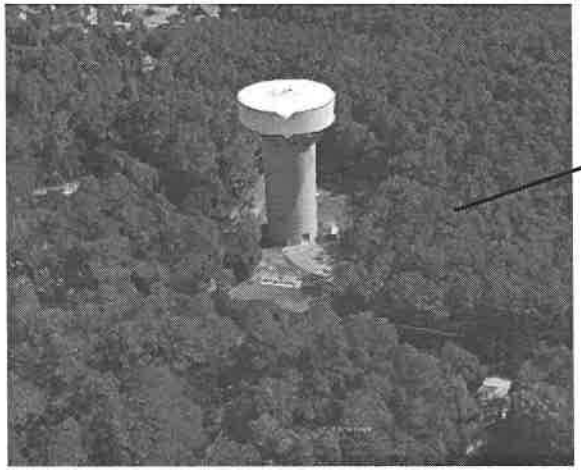
Benefits

- Peak demand source
- Water quality
- Emergency supply

ASR Well




40
140
421
Market St.
Eastwood Rd.
Oleander Dr.
College Rd.
Carolina Beach Rd.
N





ASR Temporary Withdrawal and Discharge to Sewer

- **50 million gallons stored drinking water from surface water source containing Gen-X**
  - Groundwater at CFPUA ASR Well was 830 ppt Gen-X on June 22nd
  - Groundwater at Wrightsville Beach Well #11 was 26 ppt Gen-X on June 22nd
  - Wrightsville Beach Well #11 is approximately 3,400 feet east of CFPUA ASR Well
- **Temporary discharge piping and additional monitoring wells were installed**
  - Installed temporary discharge piping from CFPUA ASR Well to sanitary sewer
  - Installed two new monitoring wells and sampled all for Gen-X to establish baseline
  - Pumping ASR groundwater to WWTP: Effluent is under 140 ppt health limit
- **Began withdrawal from CFPUA ASR Well at 500 gpm September 20th**
  - Currently highest level in any production or monitoring well is 91 ppt at ASR site
  - Drawdown cone of influence reaches Wrightsville Beach Well #11
  - Pump until 50 million gallons have been withdrawn, with periodic sampling

Goal Remove 50 million gallons by 12/1/17

ASR Program Cost Estimates

• Engineering	$ 100,000
• Construction, testing & Monitoring	$ 500,000
• **Total**	**$ 600,000**

Summary of Anticipated Short Term Costs

Water treatment evaluation	$ 90,000
UNCW support	$ 300,000
ASR remediation	$ 600,000
Ongoing Gen-X Monitoring	$ 85,000
Total	**$ 1,075,000**

Costs do not include permanent upgrades to Sweeney

Cape Fear Public Utility Authority

Mike Brown
Board Chairman

Frank Styers, PE
Chief Operations Officer

Attachment 5

Good morning, Mr. Chairman and members of the committee. Thank you for the opportunity to speak with you today. My name is Mark Lanier, Assistant to the Chancellor and Assistant Secretary of the Board of Trustees at UNC Wilmington, where I also serve as legislative liaison and coordinate various economic development activities on behalf of the university. I am joined today by Dr. Ralph Mead, from the Department of Chemistry and Biochemistry, representing the faculty researchers in UNCW's Marine and Atmospheric Chemistry Research Laboratory (known by its acronym, MACRL).

You should have at your seat some information on UNCW's Department of Chemistry and Biochemistry, which is a core component of UNCW's internationally acclaimed marine science program. The Department is routinely among the top five percent of master's degree-granting chemistry programs in the entire country. In the most recent data available, UNCW ranks second within UNC in the number of bachelor's level chemistry graduates with certification by the American Chemical Society and ranks first in the number of master's degrees.

The MACRL lab operates state of the art scientific instrumentation, including equipment that is far beyond my understanding as a political scientist and policy analyst. Dr. Mead could answer questions that you may have regarding the instrumentation.

Impressively, almost all chemistry graduates find relevant employment right away or gain entrance into top graduate and professional programs, which is another strong indicator of the program's strength and success.

As a result of the reputation and strength of the Department, Dr. Mead and other MACRL researchers were approached several months ago by CFPUA officials and others regarding their expertise, ability, and willingness to assist with testing. This resulted in a contract with CFPUA for analysis of both raw and treated water. This work is summarized in the tentative work plan that you have at your seat. The draft action plan outlines UNCW's proposed approach to the activities requested from UNCW in Section 20(a)(2) of House Bill 56 (if it becomes law).

This work is intended to supplement on-going monitoring studies of GenX and related compounds and the work that UNCW is already conducting under contract with CFPUA.

As directed by HB56, the proposed activities include:

1) the collection and analysis of sediments from the Cape Fear River, from seven locations, ranging from Southport, in Brunswick County, to upstream of the Chemours facility, which is on the border of Bladen and Cumberland counties; this will result in a better understanding the concentration of various chemicals in the sediments;

2) biodegradation studies of GenX in the sediments, over the timeframe allowed, which will help inform policy choices going forward;

3) possible work at UNCW's Center for Marine Science regarding bioaccumulation in oysters or other organisms in the ecosystem; and

4) possible work by others at UNCW in regard to potential impacts on humans and human behaviors, such as analysis of the use and effectiveness of home water filtration systems.

The citizens of North Carolina would benefit from this research, given that it provides critical information to fill knowledge gaps in understanding the longer term potential impacts of chemicals like GenX and the possibility that "relic" or "legacy" GenX may persist in the Cape Fear River, even if point sources and current discharges are eliminated.

We continue to work on the timelines for each component of this action plan, with full consideration of the timelines included in HB56. Some of the timelines are aggressive, especially given the time that will be required to develop standards that do not currently exist and to allow for biodegradation over time, as outlined in the action plan. In addition, the timelines and funding provided are simply not sufficient for complex, long term, and very expensive studies of toxicity related to the human health risks posed by the chemicals of interest.

In conclusion, the funding provided for the requested work is a worthwhile initial step to improve understanding of the chemicals that are present, their concentrations, degradation, and accumulation.

I also want to emphasize that the university would be providing these requested activities at or below the actual costs of personnel and materials. In accordance with HB56, UNCW would not collect any reimbursements for facilities, equipment, or administrative costs. Nonetheless, the university welcomes the opportunity to provide its expertise for the benefit of the state.

Edward Kidder Graham, the 10th president of UNC in the early 1900's, once said "the borders of the university are contiguous with the borders of the state." To paraphrase that, the expertise and research capabilities of the university are the expertise and research capabilities of the state.

Thank you again for the opportunity to share this information with you.

Dr. Mead and I are available to address any questions that you may have.

Attachment 6

UNCW Water Quality Research Plans (Related to HB56)
DRAFT – September 25, 2017

1. Work on existing contract with CFPUA to analyze both raw and treated water.

Purpose of Work:
As a public utility, CFPUA is committed to providing its customers the highest quality water possible. Recent studies suggest there may be unregulated compounds and chemicals in the Cape Fear River that may be difficult for CFPUA to remove and that may have unknown health effects. This study will help identify those emerging contaminants and provide a scientific basis for state and federal regulatory agencies to determine whether discharge controls would be appropriate.

Proposed Work:
Building upon previous published research UNCW will focus its efforts on two goals listed below.

Goal 1: Establish a method at UNCW for the analysis of PFAS in raw and finished drinking water using published methodology (e.g. Nakayama et al 2010). Quality assurance and control is vital and will be monitored using established procedures, including spike recoveries and internal standards. When appropriate, selected samples will be split and sent to Dr. Mark Strynar's (EPA Research Triangle Park) laboratory for analysis to test the accuracy of the method.

Deliverable 1: A brief report that summarizes the methods developed, sampling strategies, QA/QC procedures, results, and possible additional research needs. After Goal 1 is approved by both parties, UNCW will move to Goal 2.

Goal 2: Once UNCW is confident in the analytical methodology, a sampling campaign of raw and finished drinking water will begin. Weekly raw and finished water samples will be collected for 8 months using the optimized method developed in goal 1. Building upon Sun et al. (2016) and Newton et al. (2017), PFAS will be identified and where appropriate, quantified when authentic standards are available. If an authentic standard is not available, high-resolution mass spectrometry and multidimensional mass spectrometry will be used to propose a tentative structure for unknown PFAS. Additional purification and pre-concentration may be used for fluorine and proton nuclear magnetic resonance (NMR) spectrometry for structural elucidation.

Deliverable 2: A brief report that summarizes the sampling plan, sampling procedures, results, findings and recommendations.

The UNCW Marine and Atmospheric Chemistry Research Laboratory or MACRL Group will complete this project over 12 months (September 1, 2017 – August 31, 2018).

2. Develop and implement the analysis of sediments, as in HB56.

The sedimentary fate of GenX is currently unknown and poses a potential risk to the citizens of North Carolina. The research group at UNCW are experts in the fate, transport and remobilization of pollutants such as GenX from sediments. GenX may persist in riverine sediments like the Cape Fear River even if point sources are eliminated. This research will shed light into the potential reintroduction of legacy

GenX into the water column of the Cape Fear River and potentially into CFPUA input water even if current discharge is eliminated. Based upon the behavior of legacy (e.g. C8) compounds, it is possible that GenX may show an affinity for sediments also. We are currently developing the capability to measure GenX in sediments of the Cape Fear watershed. Once the methodology is developed, the temporal and spatial variability of GenX in sediments of the Cape Fear will be determined. Spatial variability will be addressed by collection of sediments at a variety of locations within the Cape Fear River. Samples in the estuarine portion of the watershed will be collected via a grab sampler on the RV Cape Fear at seven locations within the estuary beginning at the seawater end member near the city of Southport, NC, following a salinity transect to the freshwater end member north of the port of Wilmington. Additional samples will be collected in the freshwater portion of the river, including sites upstream and downstream of the Chemours facility. Transects will be collected during different seasons in order to evaluate the temporal variability of GenX within sediments of river.

The Lower Cape Fear River Program at the UNC Wilmington Center for Marine Science will provide its boats, vehicles and personnel to collect water, sediments, and biological samples for other UNCW researchers as needed throughout the basin. The UNCW Marine and Atmospheric Chemistry Research Laboratory or MACRL Group will complete this project.

3. Conduct biodegradation studies in sediments, as in HB56.

Limited studies suggest little or no degradation of GenX via hydrolysis in standardized testing over 28 days. However, to the best of our knowledge, no biodegradation studies have been conducted with authentic sediments that have been exposed to GenX over a long period of time. Often microbial communities present in sediments and exposed to specific substances are able to alter these substances. Our research team will conduct long term (1 year) incubation experiments with sediments exposed to GenX to monitor loss of the compound over time. Depending on the results of our spatial sediment GenX survey, sediments will either be monitored for loss of in situ levels of GenX or loss of GenX spiked into the sediments. The UNCW Marine and Atmospheric Chemistry Research Laboratory or MACRL Group will complete this project.

4. Bioaccumulation in ecosystem, as in HB56.

Perfluorooctonoic compounds (PFOA) like GenX has the potential to affect marine organisms. While high concentrations and acute exposures may result in death, most of the time in nature, these compounds exist in low concentrations and thus organisms are more prone to chronic exposure to low levels. Chronic exposure of PFOAs while not resulting in death, at least in adult organisms, may affect various physiological activities of organisms including growth, survival and reproduction. Some of the PFOAs behave as endocrine disrupting chemicals thus impacting reproduction and growth. This is especially pertinent and acute in early life stages of organisms since these are more susceptible to environmental and chemical perturbations.

The choice organism for the study is the eastern oyster Crassostrea virginica - an organism that is ubiquitous in the estuarine and nearshore environments. In addition to being economically important, oysters are more valuable for ecological reasons. They form reefs that serve as a buffer against waves and boat wakes protecting shoreline, provide food, shelter and habitat for over 300 species and clear water from algae, detritus, sediment, contaminants, microorganisms, and thus promote growth of sea grasses and benthic microalgae.

Given that oysters filter 4-40L/oyster/hr, potential for bioaccumulation and bioconcentration of chemicals present in the water (like PFOAs) is very high and may thus have impacts to human health upon consumption of contaminated oysters or may result in biomagnification when contaminated oysters are eaten by other predators (e.g., crabs) and make their way up the food chain. We will examine the natural concentrations of GenX in oysters from various field sites in Cape Fear region, examine the impacts of GenX on early life stages (e.g., gametes, embryos, larvae, juveniles and adults) of oysters. Responses could include cellular responses, clearance/filtration rates, disease susceptibility, lipid peroxidation, and reproductive development.

This study would be conducted in collaboration with faculty in Chemistry and Biochemistry, as well as Biology and Marine Biology. Experiments would be conducted at the UNCW Center for Marine Science.

5. Economic Impacts & Household Filtration Effectiveness and Household Risk Perception

Additional projects have been discussed that could address questions related to human health and behaviors.

One possible research study could identify filtering devices used by residential customers in order to determine the efficacy of household filtering devices at removing Gen-X from drinking water, with the goal of providing residents with information about the most effective filtration systems (i.e., reverse osmosis, carbon filters, ion-exchange, etc.) for removing Gen-X from their water source. The water samples would be extracted using flash columns, eluted with an organic solvent and then analyzed using a Sciex Triple Quad QTRAP Mass spectrometer. Samples would be quantified using linear regression analysis of known Gen-X standards.

A second possible project, probably after additional scientific research and other actions have been completed, might be a survey to understand: (1) household perceptions of Gen-X risk; (2) household behavioral responses and adaptation to the presence of Gen-X (and related chemicals); and (3) the economic impacts of behavioral adaptations.

Scientists from the Center for Marine Science and a natural resource economist in the Department of Environmental Sciences would conduct these studies, respectively.

Department of Chemistry and Biochemistry

University of North Carolina Wilmington

UNCW offers intensive, student-oriented programs in chemistry and biochemistry that award Bachelor of Arts, Bachelor of Science* and Master of Science degrees. Our expert faculty combine classroom instruction with innovative research to provide an ideal environment for training tomorrow's scientists, physicians and teachers.

THE DEPARTMENT IS AMONG THE **TOP 5 PERCENT** OF MASTER'S DEGREE-GRANTING INSTITUTIONS IN THE U.S.

Among NC public universities for 2016-17, UNCW is:

- **3rd** in total number of chemistry degrees (70)
- **2nd** in ACS-certified undergraduate chemistry degrees (33)
- **1st** in master's degrees (19)

Faculty and students use state-of-the-art instrumentation to conduct internally and externally funded research in:

- analytical chemistry
- biochemistry
- biopharmaceuticals
- chemical education
- computational and physical chemistry
- marine and atmospheric science
- natural product chemistry
- organic and inorganic synthesis



State-of-the-art instruments include:

- Agilent 1290 Infinity UHPLC w/Bruker Microtof-Q II high resolution mass spectrometer
- Agilent 1290 Infinity UHPLC w/ Bruker Amazon SL mass spectrometer
- Bruker 600 MHz NMR spectrometer
- Bruker Scion quadrapole GC/MS

In response to regional economic needs, the department is adding a track in pharmaceutical chemistry to the M.S. degree program. It is funded by a substantial gift from a local high-growth company that conducts contract chemical analyses for the pharmaceutical industry and employs many UNCW graduates.

Nearly 100 percent of UNCW chemistry graduates find relevant employment after completing their degrees, a strong indicator of the program's success. Enhancing the university's academic programs through applied learning experiences and research opportunities is among the priorities outlined in UNCW's Strategic Plan at **www.uncw.edu/strategicplan**.

To learn more, visit **uncw.edu/chem**.

* B.S. degree graduates are certified by the American Chemical Society's Committee on Professional Training.

Working Group on GenX Related Issues

G. Brooks Avery, Ph.D., Professor
- B.S. The University of North Carolina, Greensboro
- M.S. The University of North Carolina, Wilmington
- Ph.D. The University of North Carolina, Chapel Hill

Robert J. Kieber, Ph.D., Professor
- B.S., Cook College, Rutgers
- Ph.D., University of Maryland
- Postdoctoral, Rosentiel School of Marine and Atmospheric Science

Ralph Mead, Ph.D., Professor
- B.S. Florida State University
- Ph.D. Florida International University

Pamela J. Seaton, Ph.D., Department Chair of Chemistry and Biochemistry & Professor
- B.S., University of Washington, Seattle
- M.S., University of Alaska, Fairbanks
- Ph.D., University of Vermont, Burlington
- Postdoctoral, Oregon State University

Stephen A. Skrabal, Ph.D., Associate Director, Center for Marine Science, & Professor
- B.S., College of William and Mary
- M.A., College of William and Mary
- Ph.D., University of Delaware
- Postdoctoral, Old Dominion University

Martin H. Posey, Ph.D., Director of the Center for Marine Science & Professor
- Ph.D., Biology, University of Oregon, Eugene, OR, 1985
- B.A., Zoology, University of North Carolina at Chapel Hill, Chapel Hill, NC, 1980 *with highest honors*

Dr. Andrea Bourdelais, Ph.D., Center for Marine Science, Research Associate Professor

Dr. Chris Dumas, Ph.D., Professor
- Ph.D., Natural Resource Economics. University of California, Berkeley
- M.S., Natural Resource Economics. University of California, Berkeley
- B.S., Economics; Conservation. North Carolina State University

Aswani K. Volety, Ph.D., Dean of the College of Arts and Sciences & Professor
- Ph.D., Marine Science, School of Marine Science, College of William & Mary
- M.S., Zoology with Specialization in Marine Biology, Andhra University, Visakhapatnam, India
- B.S., Zoology, Andhra University, Visakhapatnam, India

Ron Vetter, Ph.D., Associate Provost for Research, Dean of the Graduate School, & Professor
- Ph.D., University of Minnesota
- B.S., M.S., North Dakota State University

Mark Lanier, Assistant to the Chancellor & Assistant Secretary, Board of Trustees

Working Group on GenX Related Issues

G. Brooks Avery, Ph.D., Professor
- B.S. The University of North Carolina, Greensboro
- M.S. The University of North Carolina, Wilmington
- Ph.D. The University of North Carolina, Chapel Hill

Robert J. Kieber, Ph.D., Professor
- B.S., Cook College, Rutgers
- Ph.D., University of Maryland
- Postdoctoral, Rosentiel School of Marine and Atmospheric Science

Ralph Mead, Ph.D., Professor
- B.S. Florida State University
- Ph.D. Florida International University

Pamela J. Seaton, Ph.D., Department Chair of Chemistry and Biochemistry & Professor
- B.S., University of Washington, Seattle
- M.S., University of Alaska, Fairbanks
- Ph.D., University of Vermont, Burlington
- Postdoctoral, Oregon State University

Stephen A. Skrabal, Ph.D., Associate Director, Center for Marine Science, & Professor
- B.S., College of William and Mary
- M.A., College of William and Mary
- Ph.D., University of Delaware
- Postdoctoral, Old Dominion University

Martin H. Posey, Ph.D., Director of the Center for Marine Science & Professor
- Ph.D., Biology, University of Oregon, Eugene, OR, 1985
- B.A., Zoology, University of North Carolina at Chapel Hill, Chapel Hill, NC, 1980 *with highest honors*

Dr. Andrea Bourdelais, Ph.D., Center for Marine Science, Research Associate Professor

Dr. Chris Dumas, Ph.D., Professor
- Ph.D., Natural Resource Economics. University of California, Berkeley
- M.S., Natural Resource Economics. University of California, Berkeley
- B.S., Economics; Conservation. North Carolina State University

Aswani K. Volety, Ph.D., Dean of the College of Arts and Sciences & Professor
- Ph.D., Marine Science, School of Marine Science, College of William & Mary
- M.S., Zoology with Specialization in Marine Biology, Andhra University, Visakhapatnam, India
- B.S., Zoology, Andhra University, Visakhapatnam, India

Ron Vetter, Ph.D., Associate Provost for Research, Dean of the Graduate School, & Professor
- Ph.D., University of Minnesota
- B.S., M.S., North Dakota State University

Mark Lanier, Assistant to the Chancellor & Assistant Secretary, Board of Trustees

Attachment 7

Mark Benton, DHHS
Zack Moore, MD, DHHS

Health Effects of GenX and Related Compounds in the Lower Cape Fear River Basin

Zack Moore, MD, MPH
State Epidemiologist
NC DHHS, Division of Public Health

September 28, 2017

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

Usual Sources for Health-Based Guidance

1. National regulatory standards (EPA)
2. State Standards (DEQ/Environmental Management Commission)
3. National health advisories or other health values (EPA, CDC)
4. Other governmental guidance
   - Standards from other states or countries
   - World Health Organization, European Union values
5. If guidance not available from 1–4, can consider establishing state-specific health goal

What is a Health Goal?

- Level of contamination below which no adverse health effects would be expected over a lifetime of exposure
- Calculated based on the most vulnerable population
- Non-regulatory, non-enforceable
- Change as new information becomes available

Health Goal: Requirements

- Must have sufficient health-related information
  - Animal studies *(required)*
  - Epidemiologic studies
  - Other laboratory studies
- Some health-related information not in public domain
- Health-related information often lacking for emerging compounds

Per- Polyfluorinated Alkyl Substances (PFAS)

- Large class of man-made chemicals used since 1950s
- Includes GenX, PFOA, PFOS, Nafion by-products
- Found in people, wildlife, and fish all over the world
- Some PFAS can stay in people's bodies a long time
- Some PFAS do not break down easily in the environment

SOURCE: Agency for Toxic Substances and Disease Registry (ATSDR): www.atsdr.cdc.gov/pfc/index.html

PFAS: Health Effects

- Potential health effects not well understood
- Certain PFAS may
  - Affect growth, learning, and behavior
  - Interfere with body's natural hormones
  - Increase cholesterol levels
  - Affect the immune system
  - Increase the risk of cancer
- Thousands of PFAS; could have different effects

SOURCE: Agency for Toxic Substances and Disease Registry (ATSDR): www.atsdr.cdc.gov/pfc/index.html

PFOA and PFOS

- Perfluorooctanoic acid (PFOA or C8) and perfluorooctane sulfonic acid (PFOS)
- Used in manufacture of carpets, clothing, fabrics, food packaging, cookware, firefighting foam, etc.
- Studied more than other PFAS
- EPA Lifetime Health Advisory: Combined PFOA/PFOS concentration of 70 ppt
- Can result in changes to liver, thyroid, pancreas and hormone levels

SOURCE: Agency for Toxic Substances and Disease Registry (ATSDR): www.atsdr.cdc.gov/pfc/index.html

GenX

- Trade name for one unregulated PFAS chemical compound
- Used in manufacturing nonstick coatings and for other purposes
- Produced as a byproduct of certain manufacturing processes

https://deq.nc.gov/news/hot-topics/genx-investigation/

GenX: Health Effects

- Laboratory studies on animals:
  - Cancers of the liver, pancreas, and testes
  - Non-cancer effects to the liver and blood
- Effects on human health unknown

https://deq.nc.gov/news/hot-topics/genx-investigation/

GenX: Preliminary Assessment

- Received request from Brunswick County, responded within 24 hours
- No federal health levels
- DHHS staff began working with federal partners, conducting review of available data
- European Chemical Agency calculated Derived No Effect Level based on a 2-year rat chronic toxicity/carcinogenicity study
- NC DHHS calculated a level of 70,909 ng/L (ppt)

https://deq.nc.gov/news/hot-topics/genx-investigation/

GenX: DHHS Provisional Health Goal

- Updated based on new data shared by EPA
- Identified different animal studies for use as starting point → 100-fold decrease
- Included assumption that exposure could come from sources other than drinking water → 5-fold decrease
- Updated provisional health goal: 140 ng/L (ppt)

https://deq.nc.gov/news/hot-topics/genx-investigation/

Other Perfluorinated Compounds

- EPA Health Advisory available for PFOA/PFOS
- Insufficient information to calculate health goal for other identified PFAS, including
  - Nafion byproducts 1 & 2
  - Three other emerging compounds in EPA report
    - PFMOAA
    - PFO2HxA
    - PFO3OA
- Unable to accurately measure concentrations of some emerging perfluorinated compounds

https://files.nc.gov/ncdeq/GenX/NC%20DEQ%20Report_4_Nontargeted.pdf

Current DHHS Activities

- Coordinating with NC DEQ on ongoing investigation
- Facilitating CDC Public Health Assessment of GenX and other PFAS in Cape Fear River
- Working with EPA
  - Intergovernmental Agency Toxicology Subject Matter Expert Working Group evaluating PFAS effects
  - National Center for Computational Toxicology
- Supporting studies by academic partners
- Analyzed data in the NC Cancer Registry

Future of Emerging Compounds

- Rapid advances in environmental testing
  - Identification of "non-targeted" compounds
  - Able to identify lower concentrations
  - Outpacing advances in toxicology, health knowledge
- Likely to detect more compounds with limited (or no) health data in Cape Fear River and elsewhere

Attachment 8

North Carolina Coastal Federation

35 years working together for a healthy coast

North Carolina Coastal Federation Comments to House Select Committee on River Quality

September 28, 2017

Thank you Chairman Davis and members of the committee.

My name is Tracy Skrabal. I am the coastal scientist for the North Carolina Coastal Federation's southeast regional office in New Hanover County. On behalf of the Coastal Federation and its 15,000 supporters I want to thank Rep. Davis and the rest of the committee for the invitation to speak to you today.

The Coastal Federation focuses on protecting and restoring the N.C. coast. For 35 years, the federation has been in the field restoring miles of coastline; training and educating students, adults and communities to take actions that result in cleaner coastal waters and advocating for an accessible, healthy, productive coast.

At Rep. Davis' direction, my comments – which I promise are short - and the comments of Dr. Lee Ferguson who you will hear from in a moment, will focus on the issue of contaminants in our surface waters. I will provide you with some suggestions about how you can address this challenge, not only in the Cape Fear River but in all drinking water supplies.

The federation is not, of course, the only community organization working on this issue. As you may know, Cape Fear River Watch has been doing very effective work in protecting and preserving the river's water quality for years and is one of the main community organizations citizens rely on for information about GenX. I hope you will consider inviting its River Keeper, Kemp Burdette, to speak to the committee some time soon.

Now, before Dr. Ferguson speaks, I want to outline the federation's priorities for any legislative response to the GenX issue.

First, any legislative response should ensure that what happened in the Cape Fear River with GenX never occurs again in any N.C. river or drinking water supply.

As you will hear from Dr. Ferguson, GenX is only one contaminant out of many others that may be in N.C. drinking water supplies.

We must make sure that contaminants like GenX that might make drinking water supplies unsafe never go undetected in our water supply for months or even years at a time.

Achieving that goal will require the development of a permanent, well-funded water monitoring program that allows regulators, local governments and the general public to have the information they need to be confident we know what is in our water and are taking the appropriate steps to ensure it is clean and safe.

As Dr. Ferguson will outline, there are states and countries that are making the investments necessary to reach this goal. We believe N.C. should join them, not only for the Cape Fear but also for all rivers and other waters that are used for public consumption.

Without investments in a robust, sophisticated and permanent water monitoring system, we simply cannot assure the public that the risks posed by GenX or other chemicals like it are not also occurring in other water supplies and communities.

In addition to a robust monitoring system, we believe N.C. needs an easily accessible, transparent system so that all stakeholders in drinking water safety – regulators, water treatment authorities, researchers and especially the public – can understand what is in our water. This kind of transparency is crucial to rebuilding the public's confidence in our drinking water and preventing what happened in the Cape Fear from occurring again.

Dr. Ferguson has helped us at the federation understand that addressing the issue of contaminants will not be easy. Many chemicals present in our water today have not been studied sufficiently to understand the full suite of existing industrial compounds existing in our waters at any time, and what if any risk they pose to human health, or at what levels.

As a result, ensuring that our drinking water is safe will require difficult choices and priority setting by regulators and other stakeholders. An increased commitment to research on these emerging industrial contaminants in the environment, and on the toxicological effects of these compounds, is a critical need at this time.

The federation believes that it is imperative that the process for understanding these challenges and making the right policy decisions necessary to protect our drinking water must be transparent and open to the public. Again, we believe that this transparency is essential to restoring and maintaining the public's confidence in our drinking water.

Finally, with the GenX issue, N.C. has an opportunity to take important steps to protect its public water supplies. And there is no question but that it has the legal authority to do so.

Under the federal Clean Water Act, "existing uses" of rivers and other public water supplies must be protected. Under the law, drinking water is, of course, an "existing use."

What this means is that anything that degrades an "existing use" is illegal. Our state has adopted what's called an "Antidegradation Policy" to enforce this federal requirement. Federal and state laws make it clear that this "antidegradation policy" is a narrative water quality standard that has the same legal standing as any specific, numerical water quality standard. It can't be violated.

In this process, the burden is on the applicant who requests permission to put polluted effluent into a river like the Cape Fear to demonstrate it will not violate any water quality standards. This includes meeting the "antidegradation policy" I just described.

To ensure that "existing uses" such as drinking water supplies are protected, these industrial users must disclose on their wastewater discharge permit applications if they have any potential pollutants in their proposed discharges that could violate water quality standards, including antidegradation standards. Not only that, but they must also disclose the potential risks associated with these compounds, including any potential harm that might result to the existing environment and human health.

If there is uncertainty about whether the polluted effluent will meet the standard, the State has the legal responsibility to deny a permit that potentially results in a violation of the antidegradation standard.

The undetected, years-long presence of chemicals like GenX in a public water supply that serves millions of people should be a wake-up call to everyone in N.C. that gets their drinking water from a river or creek.

We believe what has occurred in the Cape Fear River requires a comprehensive review of the hundreds of permit application records for existing industrial discharges to drinking water supplies that are now permitted in N.C.

This review should determine if each applicant has sufficiently answered questions in these applications about contaminants that might be found in their waste streams based upon their industrial processes. The review should also examine if permit limits are sufficient to protect drinking water supplies from those contaminants. This review can either be done by the State itself, or by hiring an independent expert consultant to audit these public records on these applications.

The federation is confident that sufficient investment in water quality monitoring, dedicated scientific research on these emerging compounds, open sharing of the results of that monitoring and associated research, a transparent process for acting

on those results and vigorous enforcement of the Clean Water Act will go a long way to ensuring the safety and public confidence in our drinking water.

Thank you again for the opportunity to speak to you today.

Now, Mr. Chairman, with your permission, I will ask Dr. Lee Ferguson to make his presentation to the committee.

Real Facts NC

Emerging contaminants in NC rivers: Strategies for protecting water quality

P. Lee Ferguson, Ph.D.
Associate Professor

Department of Civil & Environmental Engineering and
Nicholas School of the Environment, Duke University,
Durham, NC

lee.ferguson@duke.edu

On behalf of the NC Coastal Federation

Sept. 28, 2017

Attachment 9

Unlisted emerging contaminants in drinking water sources

- When chemicals are not included in priority pollutant lists, there are no water quality standards and monitoring is not routinely performed.
- Safe Drinking Water Act provides for priority contaminant monitoring (53 organic chemicals) and emerging contaminant prioritization (Contaminant Candidate List – currently includes 97 chemicals).
- EPA decides which chemicals are priorities for monitoring and future regulation.
- Which chemicals are "emerging"? Which pose risks to human health?

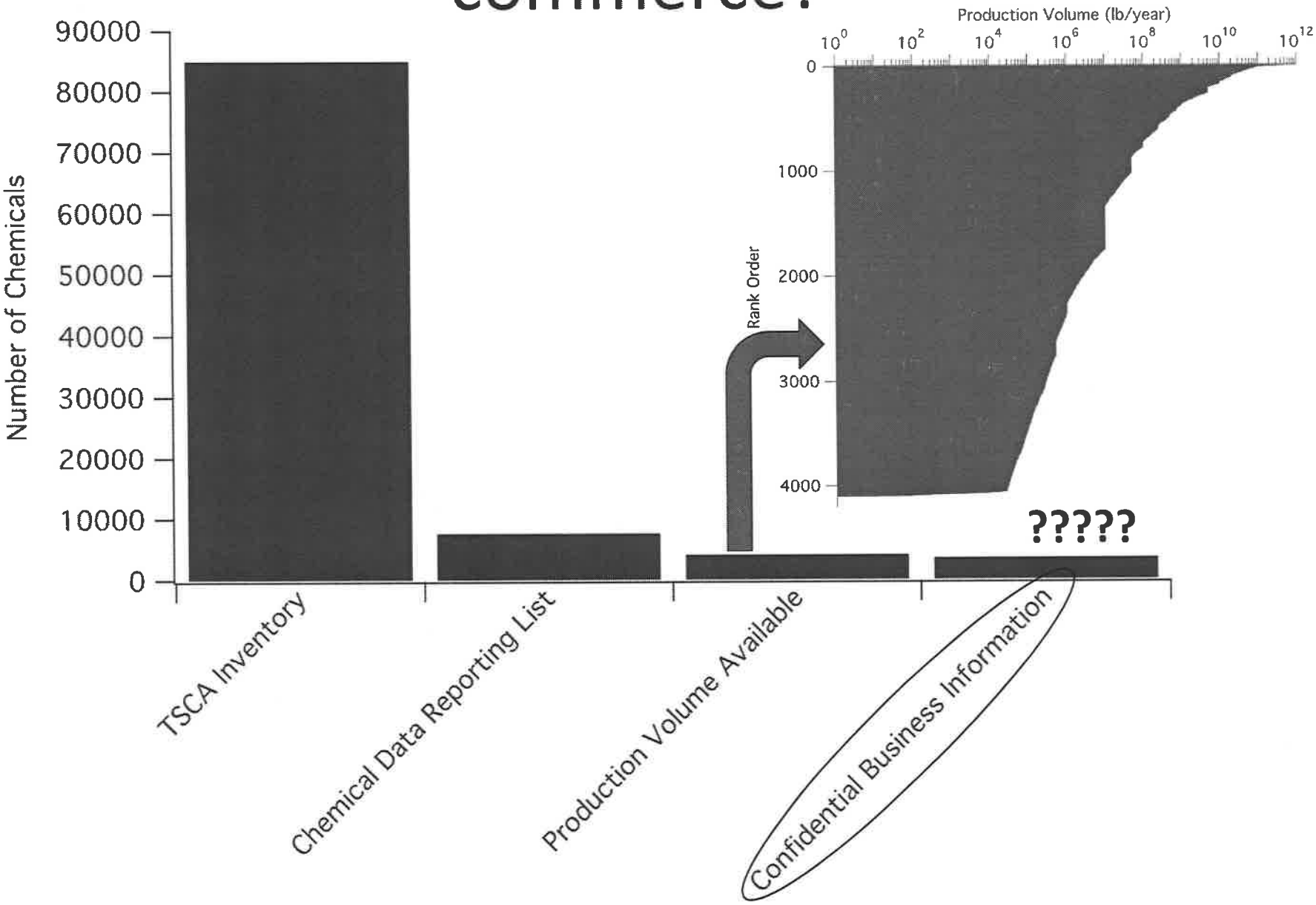
How do we avoid another GenX situation in NC waters?

- The only way to avoid being taken by surprise with unlisted (non-priority designated) emerging contaminants is to monitor for them.
- "Holistic" emerging contaminant monitoring in water is not routine. State labs do not have this capability currently.
- There are two approaches for anticipating emerging contaminant problems in water:
  - Top Down: Know which chemicals in commerce are potentially problematic, and monitor for those in water.
  - Bottom Up: Extensively monitor drinking water sources for the presence, identity, and levels of pollutants

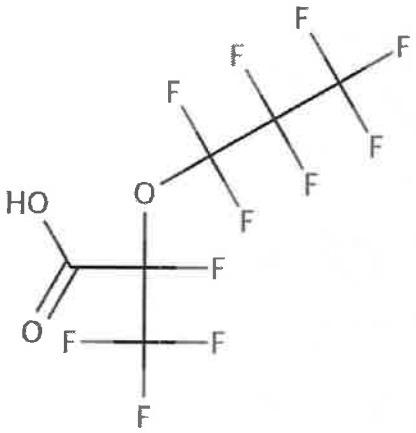
Top Down: Can we tabulate risky chemicals from regulatory lists?

- Our chemical universe:
  - How many chemicals exist? ~ 80-130 million
  - How many chemicals are used in commerce? ~ 85,000 (TSCA) Chemical Abstract Service
  - How many chemicals have been tested for toxicity? < 10,000 (hard to tabulate)
  - How many chemicals are flagged as "priority pollutants" under CWA? 126
  - How many chemicals are flagged as "toxic pollutants" under CWA? 65
  - How many chemicals have been banned by EPA? 9 (PCBs, dioxins, chlorofluorocarbons, asbestos, hexavalent chromium, and four carcinogenic mixed nitrates used in metalworking)

Which chemicals are highly used in commerce?



Example: What can we find out about GenX from EPA TSCA inventory data?



Print | E-mail Url

Home

Chemical Name:
TSCA § 12(b) Export NotificationCAS #:
2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propionic acid 13252-13-6

EPA Actions

TSCA § 5 Orders
CO

Chemicals Subject to TSCA § 12(b) Export Notification
TSCA § 12(b) information

Manufacturing, Processing, Use, and Release Data Maintained by EPA

Chemical Data Reporting
CDR Summary

Print | E-mail Url

Home

TSCA SECTION 5 ORDER

View TSCA Section 5 Order

Chemical Name: 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propanoic acid
Chemical Identifier: 13252-13-6
Effective Date: January 28, 2009
Chemical Category: PBT chemicals

What type of TSCA Section 5 Order was developed for this chemical substance?

[redacted]

TSCA Section 5 Order for: 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propanoic acid , 13252-13-6

PMN Number: P-08-0508

Has the chemical been commenced?: Yes

Functional Use: Intermediate for polymerization aid (generic)

What are the health or environmental toxicity concerns?

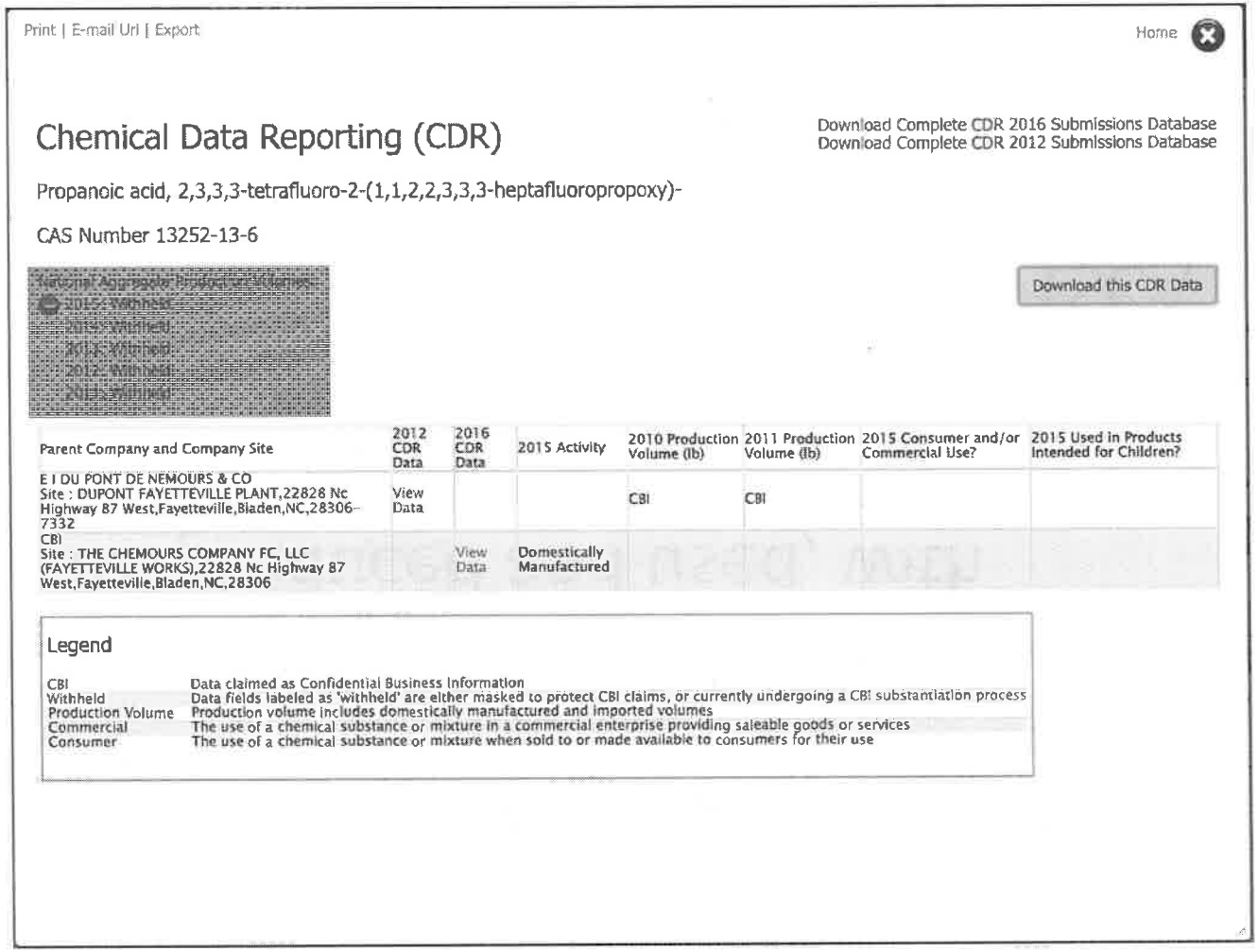
- Aquatic and/or terrestrial toxicity
- Cancer effects
- Developmental/reproduction
- Internal organs (e.g., liver, blood, kidney, etc.)/systemic toxicity
- Lung toxicity (including lung overload)
- Mutagenicity
- Persistent, Bioaccumulative, Toxic (PBT) properties

What is the basis for the health or environmental toxicity concerns?

- Analog data
- PBT chemicals

Example: What can we find out about GenX from EPA TSCA inventory data?

"The Chemical Data Reporting (CDR) Rule, issued under the Toxic Substances Control Act (TSCA), requires manufacturers (including importers) to give EPA information on the chemicals they produce domestically or import into the United States. EPA uses the data to help assess the potential human health and environmental effects of these chemicals and **makes the non-confidential business information it receives available to the public.**"



Print | E-mail Url | Export

Home

Chemical Data Reporting (CDR)

Download Complete CDR 2016 Submissions Database
Download Complete CDR 2012 Submissions Database

Propanoic acid, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-

CAS Number 13252-13-6

Download this CDR Data

Parent Company and Company Site	2012 CDR Data	2016 CDR Data	2015 Activity	2010 Production Volume (lb)	2011 Production Volume (lb)	2015 Consumer and/or Commercial Use?	2015 Used in Products Intended for Children?
E I DU PONT DE NEMOURS & CO Site : DUPONT FAYETTEVILLE PLANT,22828 Nc Highway 87 West,Fayetteville,Bladen,NC,28306-7332	View Data			CBI	CBI		
CBI Site : THE CHEMOURS COMPANY FC, LLC (FAYETTEVILLE WORKS),22828 Nc Highway 87 West,Fayetteville,Bladen,NC,28306		View Data	Domestically Manufactured				

Legend

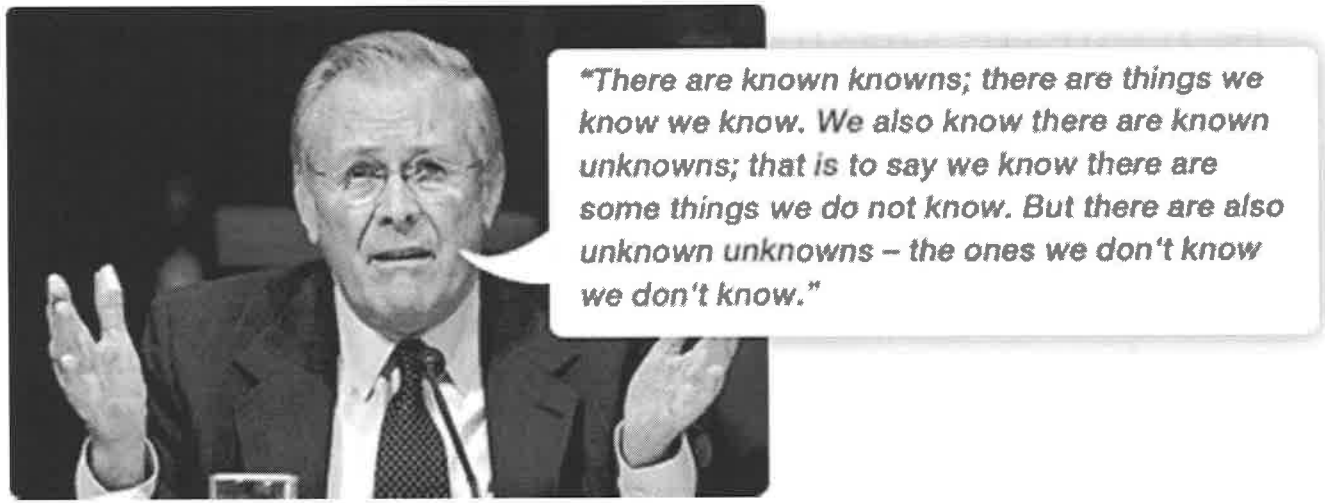
CBI	Data claimed as Confidential Business Information
Withheld	Data fields labeled as 'withheld' are either masked to protect CBI claims, or currently undergoing a CBI substantiation process
Production Volume	Production volume includes domestically manufactured and imported volumes
Commercial	The use of a chemical substance or mixture in a commercial enterprise providing saleable goods or services
Consumer	The use of a chemical substance or mixture when sold to or made available to consumers for their use

Top Down chemical prioritization: What do we need to prevent GenX situation?

- More information on which chemicals in commerce are produced and used, with location.
- Full production-volume information on chemicals in commerce (all chemicals on TSCA list).
- Relief from Confidential Business Information (CBI) disclosure limits: must be made available to researchers outside US EPA.

Bottom Up: Why is it hard to identify emerging contaminants early?

Strategies for analytical characterization of emerging contaminants			
Screening technique:	*Targeted*	*Suspect*	*Non-target*
Question:	*Are compounds x, y, & z present in this sample?*	*Which compounds of a defined list are present in this sample?*	*Which compounds are present in this sample?*
Compound Types:	*Known-knowns*	*Known-unknowns*	*Known-unknowns & unknown-unknowns*



Challenges for routine Bottom Up analysis of emerging contaminants

- "Non-Targeted" analysis of emerging contaminants relies on very specialized analytical instrumentation.
- The high resolution mass spectrometers needed are not available in most state monitoring labs (~ $1,000,000 capital cost).
- Standard methods are not deployed for performing "Non-Targeted" contaminant monitoring in ambient waters of NC.
- Expertise for such analysis is at research level.

Bottom up analysis of non-priority pollutants in water CAN be done

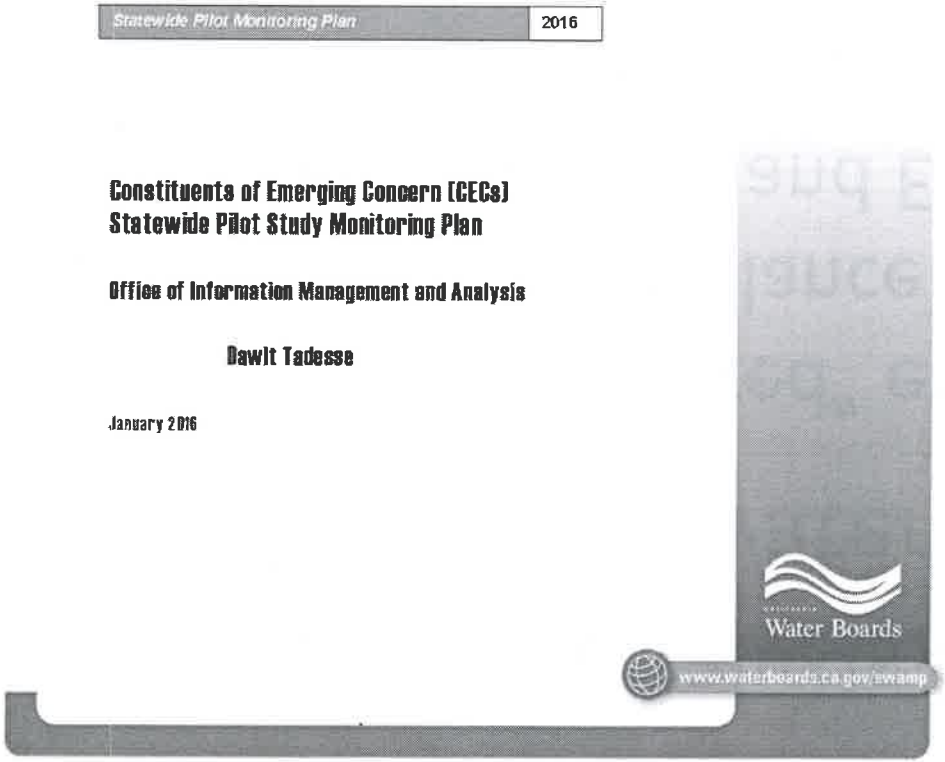
- Several "Non-Targeted" emerging contaminant surveillance programs are in place within the US and Europe:
  - California EPA State Water Resources Control Board
  - San Francisco Bay Regional Monitoring Program
  - International Rhine River Monitoring Network (Canton of Basel, Switzerland)

Best in world

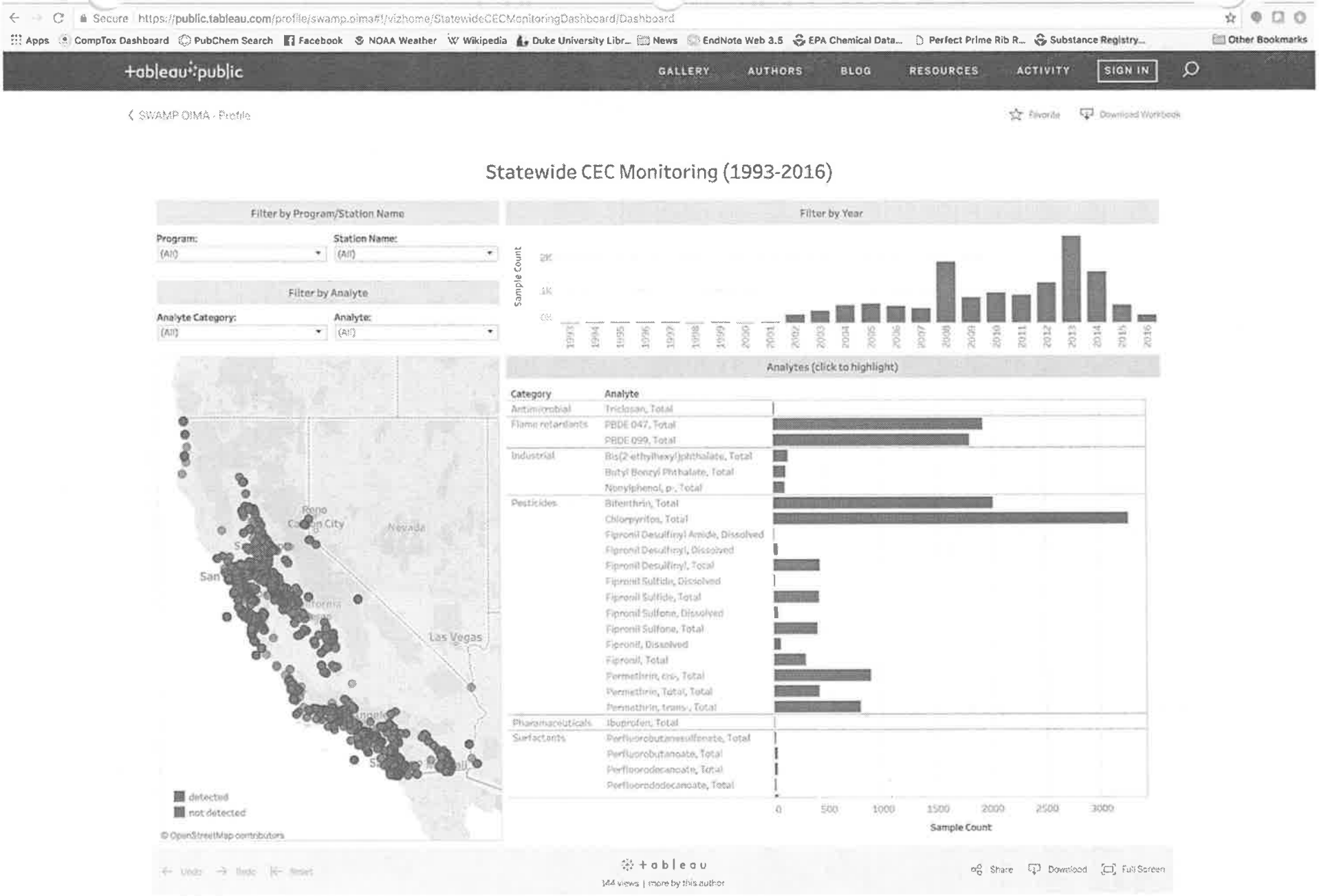
California State Water Resources Control Board



SWAMP
Surface Water Ambient Monitoring Program

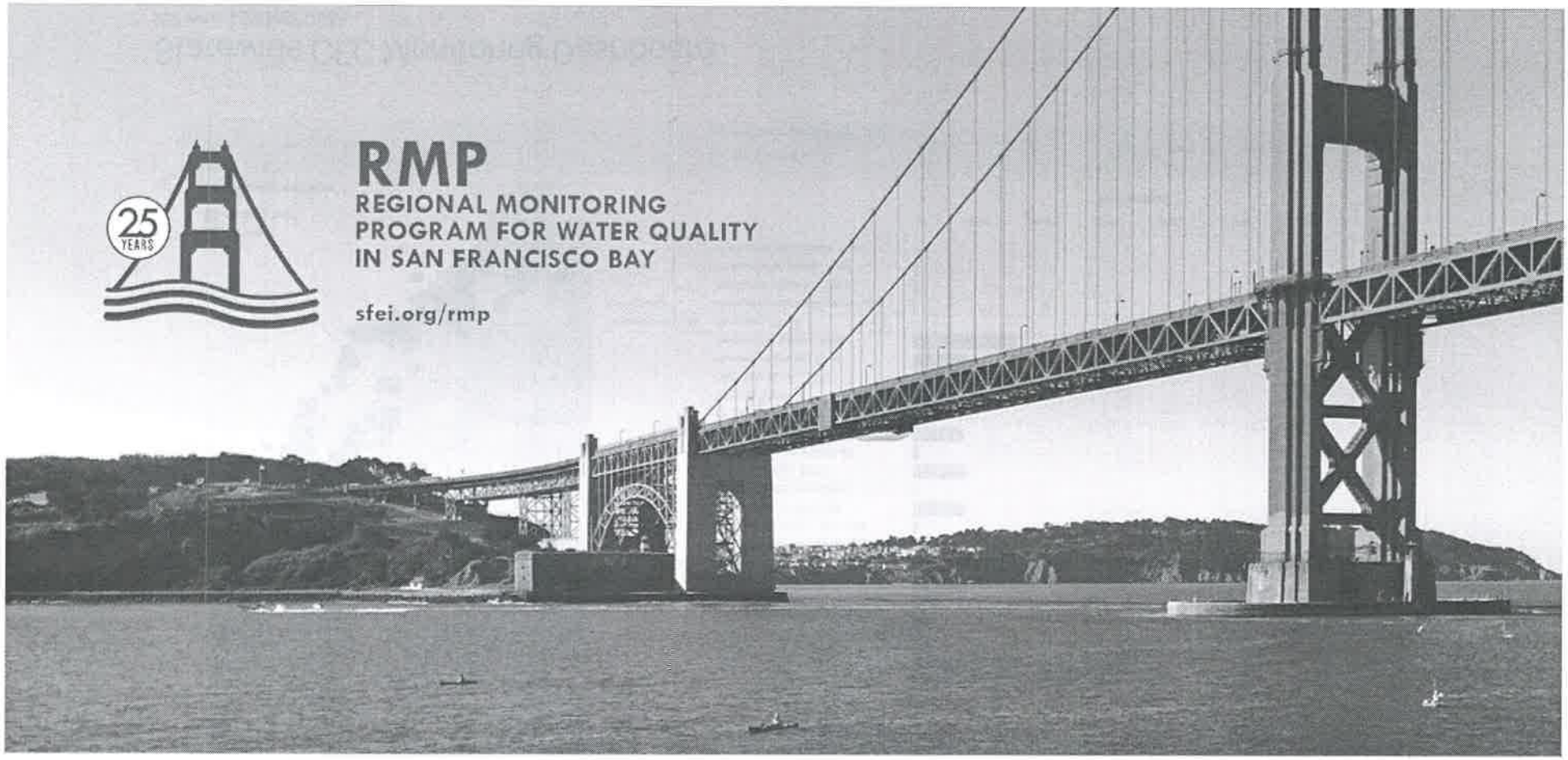


- California has implemented a state-wide emerging contaminant monitoring program.
- Incorporates risk-based screening as well as ambient monitoring.
- Collaboration of state regulatory agencies, local water boards, non-profit organizations, and academic researchers.
- Multi-Tier, science-based prioritization scheme for anticipating risks associated with emerging contaminants in water.



Statewide CEC Monitoring Dashboard

152 views | SWAMP OIMA



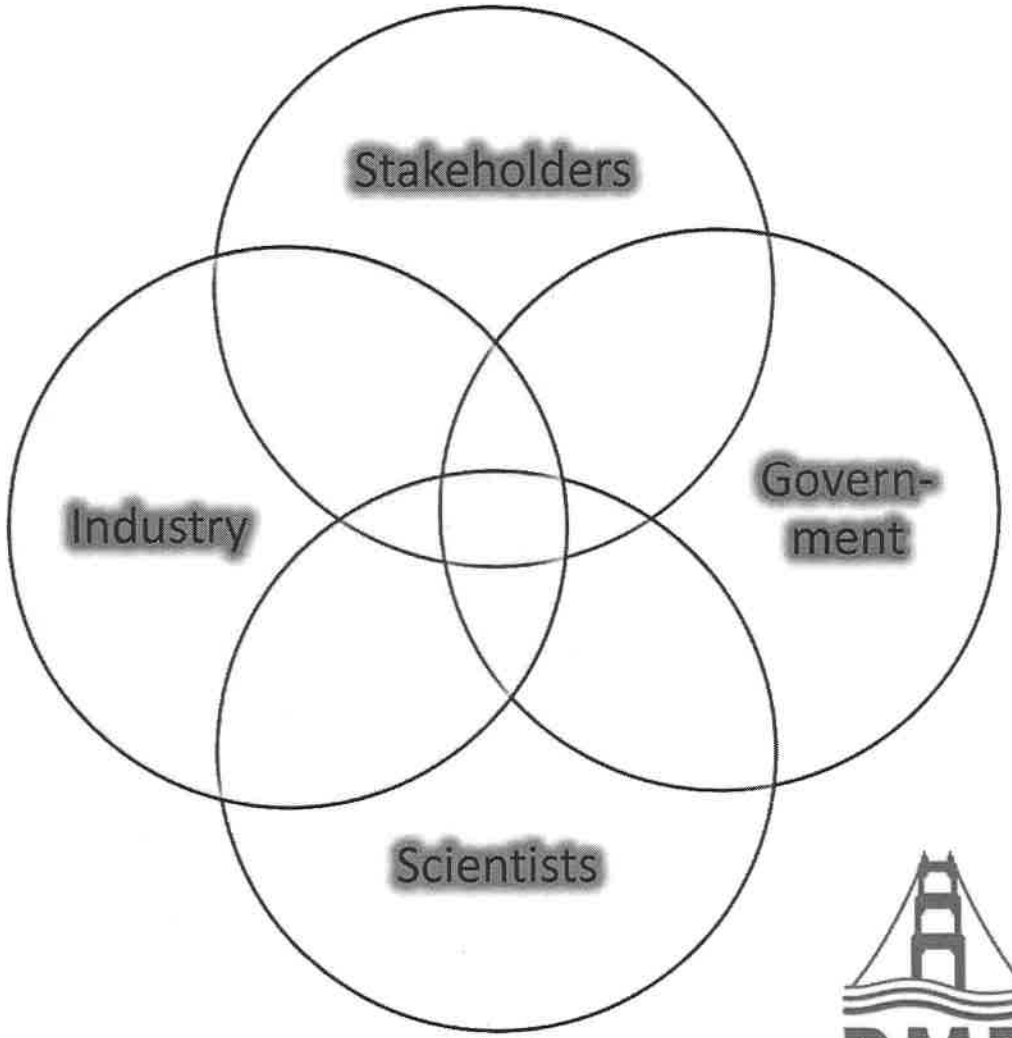
Contaminants of Emerging Concern (CEC): The San Francisco Bay Story

Slides courtesy of:

Rebecca Sutton, San Francisco Estuary Institute – Aquatic Science Center

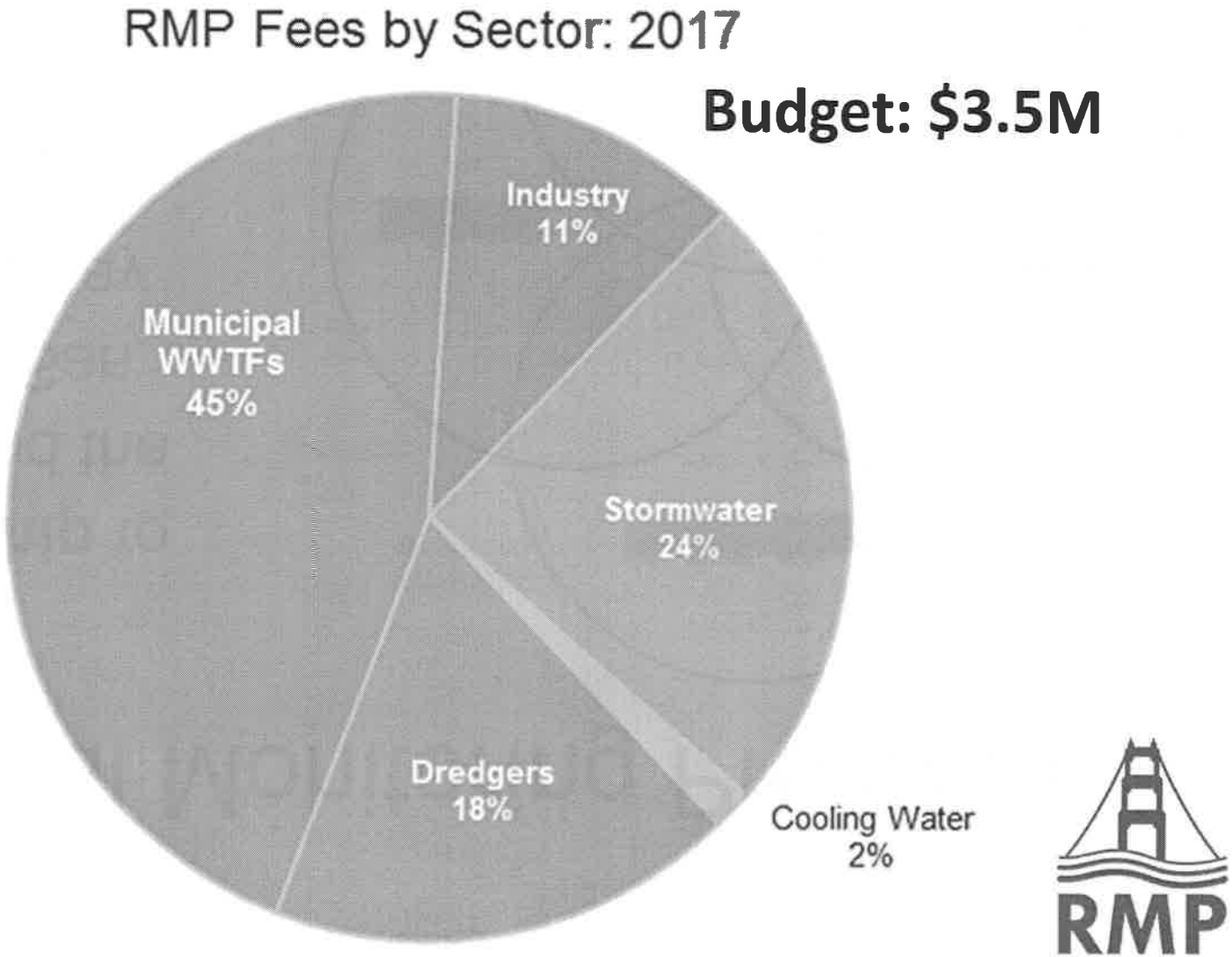
Regional Monitoring Program

Partnership to understand the **health** of San Francisco Bay



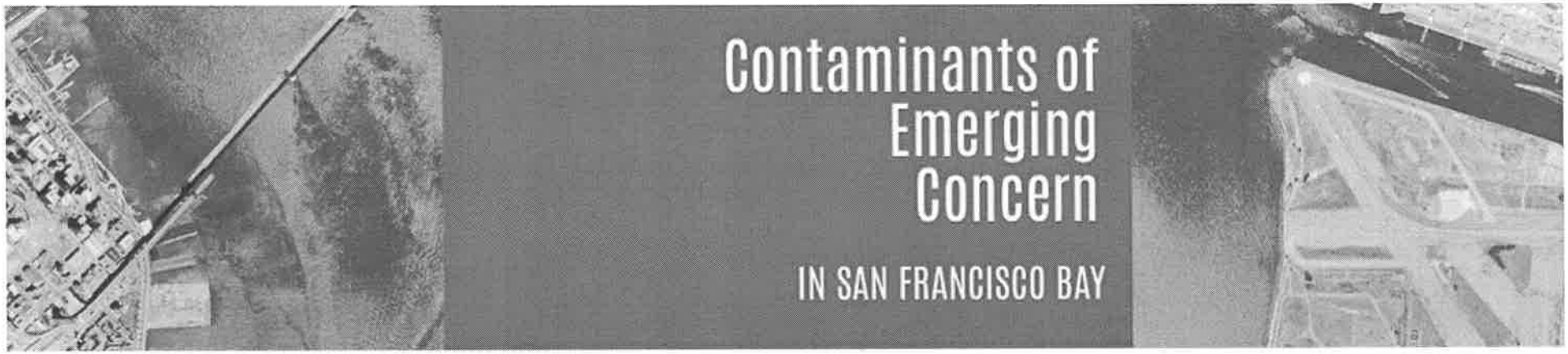
RMP

RMP Participants



RMP Focus on CECs

- 10+ years of monitoring and studies
  - Primarily ambient water, sediment, biota
  - Some wastewater and stormwater
- 2013 CEC Synthesis and Strategy
  - Added non-targeted analysis, bioanalytical tools
- 2017 Strategy Revision



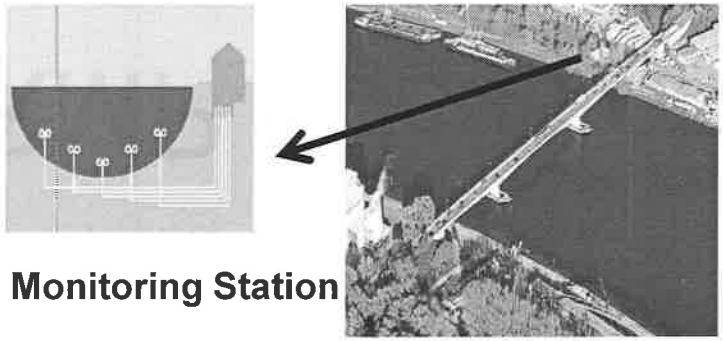
Courtesy of: **Heinz Singer**, Rahel Comte, Martin Loos, Matthias Ruff, Juliane Hollender
Swiss Federal Institute for Aquatic Research

eawag aquatic research

River Rhine

An Overview...

Length	1233 km
Catchment area	220,000 km^2
Total discharge	2,300 m^3/sec
Habitants living in the catchment	58 Mio
Habitants supplied with drinking water	20 Mio



Monitoring Station



Courtesy of: **Heinz Singer**, Rahel Comte, Martin Loos, Matthias Ruff, Juliane Hollender
Swiss Federal Institute for Aquatic Research

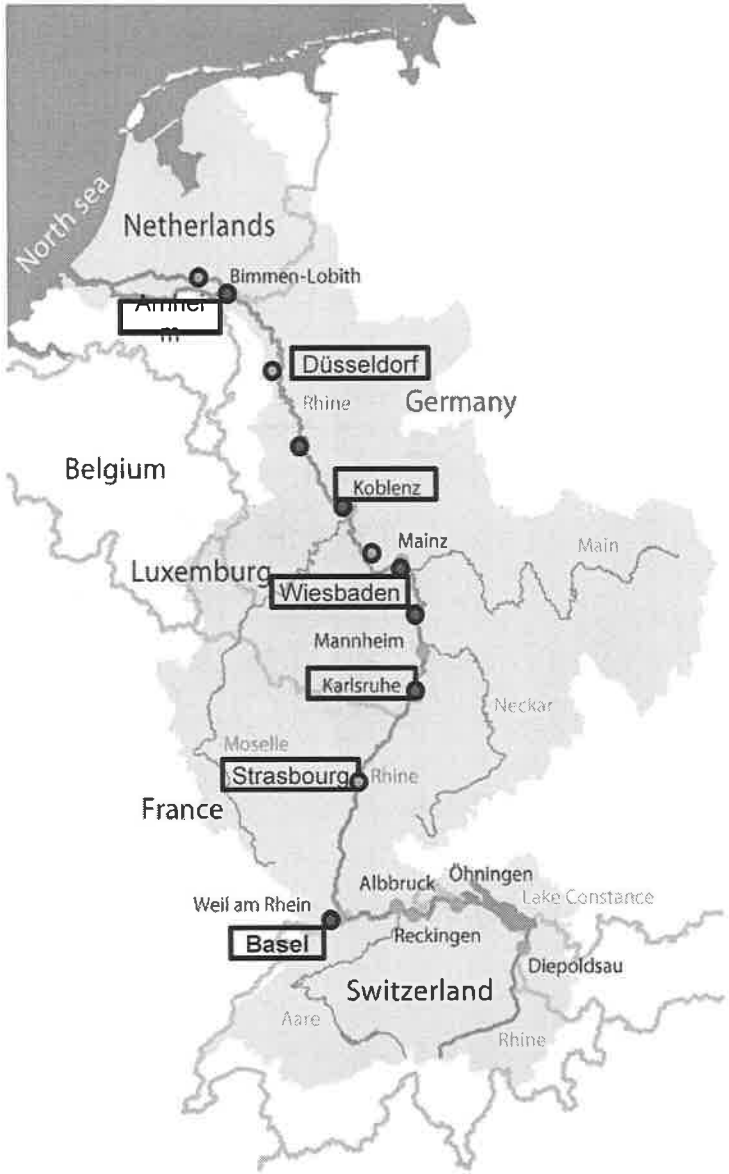
eawag aquatic research

International monitoring network

Warning and Alarm Plan

7 Headquarters

7 Monitoring stations



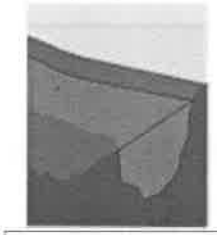
Threshold concentration levels [µg/L]		
	regional	international
Pesticides, Biocides, Pharmaceuticals	0.1	0.3
other Substances	1	3

Courtesy of: **Heinz Singer**, Rahel Comte, Martin Loos, Matthias Ruff, Juliane Hollender
Swiss Federal Institute for Aquatic Research

eawag aquatic research

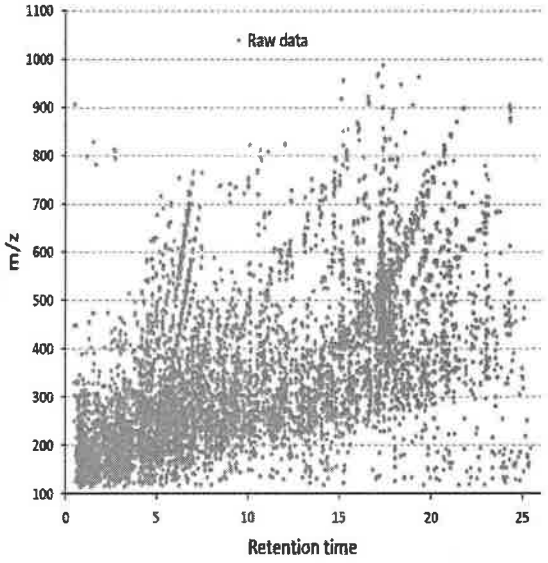
Principle of using time series

Sampling





LC-HRMS

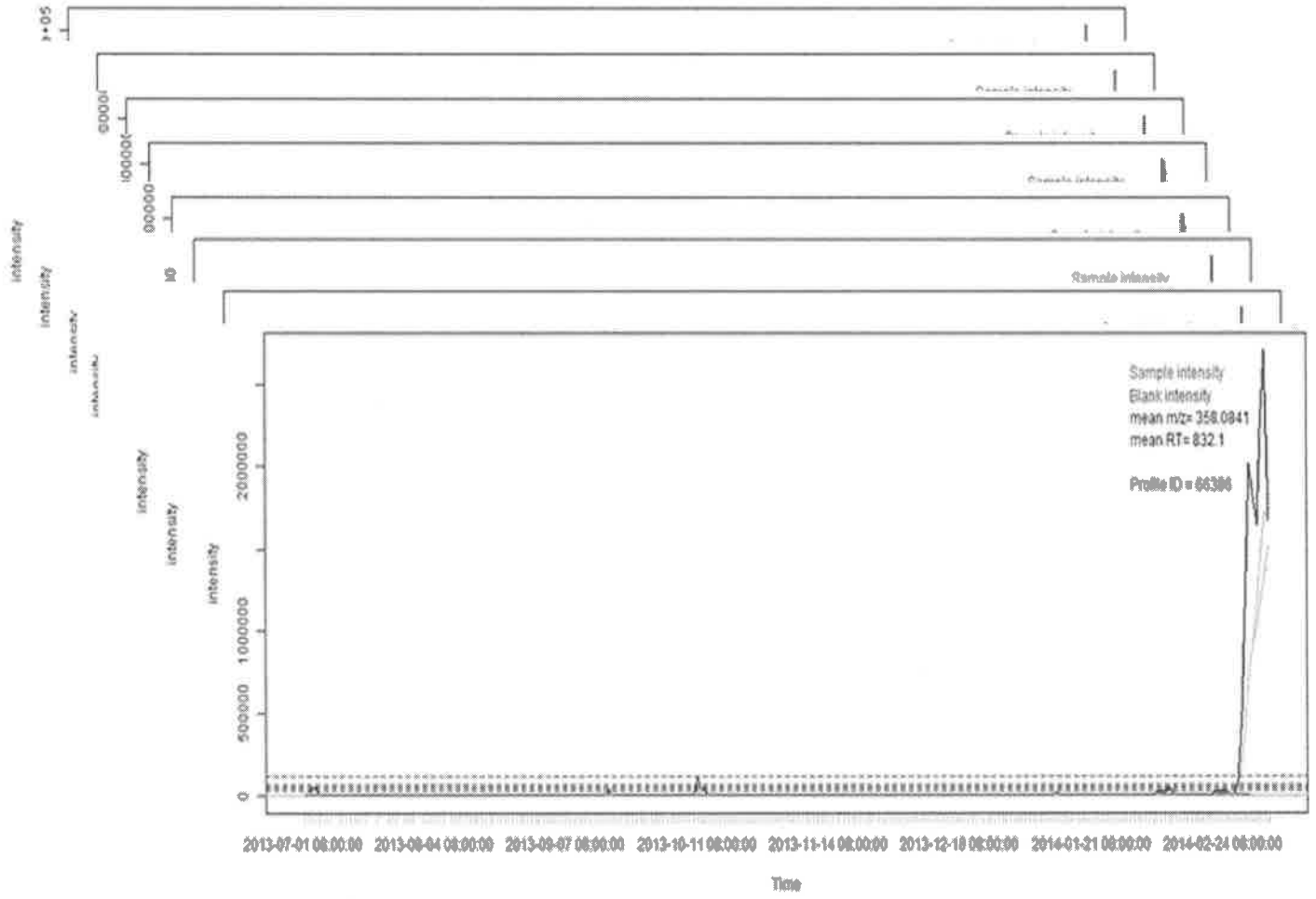


Statistical analysis

Courtesy of: **Heinz Singer**, Rahel Comte, Martin Loos, Matthias Ruff, Juliane Hollender
Swiss Federal Institute for Aquatic Research

eawag aquatic research

Indomethacin spill

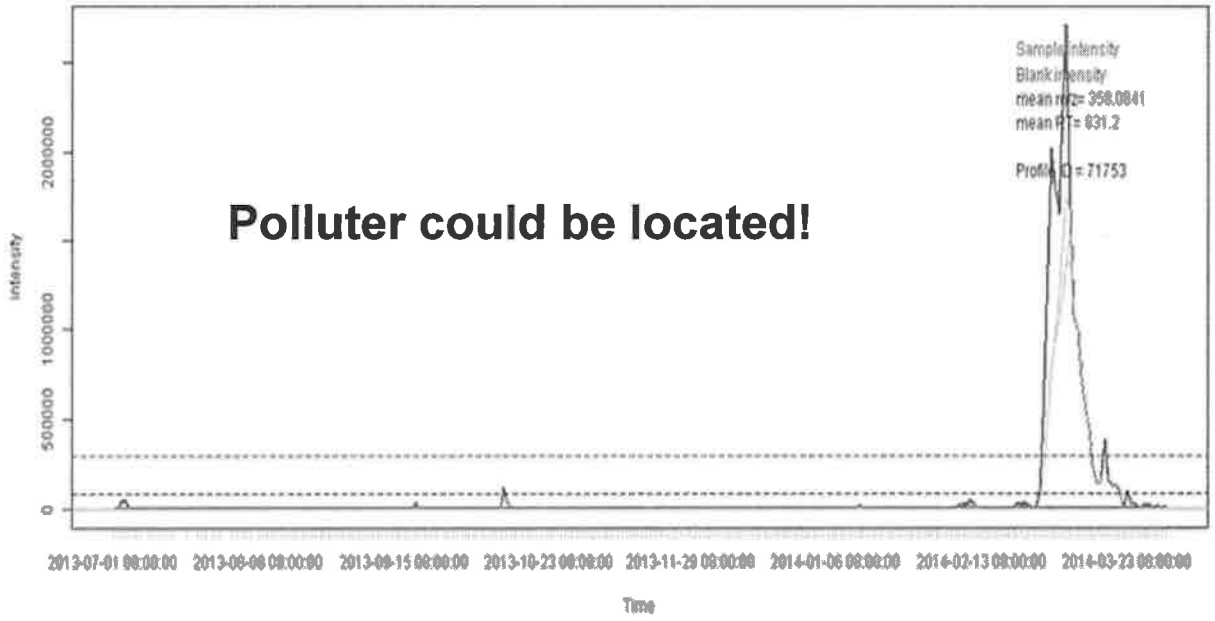


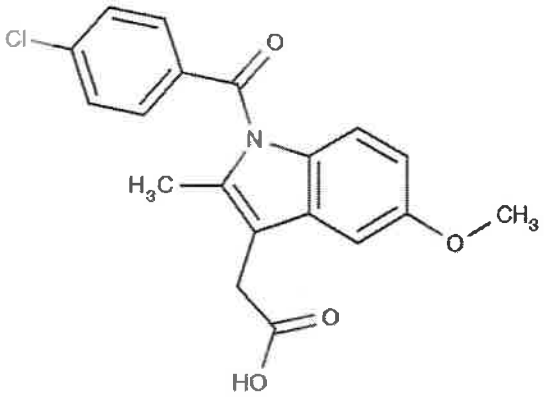
March 2014	1	2	3	4	5	6	7	8

Courtesy of: **Heinz Singer**, Rahel Comte, Martin Loos, Matthias Ruff, Juliane Hollender
Swiss Federal Institute for Aquatic Research

eawag aquatic research

Indomethacin spill





Concentration (max):	> 0.4 µg/L
Load (over 14 days):	170 kg

Take home messages: Anticipating emerging contaminant risks in water

- Routine water quality monitoring programs will NOT protect human health from unlisted, non-priority emerging contaminants.
- Chemical production, use, and release information databases are insufficient for effective emerging contaminant prioritization.
- Sophisticated emerging contaminant monitoring programs are currently in use here in the US and abroad.
- Emerging contaminant surveillance in rivers will require significant investment in expertise and infrastructure.
- State, private, and academic entities can and should all work in concert to avoid another GenX situation in NC.

Judy Lowe (Rep. Ted Davis)

From: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Sent: Wednesday, October 04, 2017 06:12 PM
To: Rep. Tim Moore; Rep. Ted Davis
Cc: Miller, Anderson
Subject: Follow up -- FW: [External] RE: PFAS testing in Cape Fear River

Speaker Moore and Chairman Davis:

We enjoyed talking with Ms. Gallagher at the initial community meeting in St. Pauls a few weeks ago and are glad she will be at tomorrow night's meeting at the Gray's Creek Elementary school. Work continues on laboratory methods to evaluate these chemicals as discussed in the Committee meeting last week.

You have my commitment to follow up with Ms. Gallagher throughout this process.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Culpepper, Linda
Sent: Wednesday, October 04, 2017 6:02 PM
To: 'Kathleen Gallagher' <gallagherkm1@gmail.com>
Subject: RE: [External] RE: PFAS testing in Cape Fear River

Right now there are no internal lab standards to quantify the Nafion® byproducts and the other three compounds we think are related to the same production line which produces GenX as a byproduct. Good news is that the levels of these three chemicals decreased as did GenX. Lab reports I have seen list the Nafion® byproducts as estimates.

Private labs and EPA are working hard to get purified chemicals associated with the Nafion® manufacturing so we are hopeful they will have an internal lab standard with a test method that can provide actual quantification soon. The EPA lab in Athens Georgia is gearing to help us with analysis too.

We can talk more tomorrow night if you like.
See you then.
linda

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Kathleen Gallagher [mailto:gallagherkm1@gmail.com]
Sent: Wednesday, October 04, 2017 12:04 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: [External] RE: PFAS testing in Cape Fear River

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you verify that the attachment and content are safe. Send all suspicious email as an attachment to report.spam@nc.gov.

So no Nafion, PFMOAA, PFO2HxA, PFO3OA?

I think GEL lab in Charleston can do those.

I warned you I would be a pain. I know when I share this, I will be asked that question.

Thanks

Katie Gallagher

On Oct 4, 2017 9:28 AM, "Culpepper, Linda" <linda.culpepper@ncdenr.gov> wrote:

Hi Kathleen – the SGS lab in Wilmington is going to run the EPA test method 537 and GenX for our samples taken at the Chemours outfall and the finished drinking water facilities downstream.

Here's the full analyte list:

ANALYTE	MF	MW	CAS	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)
Perfluoro-n-butanoic acid	$C_4HF_7O_2$	214	375-22-4	0.20	0.40	2.0
Perfluoro-n-pentanoic acid	$C_5F_9O_2^-$	263	2706-90-3	0.20	0.40	2.0
Perfluoro-n-hexanoic acid	$C_6F_{11}O_2^-$	313	307-24-4	0.20	0.40	2.0
Perfluoro-n-heptanoic acid	$C_7F_{13}O_2^-$	363	375-85-9	0.20	0.40	2.0
Perfluoro-n-octanoic acid	$C_8F_{15}O_2^-$	413	335-67-1	0.20	0.40	2.0
Perfluoro-n-nonanoic acid	$C_9F_{17}O_2^-$	463	375-95-1	0.20	0.40	2.0
Perfluoro-n-decanoic acid	$C_{10}F_{19}O_2^-$	513	335-76-2	0.20	0.40	2.0
Perfluoro-n-undecanoic acid	$C_{11}F_{21}O_2^-$	563	2058-94-8	0.20	0.40	2.0
Perfluoro-n-dodecanoic acid	$C_{12}F_{23}O_2^-$	613	307-55-1	0.20	0.40	2.0
Perfluoro-n-tridecanoic acid	$C_{13}F_{25}O_2^-$	663	72629-94-8	0.20	0.40	2.0

Perfluoro-n-tetradecanoic acid	$C_{14}F_{27}O_2^-$	714	376-06-7	0.50	2.0	10.0
Potassium perfluoro-1-butanesulfonate	$C_4F_9SO_3^-$	299	375-73-5	0.20	0.40	2.0
Sodium perfluoro-1-hexanesulfonate	$C_6F_{13}SO_3^-$	399	355-46-4	0.20	0.40	2.0
Sodium perfluoro-1-heptanesulfonate	$C_7F_{15}SO_3^-$	449	---	0.20	0.40	2.0
Sodium perfluoro-1-octanesulfonate	$C_8F_{17}SO_3^-$	499	1763-23-1	0.20	0.40	2.0
Sodium perfluoro-1-decanesulfonate	$C_{10}F_{21}SO_3^-$	599	335-77-3	0.20	0.40	2.0
N-methylperfluoro-1-octanesulfonamidoacetic acid	$C_{11}H_6F_{17}NO_4S$	571	---	0.50	1.0	2.0
N-ethylperfluoro-1-octanesulfonamidoacetic acid	$C_{12}H_8F_{17}NO_4S$	585	---	0.50	1.0	2.0
Sodium 1H, 1H, 2H, 2H-perfluorooctane sulfonate	$C_8H_4F_{18}SO_3^-$	450	27619-97-2	0.50	1.0	2.0
Sodium 1H, 1H, 2H, 2H-perfluorodecane sulfonate	$C_{10}H_4F_{17}SO_3$	550	39108-34-4	0.20	0.40	2.0
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	$C_6HF_{11}O_3$	330.05	13252-13-6	3.91	---	10.0

We'll share the data online as we have with the past results. Look forward to seeing you again if you are able to join the community meeting tomorrow night.

linda

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

Begin forwarded message:

From: "Kathleen Gallagher" <gallagherkm1@gmail.com>
To: "Moore, Zack" <zack.moore@dhhs.nc.gov>
Cc: "Cooper, Roy A" <Roy.Cooper@nc.gov>, "Rep. Ted Davis" <Ted.Davis@ncleg.net>, "Rep. Tim Moore" <Tim.Moore@ncleg.net>

Subject: PFAS testing in Cape Fear River

Why isn't testing being done for all perflourinated chemicals that have laboratory standards? Method 537 EPA has standards for more PFOA, PFOS and genX.

H2GO and Brunswick County have found chemicals in the water. The legacy chemicals have health studies available.

Why just PFOA, PFOS and genX? I understand that their are health goals for those but that doesn't make them any less dangerous in our water. We have a right to know!

PFHxS half life is 8.9 years, longer than PFOA et al. One study attached Developmental toxicity and endocrine

disruption by PFHxS (perfluorohexane

sulphonate) in rats. Plenty more studies available.

Please test for all perflourinated chemicals.

Respectfully

Kathleen Gallagher

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties by an authorized State official. Unauthorized disclosure of juvenile, health, legally privileged, or otherwise confidential information, including confidential information relating to an ongoing State procurement effort, is prohibited by law. If you have received this email in error, please notify the sender immediately and delete all records of this email.

Judy Lowe (Rep. Ted Davis)

From: Popkin, Ben <Ben.Popkin@dhhs.nc.gov>
Sent: Wednesday, October 04, 2017 10:55 AM
To: Rep. Ted Davis; Judy Lowe (Rep. Ted Davis)
Cc: Benton, Mark; Moore, Zack; Tilson, Betsey; Staley, Danny; Shehee, Mina; McCrimmon, LT; Holman, Sheila; Mackey, Chris; Popkin, Ben; Jeffrey Hudson (Legislative Analysis); Jennifer McGinnis (Legislative Analysis); Mariah Matheson (Legislative Analysis); Chris Saunders (Legislative Analysis)
Subject: DHHS responses to House Select Committee 100317.pdf
Attachments: DHHS responses to House Select Committee 100317.pdf

Dear Chairman Davis,

Please find enclosed the Department of Health and Human Services responses to the questions posed by members during our portion of last week's committee meeting. I also include, below, detail specific to the Dutch health goal for GenX and a link to the methodology for its calculation.

The Kingdom of the Netherlands has established a GenX health standard of 150 parts-per-trillion (ppt). It was developed by the National Institute for Health and the Environment (RIVM) and their provisional value was last revised in January 2017. Details as to how this standard was calculated can be accessed at this web site:

http://www.rivm.nl/Onderwerpen/G/GenX/Downloaden/148_2016_M_V_bijlage_afleiding_richtwaarde_FRD903_in_drinkwater_Definitief_revisie_jan_2017.org

I hope this information is helpful. Please let me know if you have any questions or if there is anything we can do to be of further assistance to you and the committee with this.

Ben

M. Benjamin Popkin, JD, MPH
Assistant Secretary for Legislation
Director, Office of Government Affairs
NC Dept. of Health and Human Services
919-855-4800

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties by an authorized State official. Unauthorized disclosure of juvenile, health, legally privileged, or otherwise confidential information, including confidential information relating to an ongoing State procurement effort, is prohibited by law. If you have received this email in error, please notify the sender immediately and delete all records of this email.

Response to Questions to DHHS from the House Select Committee on North Carolina River Quality
October 2, 2017

1. Does the European Chemicals Agency use the precautionary principle?

The precautionary principle states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus (that the action or policy is not harmful), the burden of proof that it is *not* harmful falls on those taking that action.

We believe the European Chemicals Agency (ECHA) uses the precautionary principle and does so through a regulation adopted by the European Union (EU). Specifically, the Registration, Evaluation, Authorization and Restriction of Chemicals (or REACH) was adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry.

REACH applies to all chemical substances, and it places the burden of proof on companies. To comply with the regulation, companies must identify and manage the risks linked to the substances they manufacture and market in the EU. They also have to demonstrate to ECHA how the substance can be safely used and they must communicate the risk management measures to the users.

More information about ECHA and REACH can be found at:

https://echa.europa.eu/regulations/reach/understanding-reach
https://echa.europa.eu/regulations/reach

2. How many environmental toxicologists has DHHS had over the past 15 years?

Toxicologists employed by the Department of Health and Human Services (DHHS) have been exclusively assigned to the Occupational and Environmental Epidemiology Branch (OEEB) within the Division of Public Health (DPH). Over the past 15 years, but up until 2008, OEEB employed two doctoral-level environmental toxicologists. Since then, there has been one environmental toxicologist.

3. Who at the Environmental Protection Agency (EPA) and Center for Disease Control and Prevention (CDC) did we speak to regarding our GenX health goal and is there any written documentation of those discussions?

A complete list of EPA and CDC subject matter experts who have participated in discussions with DPH is captured in the bullets below. Each list begins with our main agency contact (and their title) and all others that provided guidance and/or consultation.

- EPA: Maria Doa, Director, Chemical Control Division, Office of Chemical Safety and Pollution Prevention; Joyce Donohue; Amy Benson; Tracy Behrsing; Tala Henry; Betsy Behl; Catherine Aubree; Carol Kemker; and Jamie Strong.
- CDC: Audra Henry, Technical Project Coordinator, Agency for Toxic Substances and Disease Registry; John Wheeler; Tina Forrester; Selene Chou; and Franco Scinicariello

Multiple discussions were held with federal staff via phone and email regarding the change from the preliminary assessment to the current DHHS health goal of 140 parts per trillion (ppt). Two of the more significant conversations are summarized below:

- Conference call with DPH and EPA on June 20, 2017:
    - EPA staff indicated that they support the use of the study with a point of departure of 0.1mg/kg/day for non-cancer endpoints (the same study and point of departure for the current DHHS health goal of 140 ppt).
    - EPA staff indicated that this point of departure was already being used by EPA in their consent order with Chemours.
- Conference call with DPH, EPA and CDC on July 6, 2017:
    - EPA staff (Risk Assessment Division) indicated that they remain in agreement with DPH's use of 0.1mg/kg/day as the point of departure for non-cancer endpoints.
    - EPA staff also indicated that they have previously used an uncertainty factor of 10 for intra-species variability and an uncertainty factor of 10 for interspecies variability. These are the uncertainty factors used in calculation of the DPH health goal.
    - EPA staff (Risk Assessment Division) reported that the subchronic to chronic uncertainty factor of 10 used by DPH was not used by EPA Risk Assessment Division, but that this uncertainty factor was used in calculations by other parts of the agency that are involved with setting values for lifetime exposures- e.g. the EPA Integrated Risk Information System (IRIS; description of uncertainty factors available at: https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments, section 1.2.2.2.4, table 1).
    - EPA (Office of Science and Technology) used a 20% relative source contribution (RSC) for PFOA and PFOS due to ubiquitous presence in the environment and uncertainty about the amounts of these chemicals reaching people through different exposure routes. N.C. DHHS used 20% RSC based on the EPA decision tree for deriving water quality criteria (EPA-822-B-00-004, available at: http://www.nj.gov/drbc/library/documents/EPA_human-health-criteria2000.pdf).

4. What is the reference for the animal studies that provided the point of departure for DHHS's calculations of the provisional health goal for GenX?

The point of departure used for the current DHHS provisional health goal of 140 ppt is the no adverse effect level from a 28-day oral ingestion mouse study conducted by Chemours as part of their chemical registration process.

A summary of that study is available on the European Chemicals Agency website (listed as supporting study 005) at: https://echa.europa.eu/registration-dossier/-/registered-dossier/2679/7/6/2/?documentUUID=7fde65ec-5187-42ef-8e05-58436035a555).

Additional Information

The Kingdom of the Netherlands has established a GenX health standard of 150 parts-per-trillion (ppt). It was developed by the National Institute for Health and the Environment (RIVM) and their provisional value was last revised in January 2017. Details as to how this standard was calculated can be accessed at this web site:

http://www.rivm.nl/Onderwerpen/G/GenX/Downloaden/148_2016_M_V_bijlage_afleiding_richtwaarde_FRD903_in_drinkwater_Definitief_revisie_jan_2017.org

Reimbursement forms
9/28/18

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. William Brisson

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

William Brisson
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Ted Davis, Jr.

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file) 1

Number of Round Trips 280

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Jimmy Dixon

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Holly Grange

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Holly Grange
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Kyle Hall

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Pricey Harrison

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Frank Iler

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ON FILE
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Pat McElraft

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage On file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Pat McElraft
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Bob Steinburg

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage same
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Rep. Bob Steinburg
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committe on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: September 28, 2018

Member: Rep. Scott Stone

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 35786

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Thursday, October 26, 2017
TIME: **9:30 AM**
LOCATION: **643 LOB**
COMMENTS:

When completed, a copy of the agenda will be provided to the Committee members

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 3:39 PM on Tuesday, October 17, 2017.

___ Principal Clerk
___ Reading Clerk – House Chamber

Judy Lowe (Committee Assistant)

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER MCGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

JUDY LOWE
COMMITTEE CLERK

AGENDA
9:30 a.m. Thursday, October 26, 2017
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Davis, presiding

2. Introductory remarks by Cochairs
   Representative Davis
   Representative Grange
   Representative Iler

3. Presentation on research into emerging compounds, including:
   - Explanation of targeted versus nontargeted screening
   - Work in the Cape Fear River watershed on testing for emerging compounds

   (1 hour 15 minutes)
   Dr. Detlef Knappe, Professor, Department of Civil, Construction, and Environmental Engineering, North Carolina State University

4. Department of Environmental Quality update on response to emerging compounds and responses to previous questions, including:
   - Latest surface water and groundwater monitoring results
   - Information on air emissions from the Chemours Fayetteville Works facility
   - How wastewater from the closed-loop system at the Chemours Fayetteville Works facility is disposed of
   - Improving the disclosure process for National Pollutant Discharge Elimination System (NPDES) permits
   - Impact of interbasin transfers
   - Description of Departmental resources devoted to the monitoring, analysis, and regulation of emerging compounds

   (1 hour 30 minutes)

Sheila Holman, Assistant Secretary for Environment
Department of Environmental Quality

Linda Culpepper, Deputy Director, Division of Water Resources
Department of Environmental Quality

Michael Scott, Director, Division of Waste Management
Department of Environmental Quality

Mike Abraczinskas, Director, Division of Air Quality
Department of Environmental Quality

Lunch break *(1 hour)*

5. Department of Health and Human Services update on response to emerging compounds and responses to previous questions, including:
   - Description of Departmental resources devoted to the monitoring, analysis, and regulation of emerging compounds
   - Overview of research and studies that contributed to the 140 parts per trillion health goal for GenX
   - Description of the Science Advisory Board and its work

   (45 minutes)

   Elizabeth Cuervo Tilson, MD, MPH
   State Health Director, Chief Medical Officer
   Department of Health and Human Services

   Danny Staley, MS
   Director, Division of Public Health
   Department of Health and Human Services

   Zack Moore, MD, MPH
   State Epidemiologist and Epidemiology Section Chief
   Division of Public Health, Department of Health and Human Services

6. Update on the action plan to implement Section 20(a)(1) of House Bill 56 (GenX Response Measures) and testing conducted by the Cape Fear Public Utility Authority for the filtration and removal of GenX and other emerging compounds from drinking water *(45 minutes)*

   Jim Flechtner, Executive Director
   Cape Fear Public Utility Authority

   Frank Styers, Chief Operations Officer
   Cape Fear Public Utility Authority

7. Presentation on issues concerning emerging compounds *(30 minutes)*

   Kemp Burdette, Cape Fear Riverkeeper
   Cape Fear River Watch

8. Commission discussion and announcements

9. Adjourn

ADDITIONAL INFORMATION:

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578, or may visit the Committee's website at: http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

House Select Committee on North Carolina River Quality

Thursday, October 26, 2017
Room 643 Legislative Office Building
9:30 a.m.

MINUTES

The House Select Committee on North Carolina River Quality met at 9:30 AM on Thursday, October 26, 2017 in Room 643. Representatives Davis, Grange, Iler, Brisson, Dixon, Harrison, and Steinburg attended. The list of visitors is **Attachment 1.**

Representative Ted Davis, Jr., Senior Chair, presided.

He began by introducing the Sergeants at Arms, Jonas Cherry, David Leighton, Dean Marshbourne, and Reggie Sills. He expressed his thanks and appreciation for what they do for the legislature.

Representative Davis next invited comments from his co-chair, Representative Grange. She apologized for the low turnout for the Committee, but noted that today's discussion would still be significant. She looked forward to getting into a lively discussion.

Representative Davis stated that the Committee had a wonderful first meeting one month prior, with a lot of territory covered and wonderful speakers. Some of the speakers were back to give updates and further reports and there were several new speakers that would be making presentations.

He introduced the first speaker, Dr. Detlef Knappe, Professor, Department of Civil, Construction and Environmental Engineering, North Carolina State University. His complete report titled Emerging Contaminants: A Case Study for the Cape Fear River Basin is **Attachment 2.** His presentation overview included the Cape Fear River Basin case study, noting that is the largest watershed in North Carolina and supplies 1.5 million people with drinking water. About 1 million people are affected by wastewater discharges containing high levels of industrial contaminants. He referred to the universe of chemicals and stated that 6,700 chemicals are manufactured or imported in the amount of 25,000 pounds per year with 700 new chemicals added each year.

Two hundred chemicals are tested for health effects and 80,000 chemical substances are registered for use in the United States commerce. Examples of contaminants of concern include bromide (Br-), which is relatively non-toxic but it reacts with drinking water disinfectants to form disinfection by-products. When bromide levels increase, the concentration of disinfection by-products and the toxicity of disinfection by-products increases. Upgrades to drinking water treatment plants are needed to be in compliance with drinking water standards. In reference to the federal Clean Water Act, he said such discharge "must not have the effect of requiring treatment over and above that which would be necessary in the absence of such discharge in order to comply with local and United States Environmental Protection Agency (U.S. EPA) drinking water standards."

1,4-Dioxane cancer risk. 1,4-Dioxane whose sources include solvent stabilizer (declining, mostly groundwater pollution) industrial solvent and by-product of manufacturing processes involving ethylene oxide (plastics and detergents). 1,4-Dioxane is likely a human carcinogen. His presentation showed the lifetime consumption of drinking water containing three different amounts. He stated that 1,4-Dioxane is not removed in conventional water treatment plants and showed graphs for Pittsboro, North Carolina and Fayetteville, North Carolina.

He detailed management considerations, which included enforcing North Carolina surface water quality standards and control of upstream sources which should be looked at more closely. To protect the public from adverse health effects, health based guidelines have been established. Treatment options include activated carbon (effective for some Per- and polyfluoroalkyl substances (PFAS), but not for others), anion exchange (shows great promise) and reverse osmosis.

Dr. Knappe emphasized that many unregulated contaminants are present in Cape Fear River water; some "emerging" compounds have been in the River for decades; some are by-products of manufacturing processes and the challenges are (1) lack of analytical standards and (2) toxicity data. Finally, new monitoring and permitting approaches are needed to protect drinking water quality in downstream communities.

He showed a diagram showing the work flow for analysis of organic chemicals and spoke on the challenges associated with measuring organic chemicals at low concentrations. This included sample collection, matrix interference, containers—quality assurance/quality control (QA/QC), preservation, and representativeness.

He noted that 1,4-Dioxane concentrations vary rapidly in surface water as shown in a chart of daily composite samples. Matrix interference is a commonly used argument to raise doubt about the accuracy of analytical results and proper QA/QC approaches are necessary; also high resolution mass spectrometry.

Representative Davis recognized some members with questions as Dr. Knappe was continuing his presentation.

In reference to sampling, Representative Dixon asked when the sampling was done.

Dr. Knappe responded that it was done in 2014 to 15, monthly for a period of one year.

Representative Davis noted that when someone talks about the consumption of a certain amount of a particular compound in drinking water having a negative effect, over what period of time are they referencing.

Dr. Knappe responded that the calculations are based on a 70-year exposure and drinking 2 liters a day or roughly a half gallon. It is called the lifetime cancer risk.

In some of the graphs, Dr. Knappe stated the water treatment plants are unable to remove 1,4-Dioxane from the water.

Representative Harrison asked whether that was because the technology was not there or the water treatment plants were not themselves capable.

He responded that they were not equipped to deal with these kinds of contaminants which are difficult to remove and 1,4-Dioxane is very difficult to remove from surface water in particular.

Representative Steinburg asked if there was any technology available that can completely address the problem, whether it is being implemented or not, as it relates to trying to treat the water.

Dr. Knappe answered that there are technologies. One of the challenges is that these contaminants all come from somewhere but they are affecting many drinking water treatment plants downstream. He considered that the right way to address this is to control the input of the contaminant into the River rather than making a dozen

communities downstream all install very expensive treatment plants to get these contaminants out.

Following other comments by Representative Steinburg, Dr. Knappe stated that the axiom in his field is to start out with the highest possible quality of water but this requires careful study in terms of the availability of the resource. In addition to the quality of the resource, that is still water that would have to get treated in some form which would require the construction of new treatment plants, this would take several years. It would probably be faster to control the sources rather than build a new plant. The other challenge is that it may be a solution for some of the impacted communities, but may not be for others so that is also important to consider.

Representative Davis recognized Representative Iler who asked if there was a plant that is using reverse osmosis to treat 1,4-Dioxane effectively.

Dr. Knappe responded that wastewater from a water reuse plant in Orange County, California was impacted by 1,4-Dioxane. Reverse osmosis is partially effective for the removal of 1,4-Dioxane, somewhere between 80 to 90 percent.

Representative Grange thanked the presenter for being here today and asked if we have identified all the sources of risk contaminants.

He stated he was not sure if he could say "all" but some have been identified. In some cases the industry has not been identified but the community in which it is coming from is known.

Representative Davis raised the question of monitoring but noted we can't monitor what is unknown. If it is known that a contaminant exists, and we can find that contaminant based on monitoring, what can be done about it unless you know where it is coming from?

Dr. Knappe responded that non-targeted monitoring can be employed in addition to targeted monitoring. In terms of controlled measures and what can be done, it is necessary to look more closely at industrial pre-treatment programs in communities where these sources exist, look carefully at National Pollutant Discharge Elimination System (NPDES) discharge permits and think about what treatment technologies can be implemented to remove 1,4-Dioxane from the water.

Following a review of the final graphs in his presentation, Dr. Knappe stated that a future monitoring program, should such a thing be developed in this State, should have such instrumentation as an integral part to making sure that we can accurately find and identify chemicals that are present in our drinking water sources.

Representative Davis recognized Representative Dixon for a series of questions. He asked if Dr. Knappe was aware of any past efforts to do something like the Committee is doing now.

The response was that in this State, but he was not aware of any others.

Representative Dixon stated that with all that we do not know about GenX and with other compounds that were 15 times higher, how did we settle on GenX.

Dr. Knappe responded that we settled on GenX for two reasons; (1) they could actually measure its concentration (because there is a standard for it) and (2) there is at least a small amount of toxicological data on it.

Representative Dixon stated he was always amazed on the interplay between issues like this and politics. GenX was jumped on because it was a politically easy thing to do and government often does this. The government turned this into a political event from the beginning and stated that the problem was funding. This Committee, under the direction of the Chairs, is attempting to look at this situation and take the information that they have and deal with it. The great challenge is how can it be done without scaring the public. He wants something to come out of this Committee that is beneficial to his grandchildren.

Representative Harrison was recognized and she thanked Dr. Knappe for his presentation and comments. She asked for information on the Perfluorooctane sulfonate (PFOS) issue that is in Greensboro.

He responded that his group is supporting some of the analytical work for PFOS' occurrence in the Greensboro area, which is handled primarily through the City of Greensboro and their consultant. Most likely the occurrence of PFOS is related to firefighting foam.

She asked if we have any information on the biosolids and asked if we have any regulations or oversight on the biosolids application that contains the contaminants.

Dr. Knappe responded that since they are unregulated contaminants it wouldn't even be looked at.

Representative Davis asked if staff had any comments and Jeff Hudson stated that he would expect that biosolid application generally is regulated and there is a whole department ready to speak. They could probably answer the question in a lot more detail.

Representative Steinburg commented on the public alarm and it being political and perhaps an over-reaction. He asked if there has been any study done in the Wilmington area to determine if there is any uptick in the cancer rate in the last 35 years in this region.

Dr. Knappe responded that this is all being looked at right now by the Centers for Disease Control (CDC) and the State epidemiologist. He further stated that it is not just cancer, but some chemicals have adverse effects on the immune system. There needs to be a more comprehensive look on the potential effects these chemicals have. Dr. Knappe stated his goal was not to create panic but he recommended installing an under the sink treatment system as a layer of safety and to get some of the chemicals out of the water.

There being no further questions from the Committee members, Representative Davis thanked Dr. Knappe and indicated he would probably be getting back in touch with him.

The next presentation was a Department of Environmental Quality (DEQ) update in response to emerging compounds and responses to previous questions given by Sheila Holman, Assistant Secretary. It is **Attachment 3.** Ms. Holman introduced Linda Culpepper, Deputy Director, Division of Water Resources (DWR), DEQ, Tom Fransen, Planning Section Chief in the Division of Water Resources, and Julie Grzyb, Supervisor,NPDES Complex Permitting Branch, DWR. Michael Scott and Mike Abraczinskas were unable to be in attendance today.

Ms. Holman began by stating that DEQ was asked to address several topic areas including an update on latest surface water and groundwater monitoring, information on the air emissions from the Chemours Fayetteville Works facility, how wastewater from the closed loop system at the facility is disposed of, improving the disclosure process for the NPDES permits, any impact of interbasin transfers, a description of

DEQ resources devoted to the monitoring, analysis, and regulation of emerging compounds.

She stated she would be covering the requested information by the Divisions beginning with the surface and wastewater, then ground water, and finally the air emissions. She reviewed the Cape Fear River Sampling Data from 9/15/17 to 9/27/17 and noted that the values at that time were all below the health goal. She explained that DEQ did process area sampling at Chemours at each of the process streams and are just getting the data back from the U.S. EPA National Exposure Risk Lab, so she was unable to speak to that data today. It will help as the Division moves forward with considering any permit changes to the NPDES permit. Weekly sampling of finished drinking water is being continued.

The Division of Water Resources is devoted to the monitoring, analysis, and regulation of emerging compounds. The field staff in Fayetteville and Wilmington are continuing to go out and conduct sampling each week on the finished water and the composite samples being done at Chemours. DWR is also continuing its review of health studies and consultation with state and federal agencies along with national and international water standards. Further details of their research and participation is contained in the attachment.

In the Division of Waste Management, approximately 25 staff are working on the GenX issue--from performing field sampling of the private wells to reviewing the well water data from Chemours and the lab. There is data quality control that is on-going. Health Risk Evaluations (HREs) are the letters that are sent to a well owner once the Division gets sampling data back. If the result is above the health goal, there is advice on what the water can be used for if it can't be used for drinking. There is continuing review of the on-site groundwater and soil data and work with the company on a more comprehensive evaluation of the on-site contamination. The Division is participating in public information meetings and responding to data requests.

Ms. Holman moved on to the Division of Air Quality and the air emissions for GenX. They now have information from the facility on the C3 (GenX) dimer acid fluoride and the C3 dimer acid ammonium salt. The reason that these other two compounds are being looked at is because when they come into contact with water they form GenX. They have received source information, which is where the emissions are being released at the facility, and stack parameters all of which are needed to conduct air dispersion modeling. DEQ and Chemours continue to discuss potential stack

testing which would help verify the actual emissions that are coming out of the plant. DEQ is looking at whether they should conduct ambient air quality monitoring as there are the same kind of issues. There is not really an obvious method for conducting that so they are working to define a potential method.

Ms. Holman announced that she had covered all of her points and was ready to answer questions. Representative Davis asked if there was anyone else who would be making a presentation on the behalf of DEQ and there were no others.

Representative Brisson stated that people were scared, they don't know what water to use or what not to use and he had concerns about the sampling and other issues that were difficult for the general public to digest. They need to know that we are doing everything we can to provide safe drinking water.

Ms. Holman responded that the DEQ staff and the Department of Health and Human Services (DHHS) staff have not been communicating "don't use the water for anything." Part of the challenge is to try to have clear communications and the agencies are trying to get to the point of being very consistent with the messages.

Representative Harrison thanked Ms. Holman for her presentation and stated she wanted to follow up on the biosolid question that she asked Dr. Knappe. She heard concerns from constituents about contaminants not just the emerging chemicals but also heavy metals and others. She asked if there was a regulatory structure or some protection in place for the application of biosolids.

Ms. Holman stated there was a range of permitting as well as monitoring. She further stated that after hearing some of the issues and concerns, she will relook to see if there is more monitoring that should be done.

Representative Harrison shifted to the air issue, noting that in the past couple of years the air toxic's program has been changed. She asked if DEQ has the authority they need to deal with the potential air emissions as it relates to emerging contaminants that might not be on the list.

Ms. Holman responded that it does and the changes to the toxics permitting were more about the emission sources that may be subject to one of the federal technology standards and the company would not be required to do an analysis of those emissions. DEQ, as they were contemplating issuing a permit, could do an analysis of all the emissions.

Representative Davis stated he had a series of questions for Ms. Holman and requested that if she was unable to answer them and there was someone from staff that could, he would be glad to hear from them. He asked, if in looking at an initial permit application or a renewal, was it DWR that reviews those permits.

Ms. Holman responded that it was.

He then asked how many staff members worked on either an original discharge application or a renewal.

Ms. Holman responded that there were nine full time employees (FTE's).

He then asked if there were any applications now that are pending and if there was a backlog.

She stated there was a 41% backlog from 220 major facilities at the present time.

Julie Grzyb, Supervisor of the NPDES Complex Permitting Branch, responded about one-half of the full time employees work on the expedited permits and half of the other nine work on complex permits.

Representative Davis asked how long it takes a staff member to work on a particular permit.

Ms. Grzyb responded that it depends on whether it's a modification or an extension being requested so someone might be able to do it within two to three months if it is something simple, but straight forward with no changes to the facility. However, if they have modifications and there is a new operation being installed or an expansion, it could take six to eight months easily. The employees work five days a week, eight hours a day.

Representative Davis asked if there was a backlog before the GenX situation came up. Ms. Grzyb stated that there was. She noted that DEQ has hired quite a few permanent writers in the past year trying to fill vacancies that have occurred.

He asked how long the backlog has existed and asked for a 10 year chart in order to get an idea of the number of people who have been in the position of doing the

applications. His next question was how many staff members there were actually doing water monitoring throughout the State.

Ms. Holman was to get more information and get it back to him along with exactly what they do and who they report to.

Representative Davis asked if DEQ was monitoring Chemours now or if someone else was monitoring them.

Ms. Holman stated that DEQ continues to monitor Chemours.

He asked if DEQ discovers a contaminant, perhaps in the water, do they notify DHHS.

Ms. Holman went back to the normal method of trying to identify new contaminants and noted that a lot of it comes from the federal Safe Water Drinking Act and U.S. EPA's unregulated contaminant monitoring role. As DEQ looks at new compounds, it is normally following that process so parts of U.S. EPA are already looking at health effects and health studies.

Linda Culpepper, Deputy Director, DWR, DEQ, added that they do collaborate with DHHS.

Representative Davis asked for further information about the spectrometer(s).

Ms. Holman indicated that in their lab, they have several types of mass spectrometers. The one that would need to be purchased for the targeted type analysis that U.S. EPA and others have done is the high resolution mass spectrometer.

Representative Davis asked for an idea of how much they cost.

Ms. Holman thought that a new unit was in the $450,000 range and refurbished, around $330,000. Ideally, it would take a PhD chemist to operate.

In response to Representative Davis' inquiry as to whether there was that type of person on staff, Ms. Culpepper answered that they were advised that they would need to get someone who has that kind of specialized training.

He then asked for an idea of how much a full benefit package would be for someone who would be specifically trained to run that piece of machinery.

Ms. Holman agreed to look into it and get the information back to the Committee, as well as the probable maintenance cost.

Representative Davis expressed concern about the air quality permit with Chemours. Are they emitting GenX into the air?

Ms. Holman stated it was better to characterize it that there are air emission releases as part of the byproducts.

He asked how the GenX would get into the air.

She stated that most of the process units are going to have some venting or stacks where air emissions do escape or release into the atmosphere.

Representative Iler asked if there was a possibility that a university may utilize mass spectrometers on a contract basis.

Ms. Holman said that was something that they would research and get the information back to the Committee.

Representative Dixon was recognized and stated he would like to direct a general question regarding the permitting positions mentioned by Representative Davis and asked if some were receipt supported.

Ms. Culpepper answered that they would outline that when they report back.

He then directed that general question to Fiscal Research and Eric Moore confirmed that there are some positions that are funded via the receipts from the business licensing fees and he agreed to get that number.

Representative Harrison had a follow-up on the question of DEQ not pulling the permit for Chemours and she wanted to clarify that DEQ feels confident that they are not violating.

Ms. Holman responded that based on the information that has been provided, as well as their own sampling, they do feel confident.

Representative Davis thanked Ms. Holman for her presentation as well as the rest of the staff for being in attendance. He stated he looked forward to their response on the questions for which they were going to get the answers.

He announced a recess for lunch and stated DHHS would present after the break.

Representative Davis introduced Dr. Elizabeth Cuervo Tilson, MD, MPH, State Health Director and Chief Medical Officer, DHHS.

She said she appreciated being here and being part of the DHHS team and appreciated the work of the Committee on their dedication and intense effort around a very complicated and important issue that will likely be with us for the next couple of years. DHHS welcomes its partnership with DEQ and the General Assembly in addressing this for the sake of the population. She announced that Danny Staley, MS, Director, Division of Public Health (DPH), DHHS and Dr. Zack Moore, MD, MPH, State Epidemiologist and Epidemiology Section Chief, DPH, DHHS, would also be participating with her.

Dr. Tilson stated she would speak about the Secretaries' Science Advisory Board **(Attachment 4).** She noted that the Advisory Board might be an incredible resource to be able to bring to the Committee meetings going forward. She explained that there was a Secretaries' Science Advisory Board specifically for toxic air pollutants. The new charter that expanded the scope of the Advisory Board will also include soil, ground water, surface water, sediment and air, understanding that the science around environmental health is more than just air. The expanded scope means both DEQ and DHHS are providing guidance to both departments. They will be meeting at least six times a year with more work done in between. The first meeting was on Monday, October 23, 2017 with tentative dates for future meetings on December 4, 2017 and January 29 and March 19, 2018.

The overall functions of the Advisory Board include working with DEQ to evaluate what contaminants are being released into the environment and also grappling with the emerging non-targeted compounds they are finding and what should be done about them. They are evaluating which compounds need more studies and helping to navigate that landscape. The Advisory Board is working with DEQ on their main role, which is the regulatory role, to help them work around regulation of these discharge chemicals.

On the DHHS side, which is more the health side, the Advisory Board will assist in the evaluation of the human health impacts of exposure to hazardous contaminants. They will give input to DHHS and jointly put out scientifically based health goals. Those are the major functions of the Advisory Board.

The new charter not only expanded the scope of the Advisory Board but it increased the membership from eight to sixteen members including experts in toxicology, public health, ecology, engineering and related fields. The list of the members is included as **attachment 5.**

Dr. Tilson noted it was a very impressive membership, some of the best and the brightest that the State has to help work with the public sector and is an important resource. All of the members are appointed by the secretaries of Environmental Quality and Health and Human Services.

At the first meeting of the Secretaries' Science Advisory Board, the members worked through the procedures and the scope. Both DEQ and DHHS identified the first priorities that they hoped to tap into. GenX was one of them and it is being called a "provisional health goal" because as more is learned, that health goal may change. They will also look at the emerging compounds such as PFAS', those for which there is little health information. There are other chemicals and compoundsthat need more awareness and study. These are the first three priorities that were presented at the first meeting. As the Advisory Board moves forward they will address other compounds and chemicals.

Another piece of this is not only tapping into the brain power of the Advisory Board, but also welcoming public input into the process and having the public be a part of the Board. There was a public forum piece at the first meeting and it is anticipated that it will be part of other meetings. The tentative plan is to have the meeting on December 4, 2018 in the Wilmington area for public input. The next one will be held at the end of January and may be located in the western part of the State. The purpose of moving the meetings around is to allow for participation on the part of our citizens.

Dr. Tilson ended her presentation and asked if there were any questions.

Representative Davis expressed concern that there are multiple entities conducting investigations and fact finding. The House Select Committee, the Secretaries' Science Advisory Board, the Senate Select Committee (who may or may not be

investigating), and DEQ and DHHS. The concern is that the left hand is not keeping up with what the right hand is doing, so we are not moving together in a good and efficient manner. He asked if there were any suggestions on how we might keep all these components together to make sure that we are not doing the same things or different things that might conflict with each other. He wanted to keep all the moving parts going in the same positive direction.

Dr. Tilson agreed wholeheartedly, especially when there are a lot of moving parts and uncertainty. Trying to keep everybody together is incredibly important. From the DHHS and DEQ side, the Departments talk all the time. They have three check in calls every week and are working very closely to be sure they are on the same page all the time. The Advisory Board is convened by both DEQ and DHHS and is very well aligned. The Board is almost an extension of DEQ and DHHS, tapping into the brain power to help inform the Departments. She did not see this as fragmentation, but as increased capacity of what DEQ and DHHS can do together. With the House and the Senate she was not sure what could be done to get those two together.

Representative Davis stated that he was trying to think of a realistic way this Committee might be kept informed about what the Science Board is doing.

Dr. Tilson thought there were a couple of different ways. One, is to make sure members have the website so that as new information comes up it will be posted. She stated she would be happy to come and report on recommendations and what comes out of the Science Board meetings or any other way to keep the Committee in the loop. The website is https://deq.nc.gov/news/hot-topics/genx-investigation/secretaries-science-advisory-board.

Representative Dixon stated he attended the first meeting of the Secretaries' Science Advisory Board. It was mainly introductions, consideration of a mission statement, how the meetings were going to be set up, and there was almost 100 percent attendance including 4 or 5 people who called in by telephone. He stated that the qualifications of the people who were sitting on the Advisory Board were absolutely amazing and even then it is the balancing act of how collaboratively all of the Departments and this Advisory Board can do the job. He noted that the alarm that has been set off needs to be mitigated to the extent possible and a collaborative effort can go a long way to doing that and hopefully, the media will be cooperative in promoting the very conscientious ways each of these entities are going about trying to resolve these issues.

Dr. Tilson thanked Representative Dixon for being at the first meeting and his support and noted it was very well received and very much appreciated.

Representative Davis welcomed Danny Staley, Director, DPH, DHHS and stated that the Committee would be very glad to hear from him.

Mr. Staley thanked the Committee for inviting him here today and the opportunity to speak to them. His presentation titled NC DHHS Staffing for GenX Response and Calculation of Provisional Health Goal is **attachment 6.**

He stated that their purpose in being here was to answer some of the questions that Committee members have and stated some of them were summarized on his first slide. One question was of the compounds detected through environmental sampling, could it pose a risk to human health?

He explained that Dr. Moore would talk more about that as well as the exposure level and risk assessments and risk communication pieces. Mr. Staley indicated he would be covering the personnel and staff involved in performing a lot of the risk assessment work and where they are in DPH. He stated that the work they had been doing on GenX has been done specifically in the Occupational and Environmental Epidemiology branch. Some positions are funded with State dollars and some are funded with federal dollars, through a couple of grants.

In answer to a question from Representative Davis, Mr. Staley explained in more detail the number of people staffing various components of the Occupational and Environmental Epidemiology branch. He noted it was a small and mighty branch within DPH.

Another question was how the branch would add a toxicologist and how many they would like to add.

Mr. Staley showed a slide with a timeline of toxicologist positions. He stated that there was a number of things that these positions were dealing with on a day-to-day basis. He continued with a more detailed explanation of the staffing and how the branch has rearranged their work distribution. It was not until about 2015 when they started dealing with emerging issues and contaminants that they started developing some backlogs in responding back to individuals with private well concerns, which is a lot of the work that the toxicologist does.

Representative Davis added that he had asked DHHS some questions about the toxicologist position and he learned that in February, 2009, in response to the priority needs in the State Public Health System, one of the two positions of toxicologists was reallocated to a nurse consultant and was transferred to the local technical assistance in training branch. He further stated that he ascertained from Fiscal Research that none of the Governor's recommended budgets submitted since 2008 to 2009 have requested a toxicologist.

Mr. Staley stated that he was finished and unless there were more questions, he would turn it over to Dr. Moore who would talk about how they arrived at their provisional health goal.

Representative Harrison commented that she felt like there was some sort of clearinghouse which states subscribe to that lists chemicals of concern. She thought that previously there was an effort made to get North Carolina to join. She asked if she was right in thinking there was a clearinghouse and if so, is North Carolina a member.

Mr. Staley responded that he was not familiar with the question about the clearinghouse but did know that we work through the CDC in a cooperative program which has multiple states that are working on different emerging contaminants.

Next, Representative Davis introduced Dr. Zack Moore, State Epidemiologist, DPH, DHHS, and expressed appreciation for him being there. His comments were a continuation of **attachment 6.**

Dr. Moore began by stating that he was here to address a couple of questions that were raised by the Committee. First, was to describe the research and studies that contributed to the establishment of the 140 parts per trillion health goal for GenX and second, to provide relevant detail regarding sources of data (studies, etc.) and processes used in developing the health goal.

He began by reviewing what a health goal is:

Level of contamination below which no adverse health effects would be expected over a lifetime (70 years) of exposure
Calculated based on the most vulnerable population
Non-regulatory, non-enforceable
Change as new information becomes available

The requirements to form a health goal are:

Must have sufficient health-related information, including animal studies, epidemiologic studies (human health) and other laboratory studies
Some health-related information not in public domain
Health-related information often lacking for emerging compounds

A health goal = (Reference Dose (RfD) x Relative Source Contribution (RSC)) x Body Weight/ divided by Water Consumption Rate (WCR). A Reference dose=No Adverse Effect Level divided by Uncertainty Factors. He continued to explain the terms, including the No Adverse Effect Level (NOAEL), RfD, Uncertainty Factors (UF), and RSC. The slide presentation gives more detail on each of the terms.

The calculation of a health goal = (RfD (mg/kg/day) x RSC x body weight (kg)) divided by WCR (L/day). He stated that this health goal applies only to GenX, not related compounds. There is not sufficient information at this time to calculate health goals for other emerging PFAS compounds in combination.

Representative Davis asked what information would be needed to calculate other noted health goals.

Dr. Moore responded that ideally they would have animal study data as a starting point so they could understand what would happen in animals and then they would go through the same kind of calculations that he referenced above for GenX for other compounds.

Following the presentation, Representative Davis recognized Representative Dixon. His question was what the first standard was on GenX.

Dr. Moore stated that the first standard was about 500 times higher than the current standard.

Representative Dixon queried further about information to the public and how disconcerting it was to the ordinary person.

Dr. Moore stated that the Department has a lot of interactions with the public and with the people who are affected by this. They have participated in community meetings, put out fact sheets, etc. to try to get the messages across and they are absolutely cognizant of the concerns that people have. He said there is always room

for them to improve their health messaging and that is something they are constantly striving to do.

Representative Dixon then asked what, if any, political influence did the Department feel in the transition from the first standard to the second.

Dr. Moore responded that he was part of all of this and felt no political influence; it was done on a purely scientific basis and continued consultation with the U.S. EPA and other agencies. It was always about trying to come up with the scientifically appropriate health information to provide.

Representative Brisson thanked Dr. Moore for his presentation and asked if "to weather the storm" was there any way to translate the information to the general public.

Dr. Moore responded that there is a need to relay how the levels are calculated, what the levels mean, what the process is from here on out, what the people can expect, and when things might change and what might change them. That is something that the Department has been working on. It is a big challenge and at the top of their priorities.

Representative Steinburg was recognized. He asked Dr. Moore if there had been anything in North Carolina that had been comparable to Gen X that the Department has had to deal with.

Dr. Moore replied that here in the State, this has been unique in many ways particularly when you get pullback just from looking at GenX and consider the other compounds for which there is such limited information. That is not a normal situation; most of their work is on contaminants where they know the health effects and where they have well established science.

Representative Steinburg asked if many of these things, hopefully all of them, that have been confronted over the last 25 or 30 to 40 years have eventually been brought to a safe resolution. He asked if it was fair to say that the track record on cleaning up situations like this and finding a solution to problems with our water supply was pretty good.

Dr. Moore responded that he was not prepared to comment in terms of the overall environmental effects and how those have been mitigated in other situations but from

a health side, he would say the ark has been towards improved identification and remediation either through stopping discharges or remediation techniques.

Mr. Staley added that one of the things that is persistent in the environment that they have stopped producing in the mid-seventies was lead. Lead is comparable but they are still working on the health effects of lead in small children. Sometimes these things do take decades.

The next item on the agenda was an Update on Cape Fear Public Utility Authority (CFPUA) Response to Cape Fear River Water Quality Concerns. Representative Davis introduced Mr. Jim Flechtner, Executive Director and Mr. Frank Styers, Chief Operations Officer.

Mr. Fletchner referred to House Bill 56, Amend Environmental Laws (S.L. 2017-209) and noted an interim report was due no later than December 1, 2017 and a final report no later than April 1, 2018. Costs included study identification and deployment of treatment alternatives ($100,000) and ongoing water monitoring ($85,000). He reviewed the response measures underway, including water treatment alternative evaluation for removing PFAS, GenX and emerging compounds; water supply monitoring; and information sharing through the website. An advanced treatment is in place through technology and includes ozonation, biological filtration and ultraviolet disinfection. The Accelerated Column Test (ACT) was completed in late September 2017. A graph showing preliminary granular activated carbon (GAC) data was to evaluate multiple fluorinated compounds and others of emerging concern; determine breakthrough over time; and determine suitability and operating cost 6 to 12 months before treatment decision are made. He concluded the update with a summary and a schedule.

Representative Harrison asked Dr. Moore if North Carolina looks at other states' standards before adopting our own.

Dr. Moore responded that they do by looking first for federal guidance and if there isn't federal guidance, they look to see if there are other states that have guidance. They also might look to the World Health Organization and the European Chemicals Agency, etc.

Representative Steinburg asked Dr. Moore if he would answer some questions he had related to cancer.

Dr. Moore said they did look at the cancer rates in the Lower Cape Fear in four different counties: Bladen, Brunswick, New Hanover, and Pender. They looked at five different types that had been associated with per-fluorinated compounds. Overall, the cancer rates were similar in those counties to the State rates and this was looking at the rates from 1996 to 2015 as a whole and then they looked in five year increments. That report is available online at the DEQ website.

Representative Davis asked Dr. Moore to get that information to him and then he would disseminate it to the Committee members.

Dr. Moore stated he would and Representative Davis thanked him for his presentation.

The next item on the agenda was an Update on the Action Plan to Implement Section 20(a)(1) of House Bill 56 (GenX Response Measures) by the Cape Fear Public Utility Authority for the filtration and removal of GenX and other emerging compounds from drinking water presented by Jim Flechtner, Executive Director and Frank Styers, Chief Operations Officer.

Mr. Flechtner stated they would be reviewing CFPUA's role in regard to HB56, specifically the initiatives the Authority has taken in response to GenX and other emerging contaminants that have been identified in the Cape Fear River which is their source of water for most of their customers. He thanked the Committee for their support in help funding HB56. He shared that the initiatives that CFPUA had taken would not only help CFPUA, but also Brunswick and Pender Counties who use the same source of water. The work that they have already undertaken has helped to advance the body of knowledge not just for their region, but for bodies across the State that are working with similar issues.

There are three important parts to HB 56 as it relates to water quality and the efforts at CFPUA. First, was to study and identify deployment options and alternatives for their treatment processes. That work is underway. The second component is the ongoing water monitoring. It has two parts to it: the ongoing testing they have been doing for GenX in their water and the work they are doing with UNC-Wilmington. The third part is information sharing and they will provide all of this information to the General Assembly, Brunswick, and Pender Counties. He stressed that none of the things they are doing is a substitute for proper regulation and enforcement. This is reacting to something that is happening but it is very inefficient that individual authorities are trying to sort through these issues.

Mr. Styers was called on to explain the steps to test their options and also improve water quality. He reviewed the work at the Sweeney Surface Water Plant-- a state-of-the-art facility that uses the best available technology in the water treatment industry. Even with the advanced treatment of the Plant, it does not have removal effectiveness with these shorter chain compounds they are dealing with and the Plant was not designed to remove these compounds.

He showed a slide of the ACT that was completed in late September 2017. He also detailed the GAC Pilot Testing equipment and Ion-Exchange Resin Testing. He stated that they are having preliminary success with this test. The Authority has developed some costs, very widely, because they do not know how long the GAC media is going to last. The detail of this is included in the summary.

The presentation was turned back over to Mr. Flechtner to finish. He stated that looking forward, they have prepared a schedule with three time lines. The first one is pilot testing which will be coming in over the next few months. The UNC-W research is key to this and will identify what else is in the river. That report will start to come in during the summer of 2018 and the Authority will have a much better understanding of their options for improving treatment processes.

The second timeline contemplates the possible design and construction of new facilities, an engineering report, detailed design, permitting and bidding, and finally construction of new facilities which would go well into 2022. Any solution on the treatment side is quite a ways out. The last timeline involves replacement of Media, selection of Media, and filter Media replacement and construction. All of these expenses would need to be approved by the Board of the CFPUA.

The final item on the agenda was a presentation on issues concerning emerging compounds from Kemp Burdette, Cape Fear Riverkeeper, Cape Fear River Watch.

Representative Davis stated that he asked Mr. Burdette if he would come and comment on three different things. He gave a brief report on his background and stated he became the Cape Fear Riverkeeper about 10 years ago because of a deep love for the Cape Fear and a deep commitment to protecting it for his children and their community. He came to discuss risk management noting there is a principle in risk management called the precautionary principle, which states "if an action or policy has a suspected risk of causing harm to the public or to the environment, in

the absence of scientific consensus, the burden of proof that it is not harmful falls on those taking that action."

When it comes to emerging contaminants and how we allow industry to discharge contaminants into our drinking water supplies, it seems we have completely disregarded the precautionary principle. The way we currently regulate contaminants allows industry to discharge contaminants that we know very little about and we hope that they don't harm us. The risks of this backwards approach are far too great to continue down this path especially now that we understand how serious and how widespread the problem is. We need to change the way we approach pollution in North Carolina. The burden of proof should always fall on the industry to show, beyond question, that the substances they discharge into our drinking water supplies are safe. GenX is just the tip of the emerging contaminants iceberg and the Cape Fear River is just 1 of 17 in the State of North Carolina.

We know there are other emerging compounds in other rivers. It is very clear that this is a statewide issue. It is not just the Cape Fear River. He urged the Committee to work with their colleagues across the General Assembly to find statewide approaches to address this problem and he believes it can be done.

He also touched on the Science Advisory Board and the role that he hopes they can play in addressing the environmental and health concerns where there seems to be a great risk but very little information and little guidance from federal agencies, like the US EPA and DHHS. North Carolina should not have to wait for guidance from the federal government when situations arise that put North Carolinians into risk. We know our state, we know our issues and he hopes the Science Advisory Board will be empowered to make decisions based on sound science that can protect our state's environment and public health.

Some issues like emerging contaminants in drinking water supplies may even warrant stronger protections at the State level than are in place at the federal level. He hoped that the Science Advisory Board will foster greater communication between DEQ and DHHS, as we know that the connection between the environment and health is clear. This Committee clearly understands how important our rivers are to the people of North Carolina as well how significant the threat of emerging compounds is to the people.

GenX was a wakeup call for citizens, scientists, regulators, and legislators. His thoughts on how we should tackle this issue, include exercising the precautionary

principle, which means industry should be required to show, beyond a shadow of doubt, that their waste streams will not endanger human health or the environment. Emerging compounds and the risk they pose to human health are complex and we should concentrate on building the scientific expertise needed to tackle these issues.

The Science Advisory Board should focus on issues where federal guidance is absent and the risks to human health and the environment are high. We should also focus on filling environmental boards and commissions with scientists. We need to rebuild regulatory agencies so they can do the job North Carolinians expect them to do. DEQ and DHHS are the agencies for statewide solutions to this statewide problem. Finally, we should avoid passing legislation that limits our ability to regulate industry. We can fix this problem but only if we use this crisis as an opportunity to learn from our mistakes and change our behavior moving forward. No industry is more valuable than safe and clear drinking water.

Following Mr. Burdette's update, Representative Davis thanked Mr. Burdette for being here and his comments were appreciated.

Representative Dixon complimented the agenda the Chairs put together. He stated he was very happy that Representatives Davis, Iler, and Grange were taking the time to discuss this at the level that it is being discussed. He offered his thanks to the Chairs and he believed that we have an opportunity to do something worthwhile for our children.

Representative Davis thanked the staff that has worked very hard putting together today's agenda and knows that they will work just as hard to put together the agenda for the next meeting.

Representative Davis announced that the next meeting of the Committee would be on Thursday, November 30, 2017 and would be the final meeting as far as fact finding was concerned. He stated that if there were any additional individuals that any Committee member would like to hear from, he wanted to know as soon as possible, so he and the staff could prepare the agenda for the next meeting. He announced that there would be no meeting in December, so in January he wants the Committee to focus on and be prepared to discuss possible solution and legislation. He would like to see the Committee come forth with a report and present it to the House in the Short Session. He appreciated everyone being here and their input.

Representative Harrison echoed Representative Dixon's compliments on the great job done. She indicated she would like to include flame retardants in the next meeting and stated there is an excellent scientist at Duke University who has done a lot of research and has come to the Legislature and testified for the Environmental Review Commission.

Representative Davis asked that the information be emailed to him and he will sit down with staff and discuss where we have been, where we are, where we are going, and try to come up with the speakers that will address those particular issues.

Representative Grange asked for the opportunity to thank everyone who came and presented today as everything was extremely informative and there was a bit of bipartisan comment between Representative Dixon and Representative Harrison, which she agreed with wholeheartedly. If there are emerging compounds that are discharged into our water and we don't know what they do, then they do not need to be discharged into our water. The bottom line is to be sure we have safe drinking water for all of our citizens. She then thanked Representative Davis for today's agenda.

The meeting was adjourned at 3:10 PM.

Representative Ted Davis, Jr. Senior Presiding

Judy Lowe, Committee Clerk

ATTACHMENTS:

1. Visitor Registration Sheets
2. Emerging Contaminants: A Case Study for the Cape Fear River Basin—Dr. Knappe
3. NC Department of Environmental Quality Update—Sheila Holman
4. Department of Health and Human Services Update on response to Emerging Compounds—Elizabeth Cuervo Tilson, MD, MPH, State Health Director, Chief Medical Officer NC DHHS
5. Secretaries' Science Advisory Board Members—Elizabeth Cuervo Tilson, M.D
6. NC DHHS Staffing for GenX Response and Calculation of Provisional Health Goal—Danny Staley and Zack Moore
7. Update on Cape Fear Public Utility Authority Response to Cape Fear River Water Quality Concerns—Jim Flechtner and Frank Styers

Attachment 1

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — 10/26/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Beth Svendsgaard	Duke Environmental Law & Policy Clinic
Dana Shillinglaw	NC State University
Bob Kieber	UNCW
Ron Vetter	UNCW
Ralph Mead	UNCW
Steve Skrabal	UNCW
Matt Cadle	NC ForCon
Jon Carr	NC Rural Water Assn.
Rick Zechini	Williams Mullen
LC Bryman	CSS
Preston Howard	NCMA

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — 10/26/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Tommy Stevens	Stevens Lobby
Chris Anderson	
Rob Lamm	FLA
Brian Powell	NC Con Network
Lindsey Dowling	FSP
Crystal Feldman	SA
Martha Babcock	PPAB
Tom BEAN	EDF, NCWF
Beth Svendsgaard	Duke Environmental Law Policy Clinic
Brian Merrell	WM
Cassie Gavin	Sierra Club

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — 10/26/2017

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Tom Fransen	DEQ, DWR
Roger Gibson	NCFA
Julie Moyer	DEQ, DWR

Committee Sergeants at Arms

NAME OF COMMITTEE Hse Select Committee on NC River Quality

DATE: 10/26/2017 Room: 643

House Sgt-At Arms:

1. Name: Jonas Cherry
2. Name: David Leighton, JR
3. Name: Dean Marshbourne
4. Name: Reggie Sills
5. Name:

Senate Sgt-At Arms:

1. Name:
2. Name:
3. Name:
4. Name:
5. Name:

Attachment 2

NORTH CAROLINA STATE UNIVERSITY

NC STATE UNIVERSITY

Emerging Contaminants: A Case Study for the Cape Fear River Basin



Detlef Knappe

Professor of Civil, Construction, and Environmental Engineering
North Carolina State University
(knappe@ncsu.edu)

Students and post-docs: Elisa Arevalo, Amber Greune, Zachary Hopkins, Catalina Lopez-Velandia, Mei Sun

Funding: National Science Foundation, NC Water Resources Research Institute, NC Urban Water Consortium

House Select Committee on NC River Quality, Raleigh, NC, October 26, 2017

Attachment 2

Presentation Overview

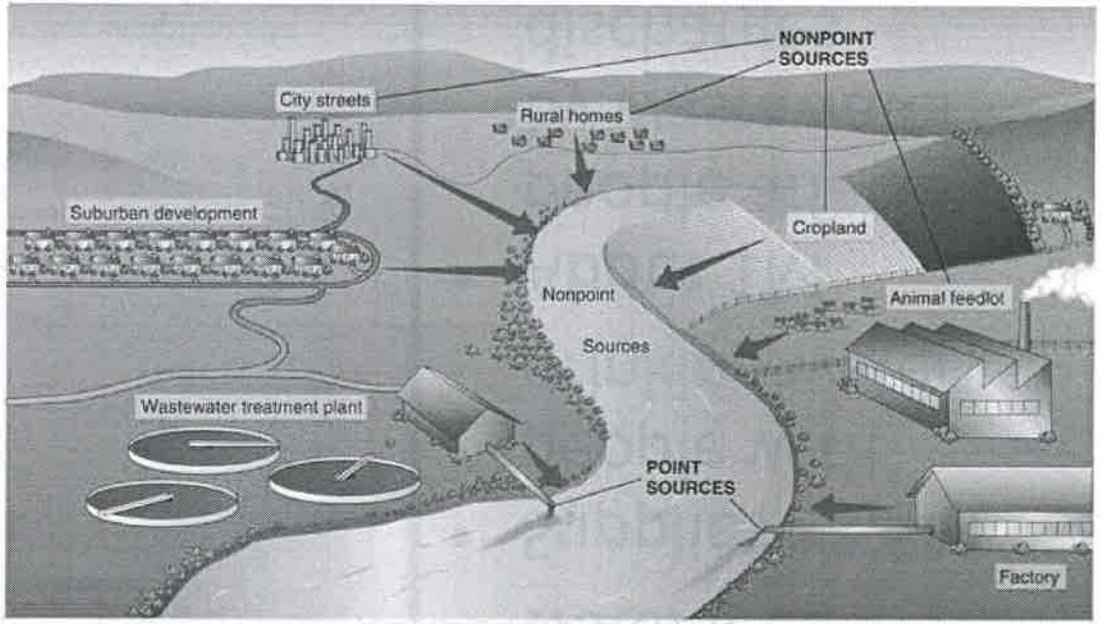
- Cape Fear River basin case study
  - We all live downstream/unplanned potable reuse
  - The Universe of Chemicals
  - Example contaminants of concern
    - Bromide
    - 1,4-Dioxane
    - Perfluoroalkyl substances
- Targeted and non-targeted analysis



- Largest watershed in NC
- Supplies ~1.5M people with drinking water
- About 1M people affected by wastewater discharges containing high levels of industrial contaminants

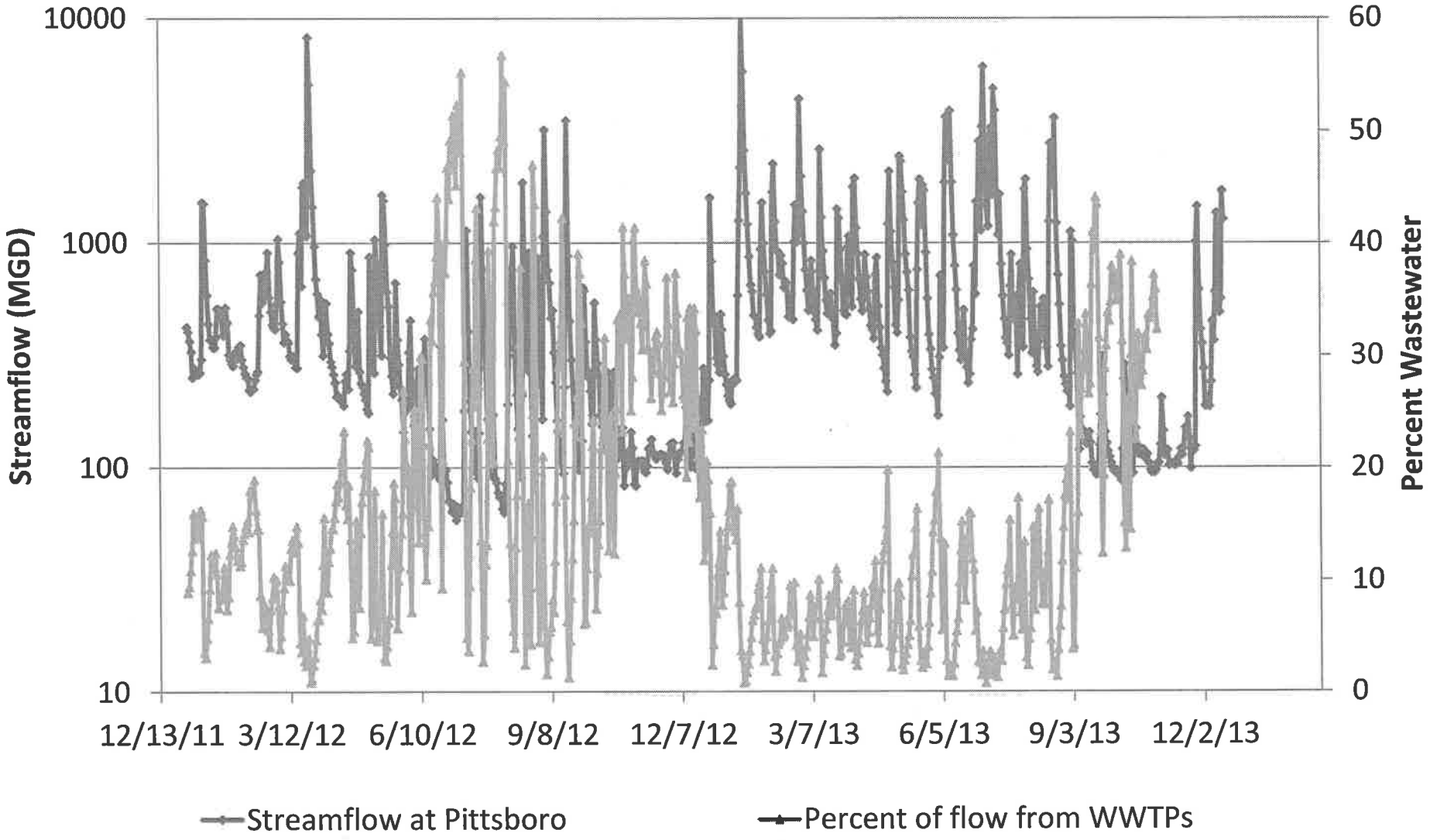
We all live downstream

- Point sources
  - Municipal wastewater treatment plants
    - Industrial wastewater inputs
    - Landfill leachate
    - Coal ash leachate
  - Industrial wastewater treatment plants
  - (Coal-fired) power plants
- Non-point sources
  - Urban stormwater
  - Agricultural runoff
  - Land application sites for wastewater treatment plant biosolids
  - Contaminated groundwater discharge
  - Dry and wet deposition of air pollutants

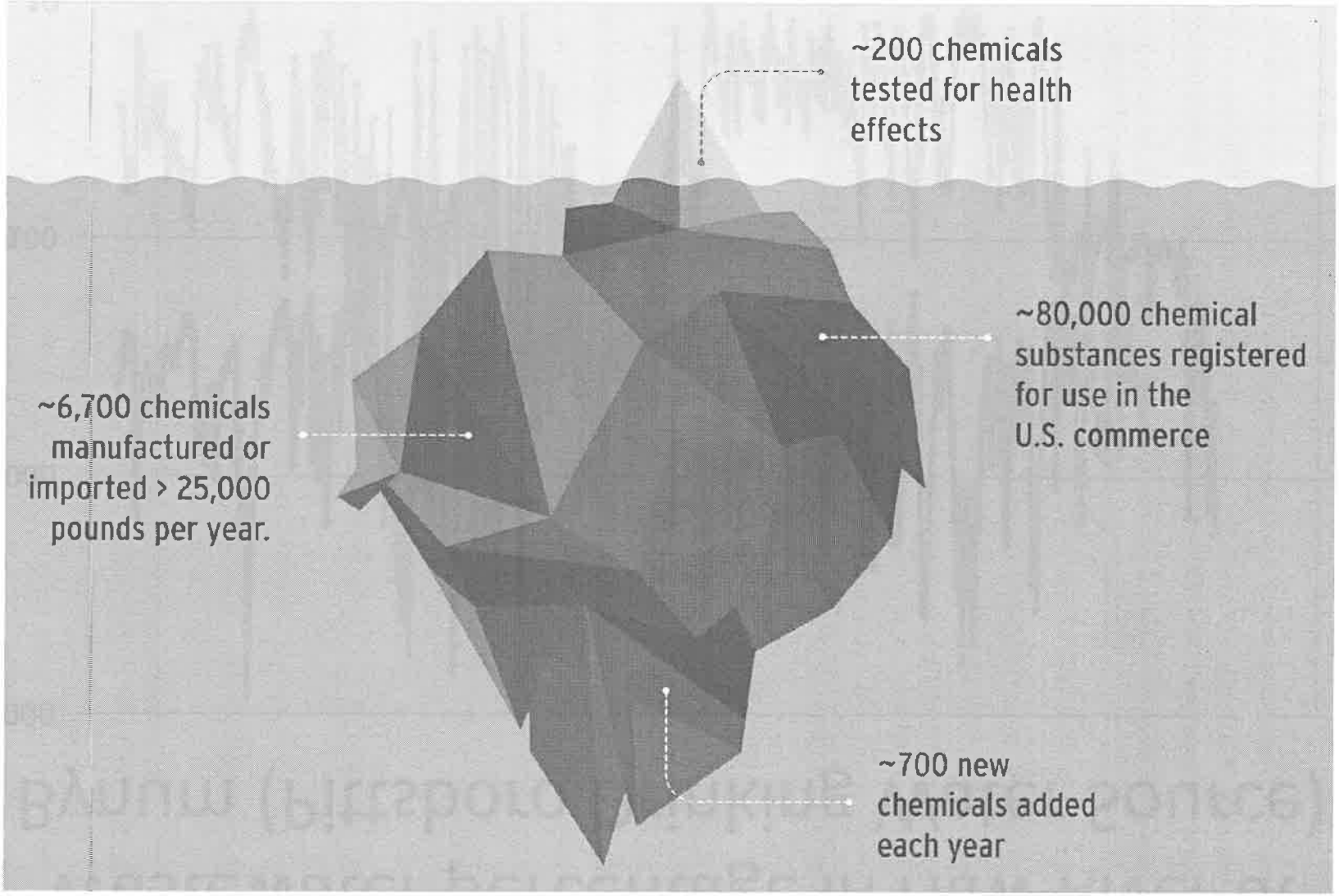


Copyright © 2005 Pearson Prentice Hall, Inc.

Wastewater percentage in Haw River at Bynum (Pittsboro Drinking Water Source)

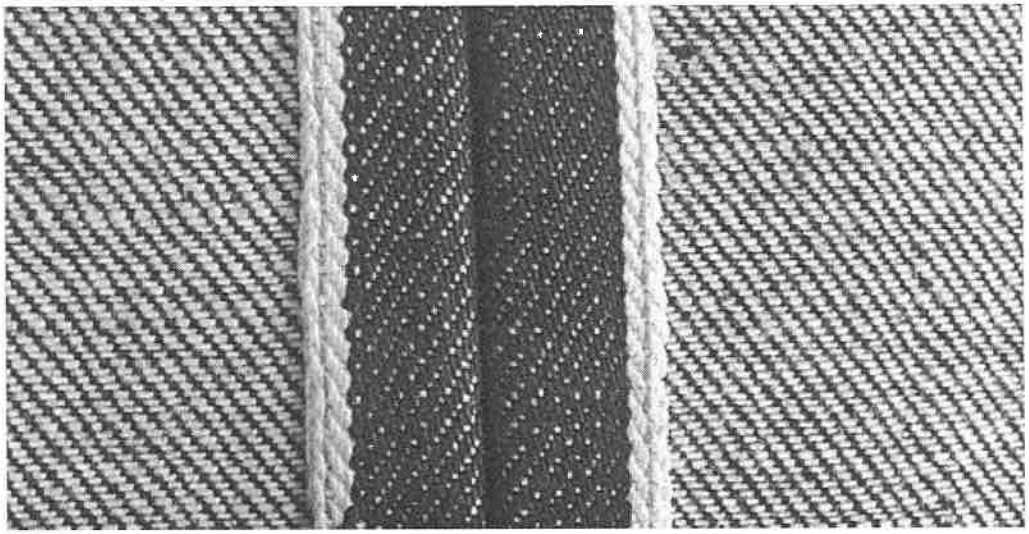


The Universe of Chemicals

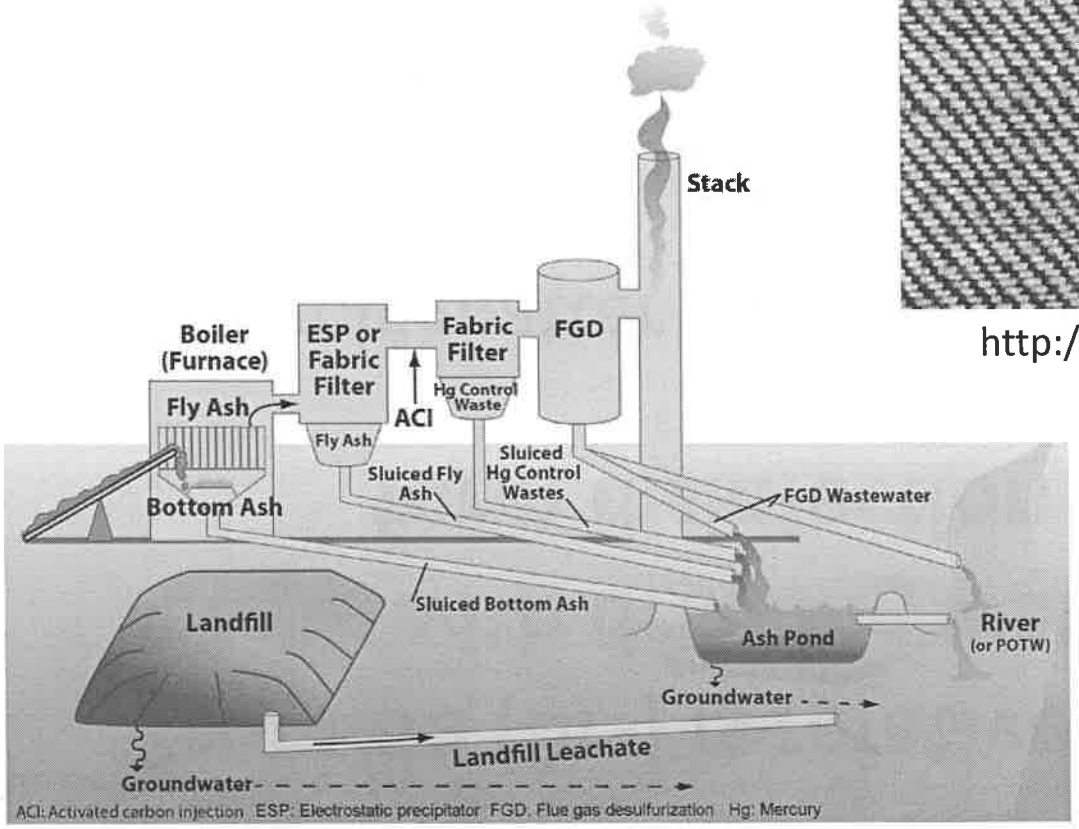


Woodruff, T. Identifying Cumulative Exposures to Chemicals in Pregnant Women – Non-targeted Screening of Environmental Chemicals. PPTOX IV, Boston, MA, Oct. 26-29, 2014.

Bromide (Br^-)



http://www.heddels.com/dictionary/sulphur/



http://www.epa.gov/eg/steam-electric-power-generating-effluent-guidelines-2015-final-rule

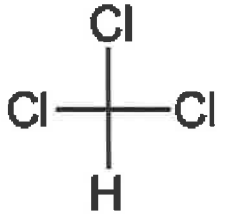
Bromide (Br-) is relatively non-toxic, but it reacts with drinking water disinfectants to form disinfection by-products

- Organic matter + chlorine + bromide $\longleftrightarrow$ trihalomethanes (THMs) + haloacetic acids (HAAs) + …

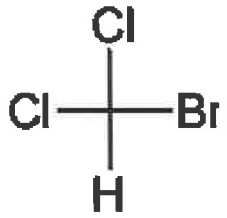


http://water.usgs.gov/edu/pictures/color-tannin-sediment.jpg

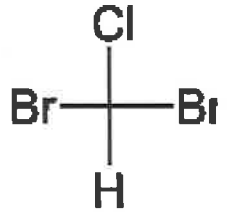
Trihalomethanes (THMs)



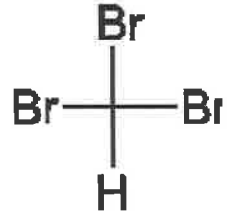
- Chloroform
  Molecular weight = 119.4 g/mol
  One-in-a-million cancer risk: -



- Bromodichloromethane
  Molecular weight = 163.8 g/mol
  One-in-a-million cancer risk: 0.6 μg/L

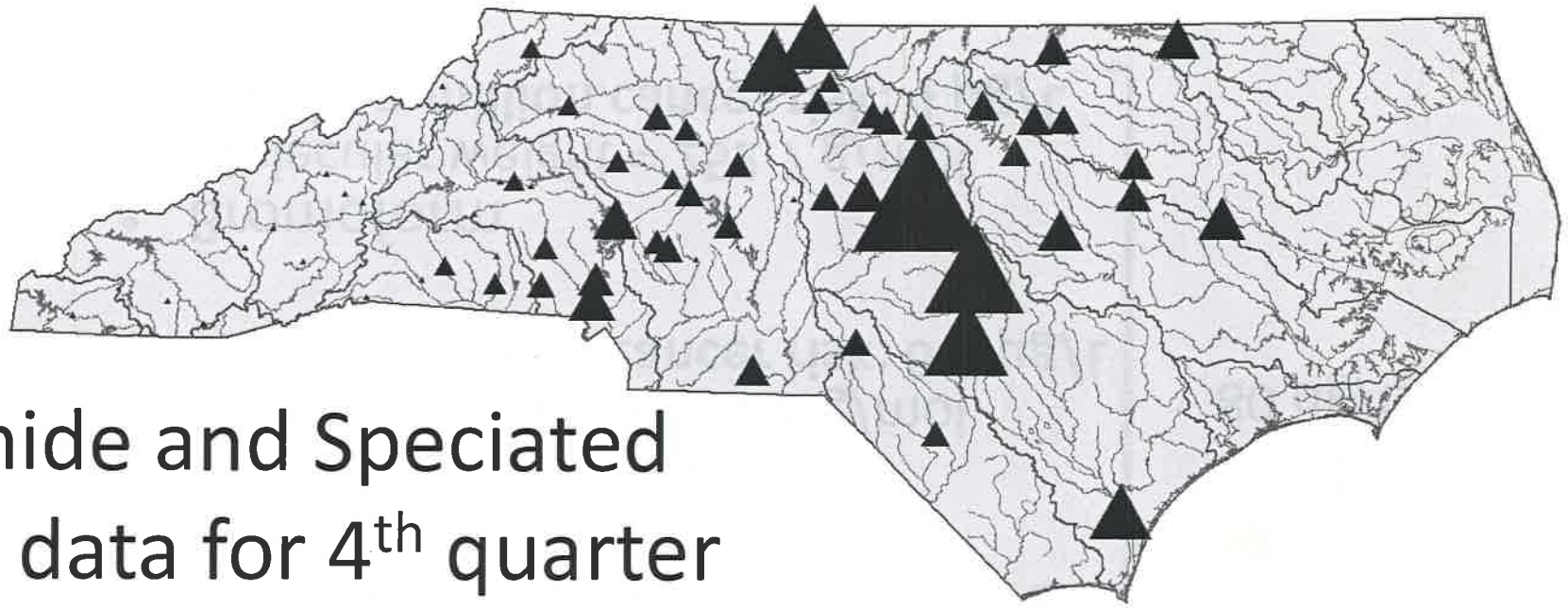


- Dibromochloromethane
  Molecular weight = 208.3 g/mol
  One-in-a-million cancer risk: 0.4 μg/L

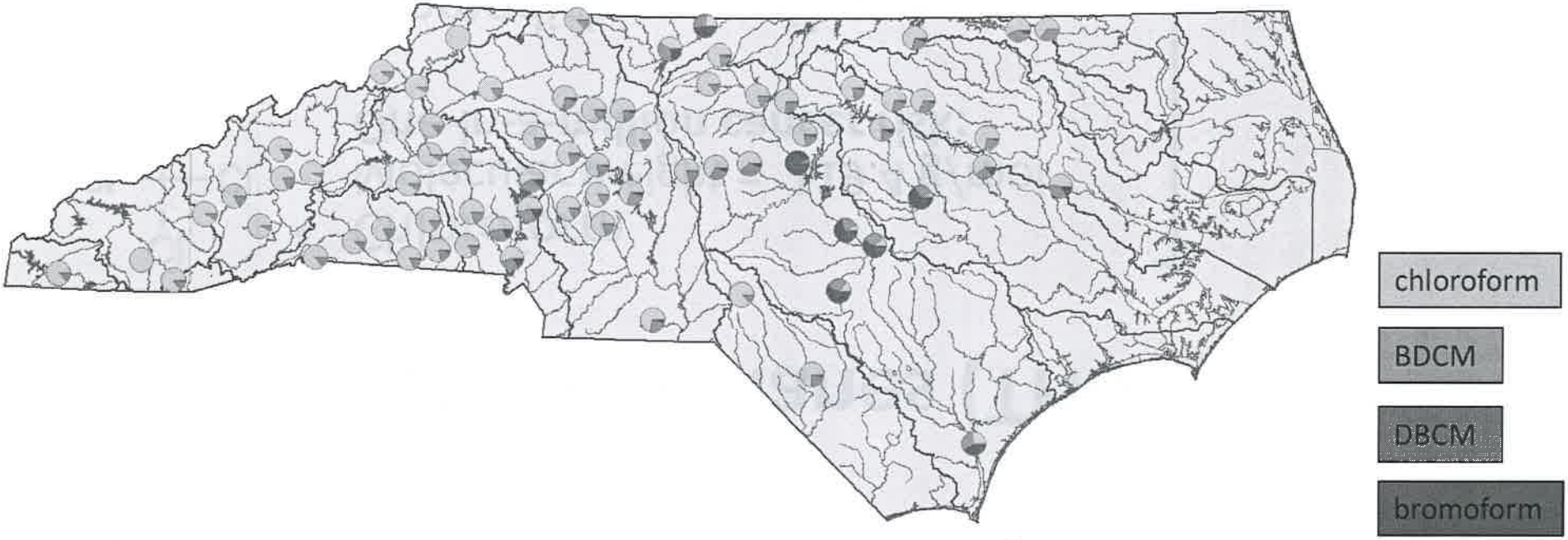


- Bromoform
  Molecular weight = 252.7 g/mol
  One-in-a-million cancer risk: 4 μg/L

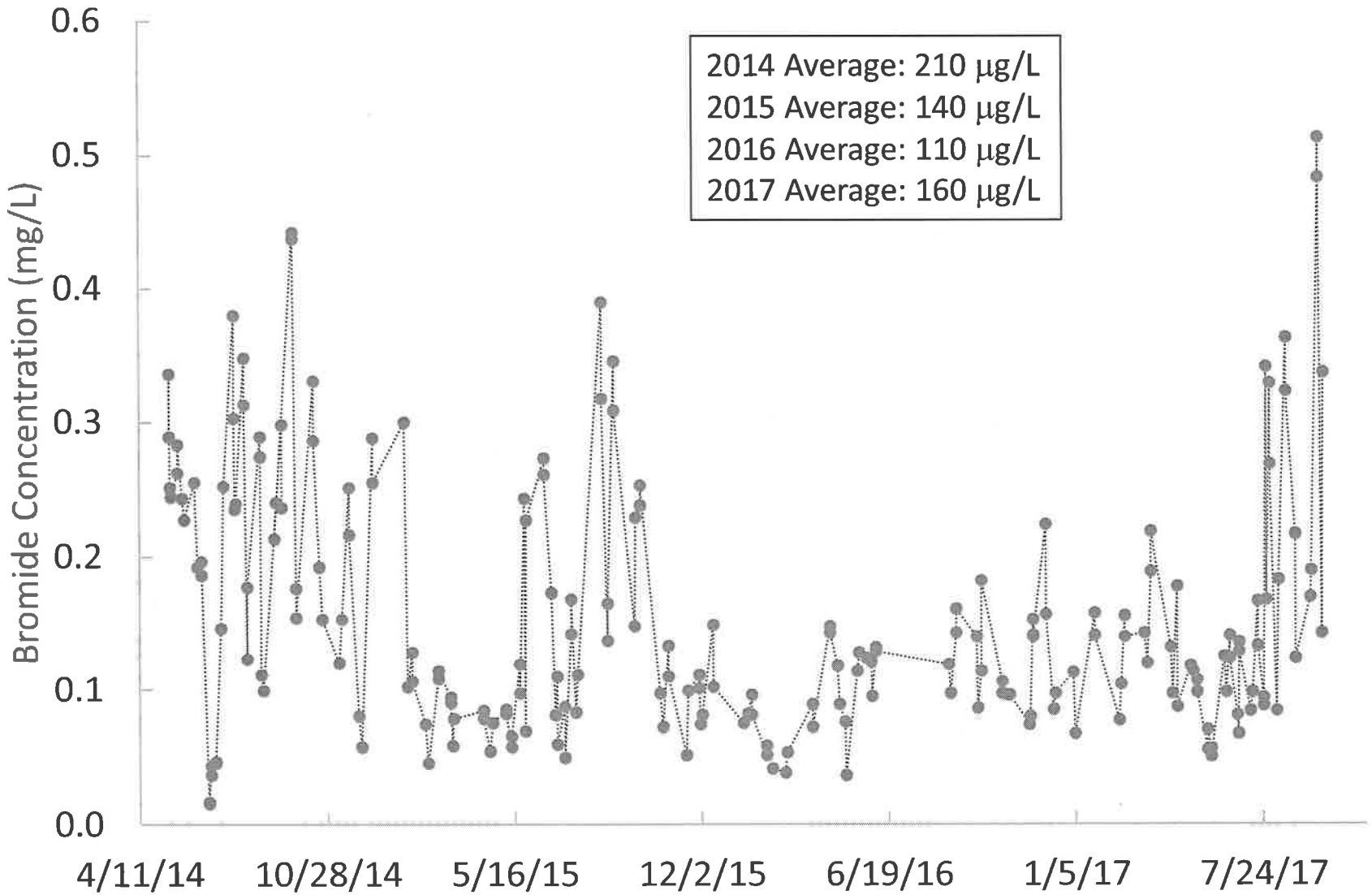
Drinking water standard: Σ THMs = 80 μg/L



Bromide and Speciated THM data for 4th quarter of 2013



Bromide Concentrations at Intake of Community B



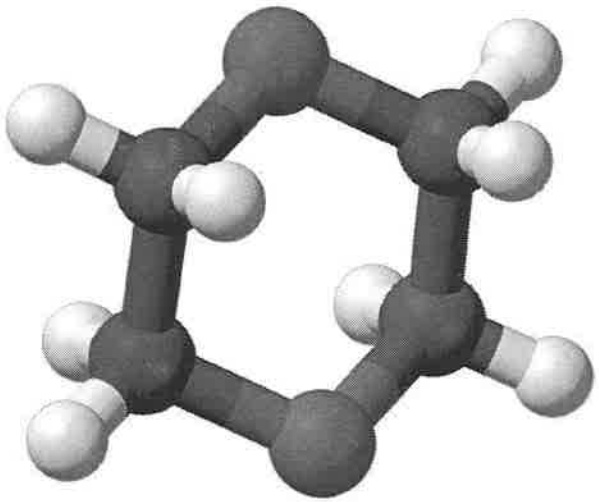
Bromide Impacts

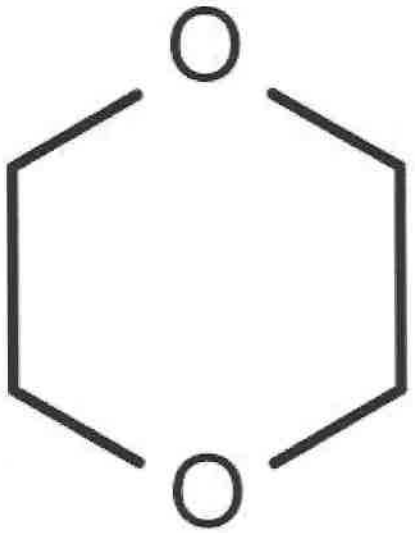
- As bromide levels increase
  - Concentration of disinfection by-products increases
  - Toxicity of disinfection by-products increases
- Upgrades to drinking water treatment plants needed to maintain compliance with drinking water standards
  - Cape Fear River basin
  - Dan River basin
- Bromide discharges a violation of the Clean Water Act?

  "Impact of [wastewater] discharge on public water supplies" (40 CFR 125.62):

  [Such discharge] "must not have the effect of requiring treatment over and above that which would be necessary in the absence of such discharge in order to comply with local and EPA drinking water standards."

1,4-Dioxane



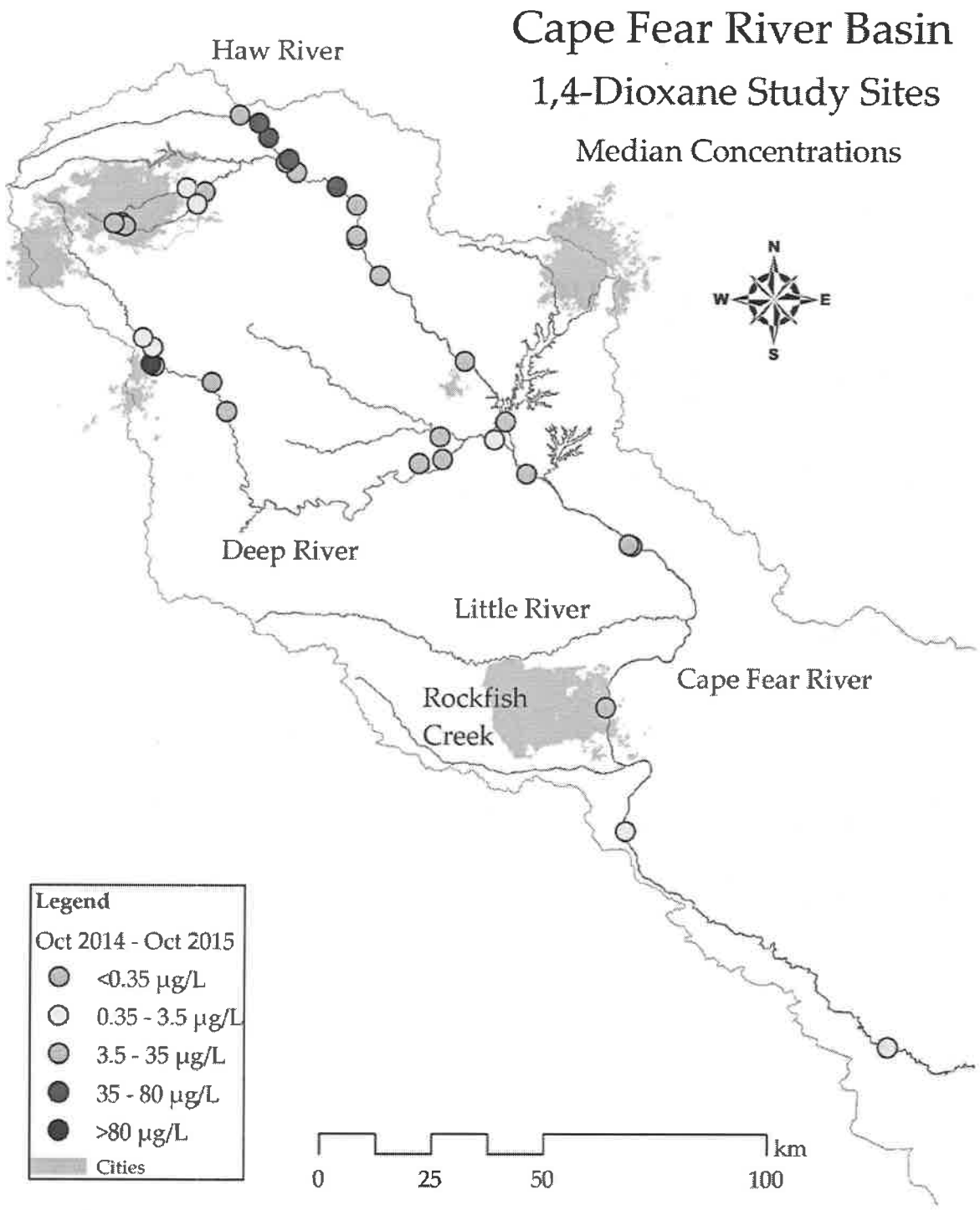


1,4-Dioxane – Background Information

- Sources
  - Solvent stabilizer (declining, mostly GW pollution)
  - Industrial solvent
  - By-product of manufacturing processes involving ethylene oxide (e.g. plastics, detergents)
- EPA's Third Unregulated Contaminant Monitoring Rule (UCMR3)
  - Detected nationwide in 11.5% of 36,479 drinking water samples
  - 7 of the 20 highest concentrations across the US occurred in NC (all derived from Cape Fear River water)

1,4-dioxane cancer risk

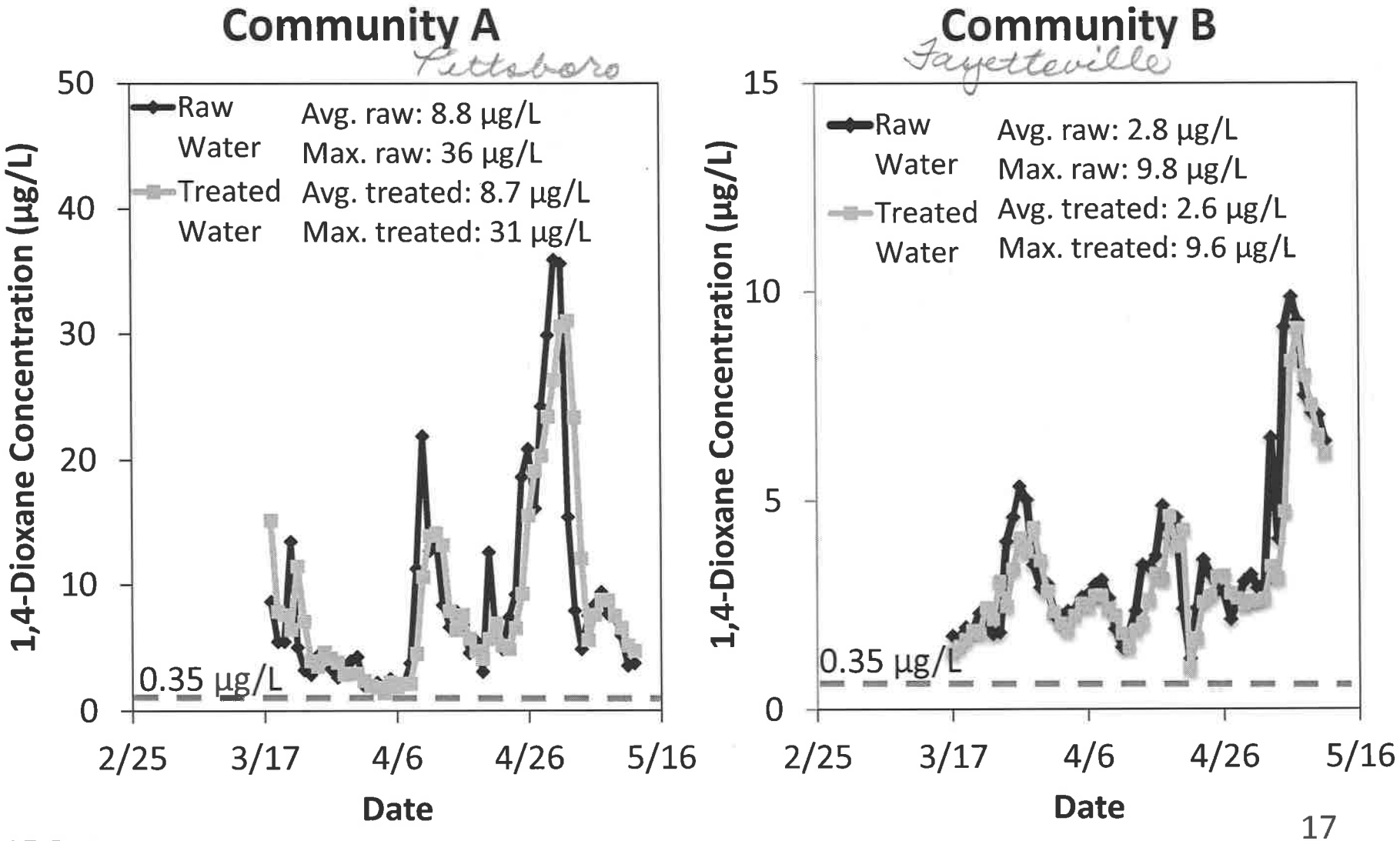
- Likely human carcinogen (EPA IRIS database)
- Lifetime consumption of drinking water containing
  - 0.35 μg/L = 1:1,000,000 excess cancer risk
  - 3.5 μg/L = 1:100,000 excess cancer risk
  - 35 μg/L = 1:10,000 excess cancer risk
- Comparison with disinfection by-products
  - Bromodichloromethane: 0.6 μg/L = 1:1,000,000 risk
  - Dibromochloromethane: 0.4 μg/L = 1:1,000,000 risk



- NC Surface Water Supply Standard (WS I – WS IV): 0.35 µg/L
- Standard violated in vast stretches of the Haw, Deep, and Cape Fear Rivers

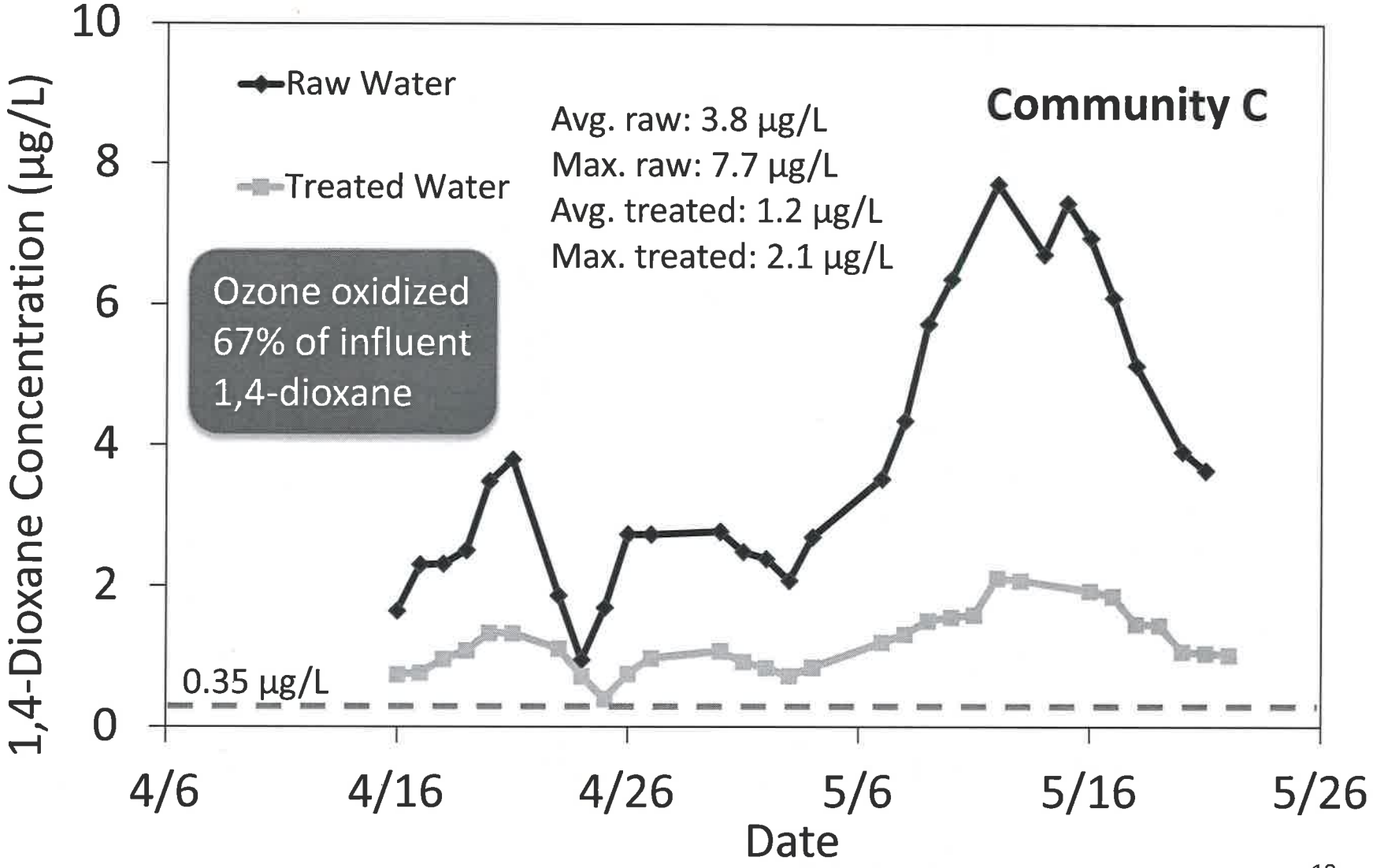
Sampling done in 2014-2015 over a period of one year

1,4-Dioxane is not Removed in Conventional Water Treatment Plants



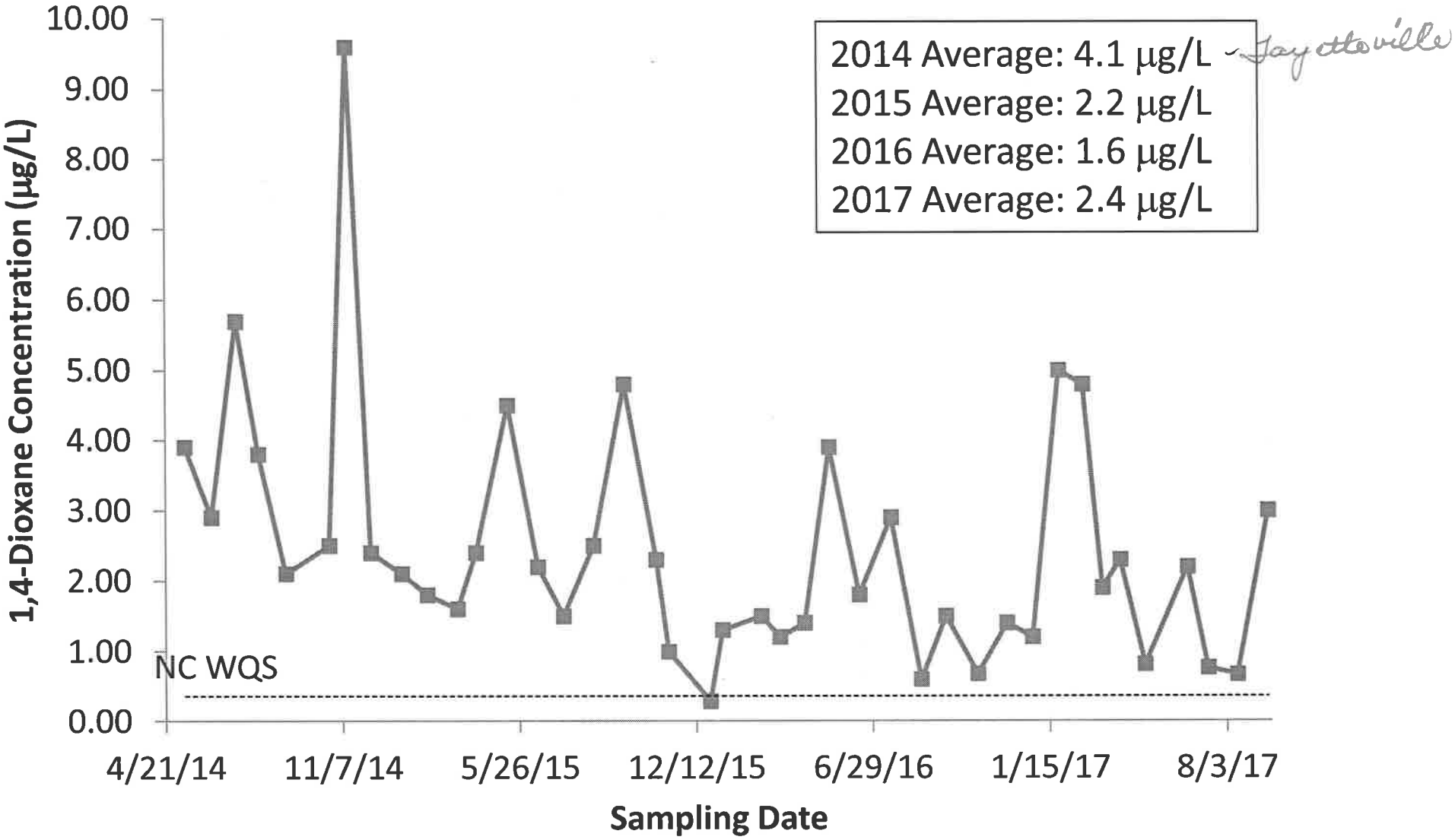
2015 Data

1,4-Dioxane is Partially Oxidized by Ozone



2015 Data

1,4-Dioxane Concentrations at Intake of Community B



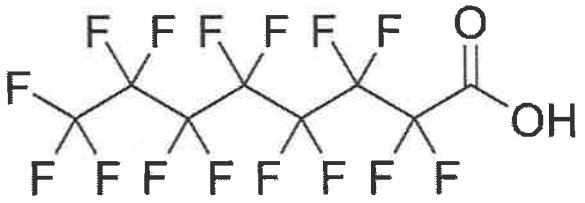
1,4-Dioxane Management Considerations

- Enforce NC surface water quality standard (0.35 μg/L)
  15A NCAC 02B .0208 states that "for carcinogens, the concentrations … shall not result in unacceptable health risks and shall be based on a Carcinogenic Potency Factor. An unacceptable health risk for cancer shall be considered to be more than one case of cancer per one million people exposed (one-in-a-million risk level)."
- Control of upstream sources
  - Industrial pretreatment programs
  - NPDES discharge permits
  - Treatment technologies exist to remove or oxidize 1,4-dioxane in water
    - Advanced oxidation (UV/H_2O_2)
    - Tailored sorbents (carbonaceous resins)
    - Reverse osmosis
    - Biological methods (in the research stage)

Look at more closely

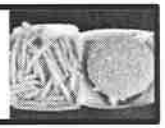
Per- and polyfluoroalkyl Substances (PFASs)

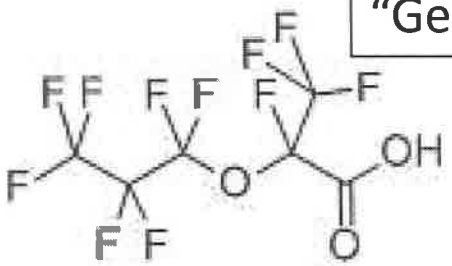
Non-stick coatings



C8 = PFOA

Grease- and oil- resistant coatings for paper products





"GenX"

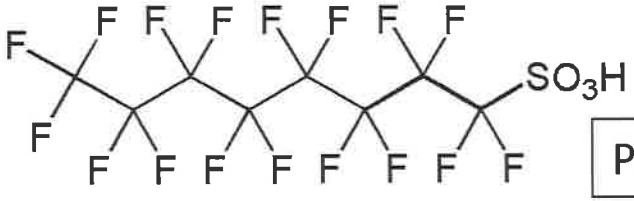
Water repellent fabrics

Stain-resistant coatings for fabrics, carpets, and leather

Fire fighting foams



Aqueous film forming foams



PFOS

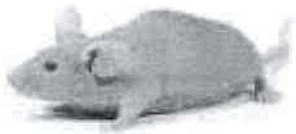
PFASs have long half-lives in humans

- Half-lives in humans
  - PFOA: 3.8 years
  - PFOS: 5.4 years
  - GenX: ? - Do not know half-life yet





- Toxicokinetic differences for PFOA
  - 17-19 days in mice
  - 4 hours in female rats

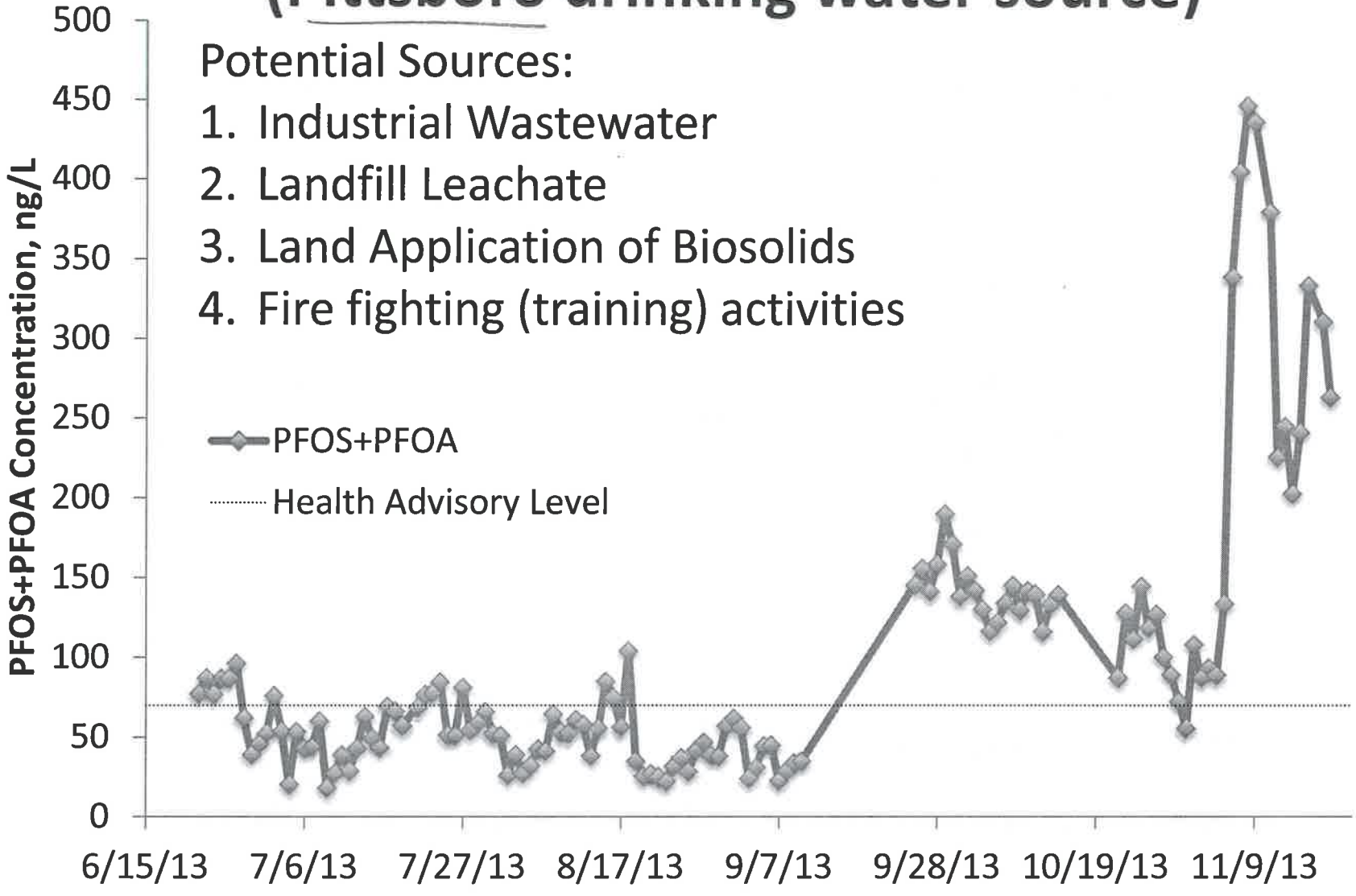




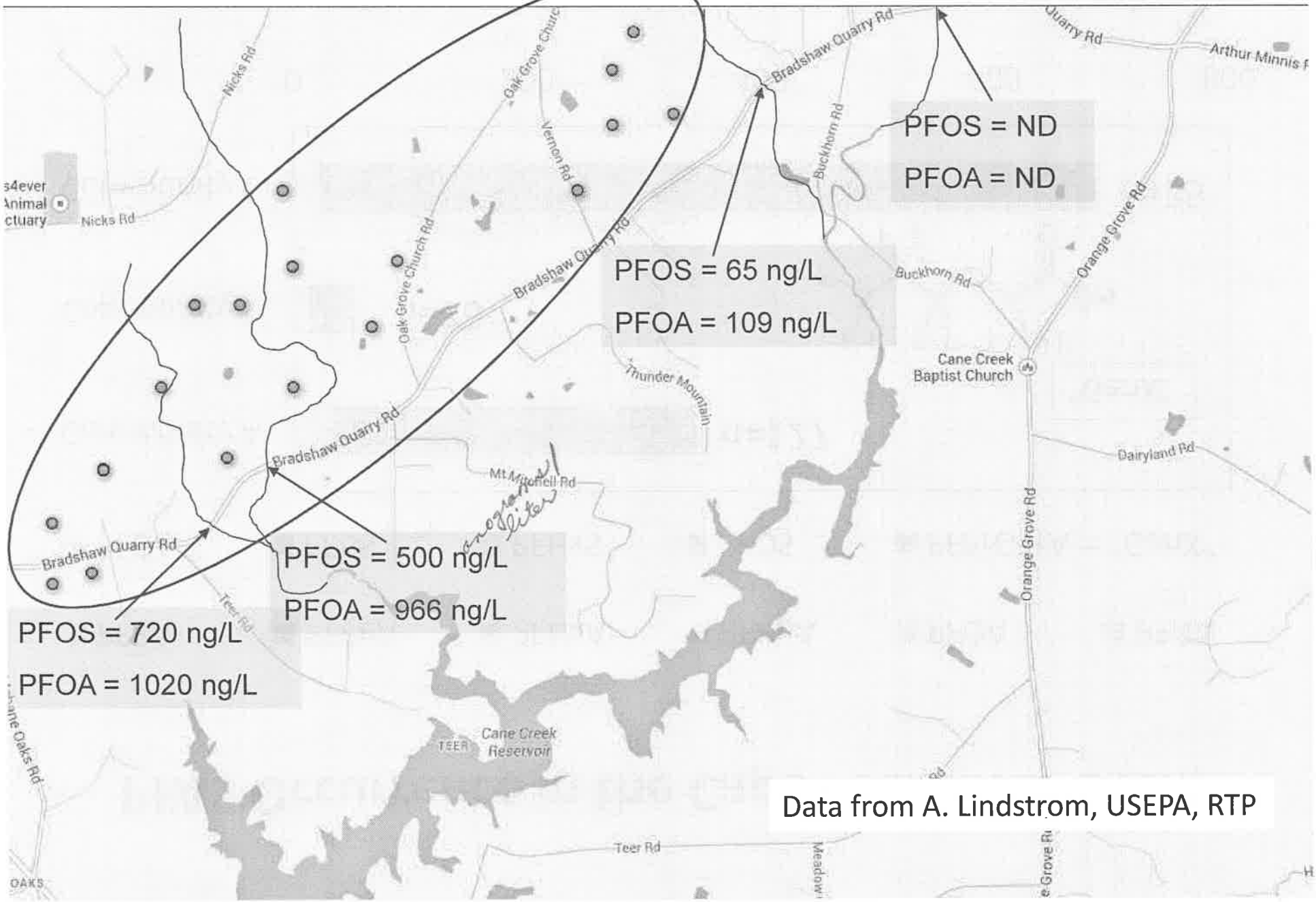
To protect the public from adverse health effects, health based guidelines have been established.

EPA Health Advisory (chronic expoure)	→	PFOS + C8: 70 ng/L
New Jersey guidance level (C8) and recommended MCL (C9)	→	C8: 40 ng/L C9: 13 ng/L
North Carolina health goal (GenX)	→	140 ng/L

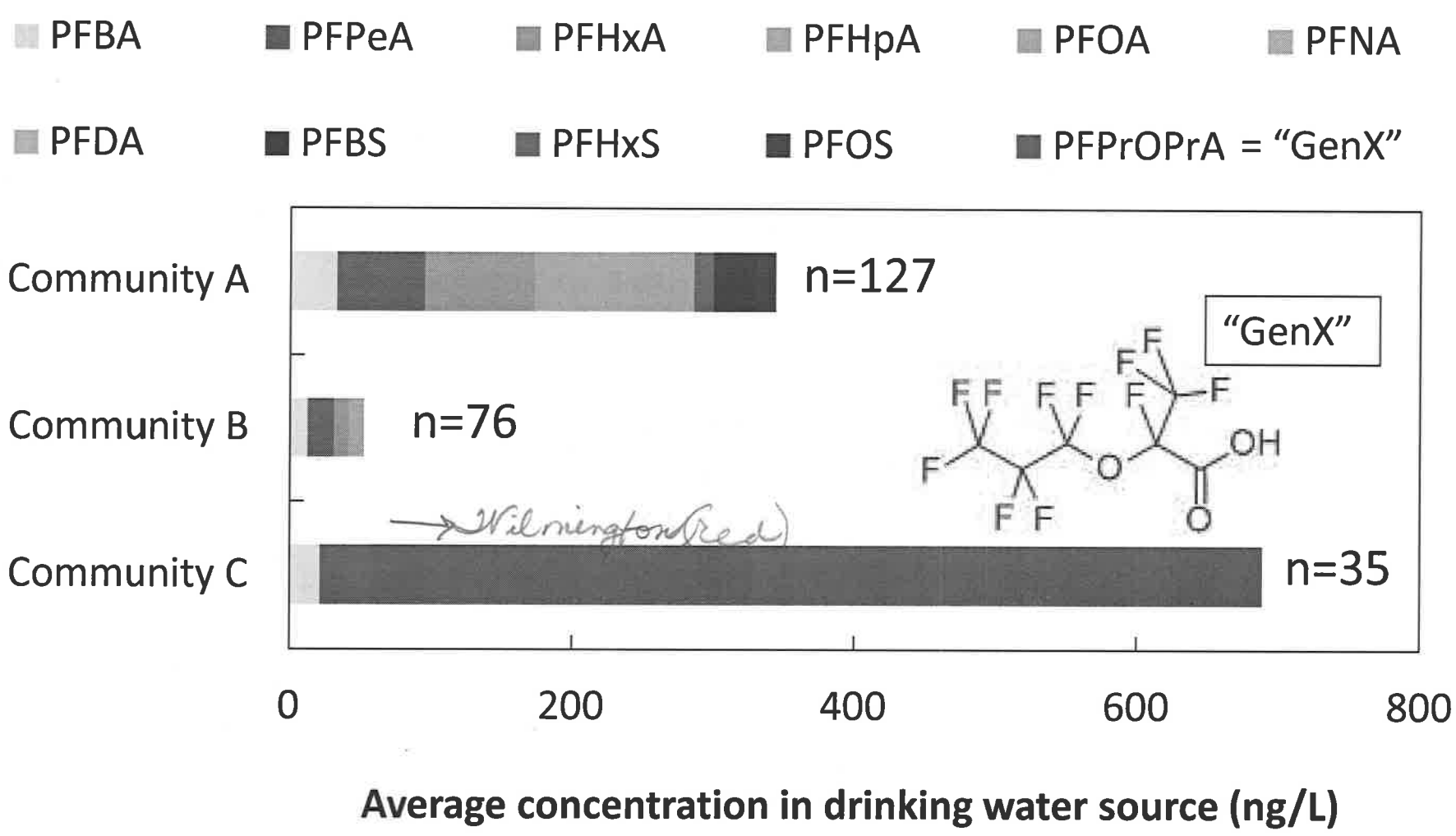
PFOS+PFOA Concentrations often exceed EPA's Health Advisory Level in Haw River at Bynum (Pittsboro drinking water source)



Land application of biosolids in watershed of a NC drinking water reservoir

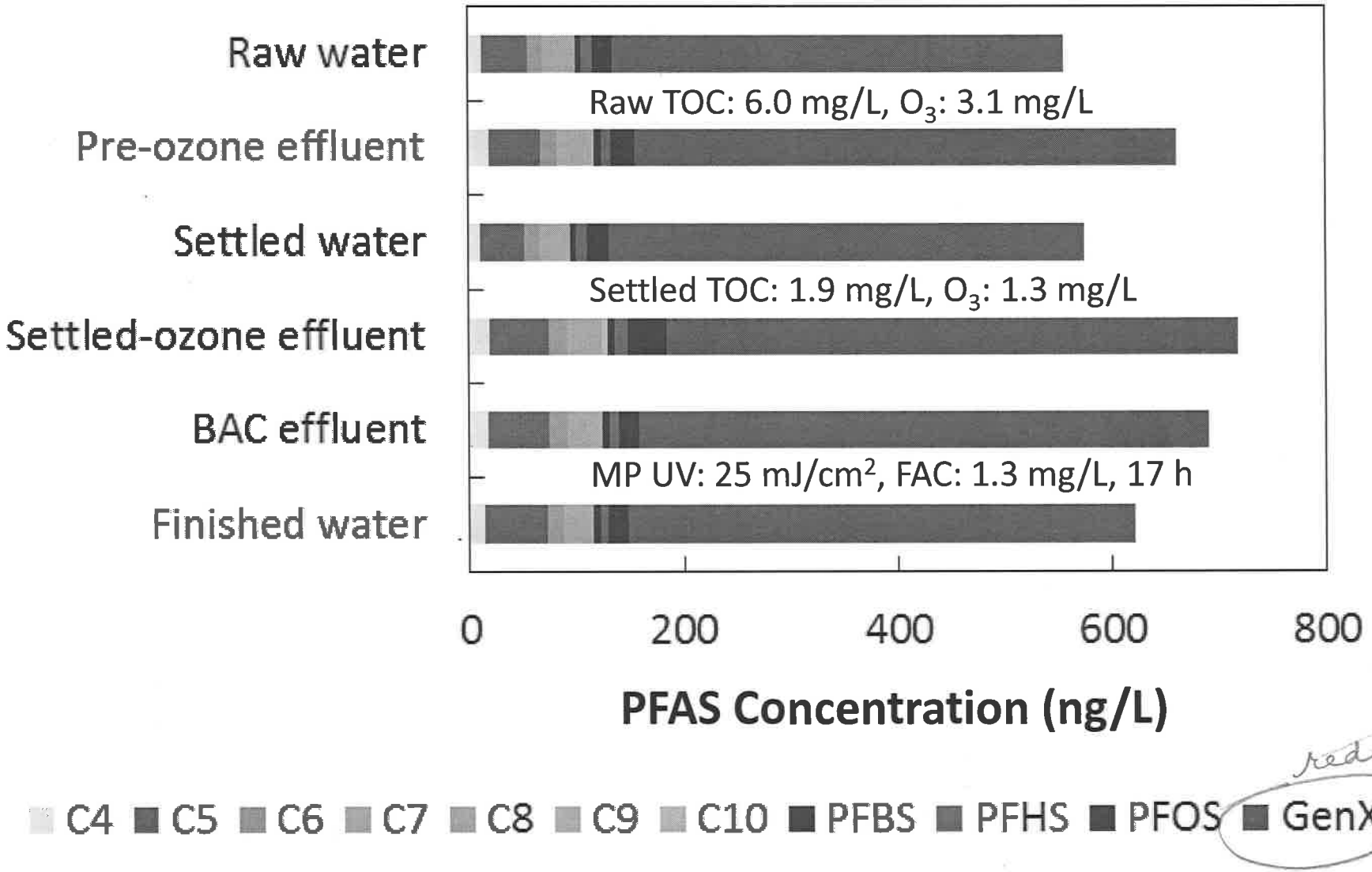


PFAS Occurrence in the Cape Fear River Basin

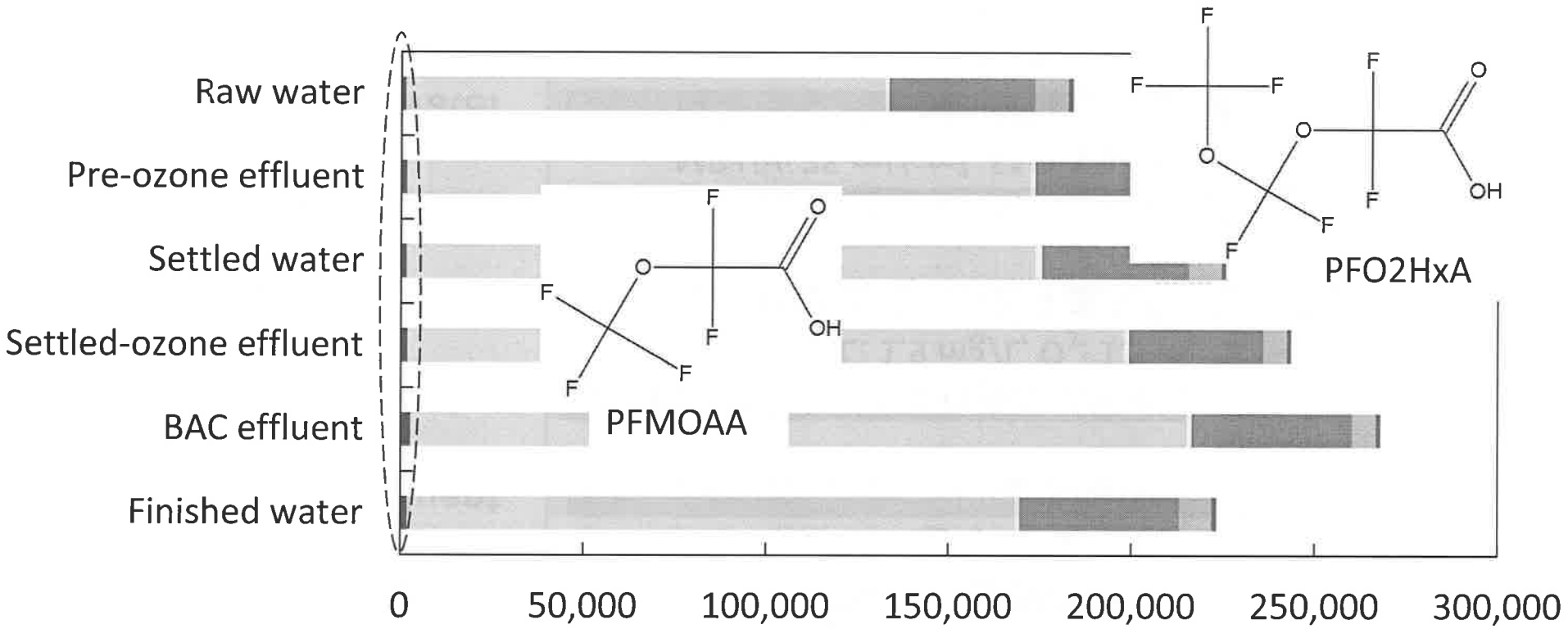


Sun et al. (2016) ES&T Letters

No measurable PFAS removal by conventional and advanced treatment



Recently discovered perfluoroalkyl ether carboxylic acids occur at substantially higher concentrations than traditional PFASs and GenX



Sun et al. (2016) ES&T Letters

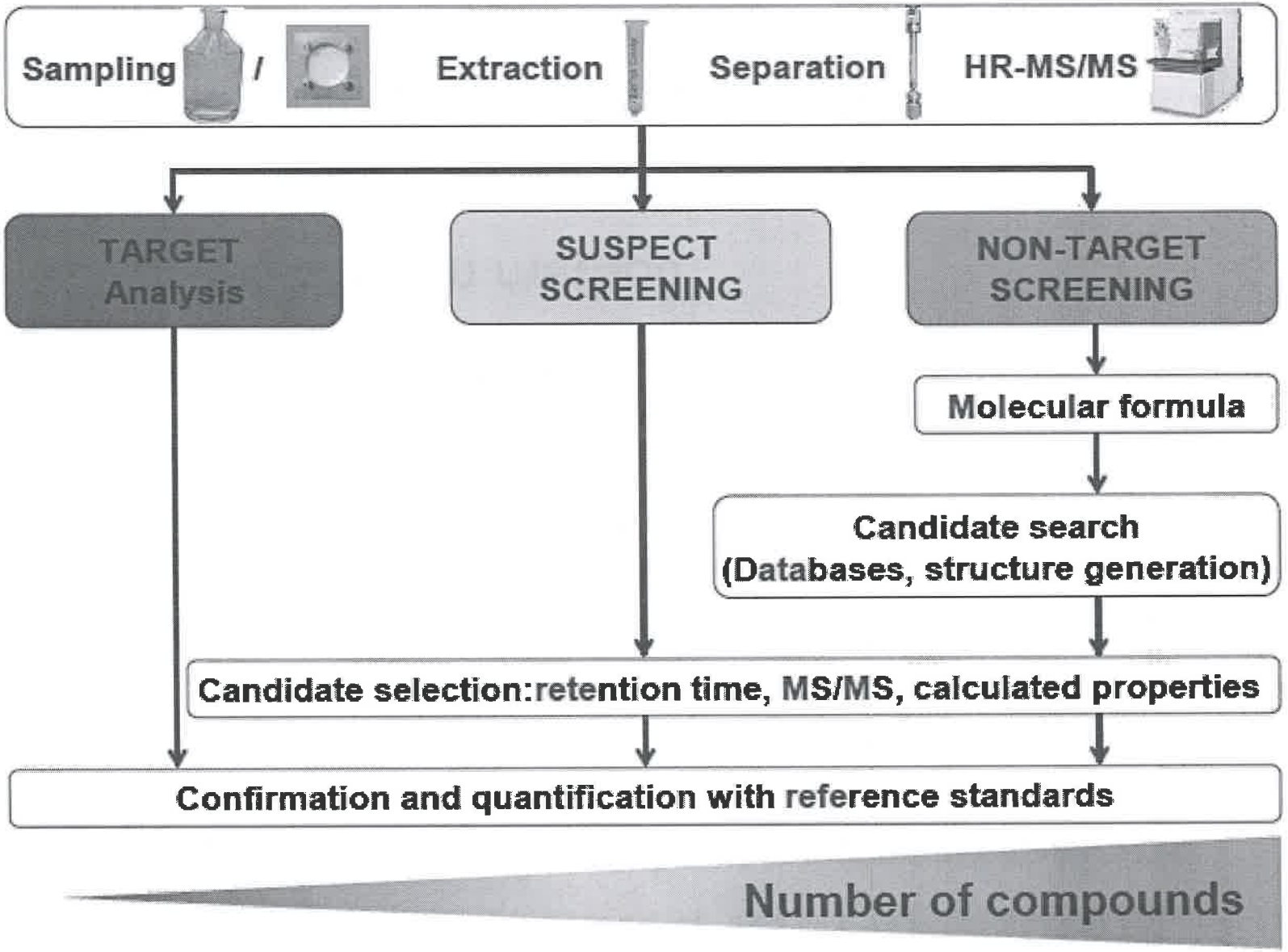
PFAS Management Considerations

- Control of upstream sources - most protective of downstream communities
  - NPDES discharges
  - Industrial pretreatment programs
  - Test biosolids prior to land application
  - Manage runoff from fire fighting (training) activities
- Treatment options
  - Activated carbon (effective for some PFASs, but not for others)
  - Anion exchange - shows great promise
  - Reverse osmosis

Take Home Messages

- Many unregulated contaminants are present in Cape Fear River water
- Some "emerging" compounds have been in the river for decades
- Some are by-products of manufacturing processes – lack of analytical standards, toxicity data
- New monitoring and permitting approaches are needed to protect drinking water quality in downstream communities

Work flow for analysis of organic chemicals



Hollender et al. 2014. *Chimia*

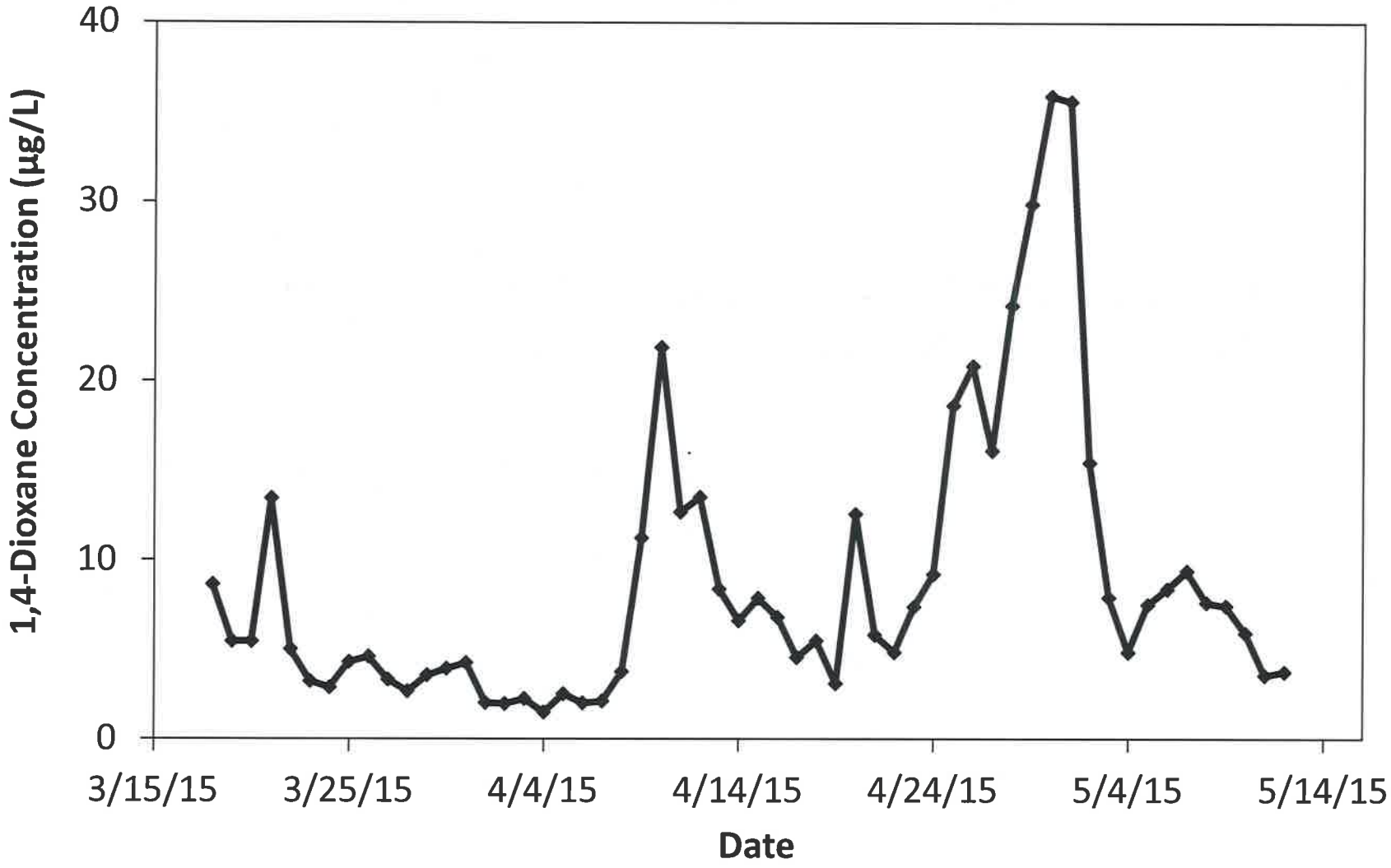
Challenges associated with measuring organic chemicals at low concentrations

- Sample collection
  - Sample containers and cleaning
  - Preservation
  - Representativeness
- Matrix Interference
  - Isotope dilution method
  - Matrix spikes
  - High resolution mass spectrometry

Sample collection

- Containers – QA/QC is important!
  - No leaching (blanks)
  - No sorption (fortified blanks)
  - Detergents can contain interferences (e.g. 1,4-dioxane)
- Preservation
  - Not a critical factor for persistent organic pollutants, but acidification helps control biological growth that interferes with sample filtration
  - Critical for reactive compounds (e.g. hydrolysis, biodegradation)
- Representativeness
  - Spatial (groundwater plume, surface water with multiple point and non-point sources)
  - Temporal (surface water with multiple point and non-point sources, hydrological conditions)

1,4-Dioxane concentrations vary rapidly in surface water – results of daily composite samples

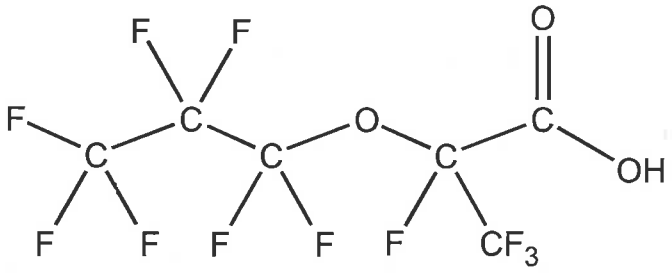


Matrix Interference

- Matrix interference is a commonly used argument to raise doubt about the accuracy of analytical results
- Proper QA/QC approaches are required:
  - Isotope dilution (spike known quantity of isotopically labeled analog into sample prior to sample extraction and analysis)
  - Matrix spikes
- High resolution mass spectrometry

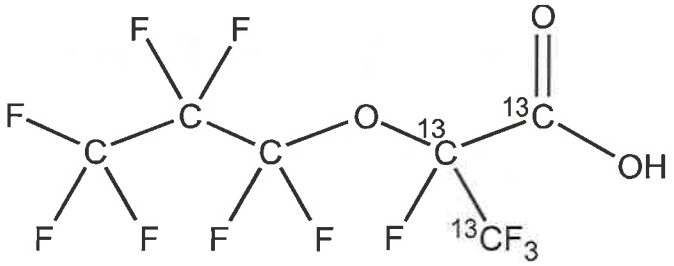
Isotope Dilution

- Need reference standards
  - Native (^{12}C, ^{1}H) for calibration standard preparation
  - Isotopically labelled (^{13}C, ^{2}H) internal standard added to calibration standards and unknowns



MW: 330 Da

GenX



MW: 333 Da

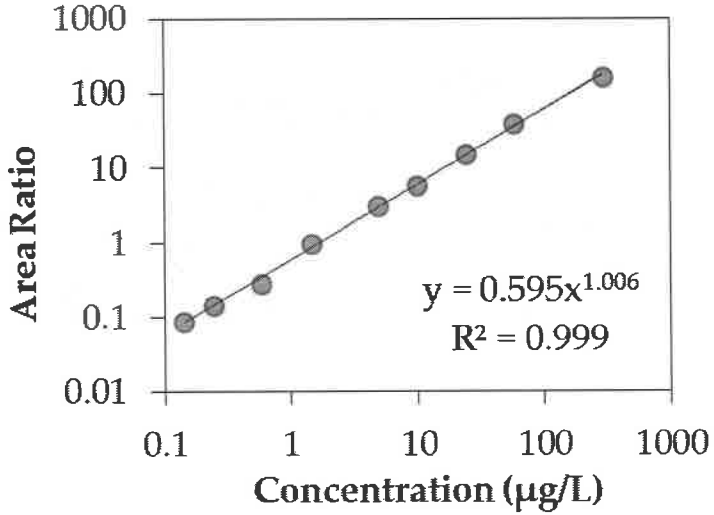
- Add isotopically labeled to sample prior to extraction to account for
  - Extraction efficiency and variability
  - Instrument variability

Isotope dilution

- Base calibration and sample analysis on area ratio:

  Analyte peak area/Internal standard peak area

- If extraction efficiency in a particular matrix is low, it is similarly low for analyte and internal standard
- If instrument response is affected (e.g. ion supression by background matrix), effect is similar for analyte and internal standard



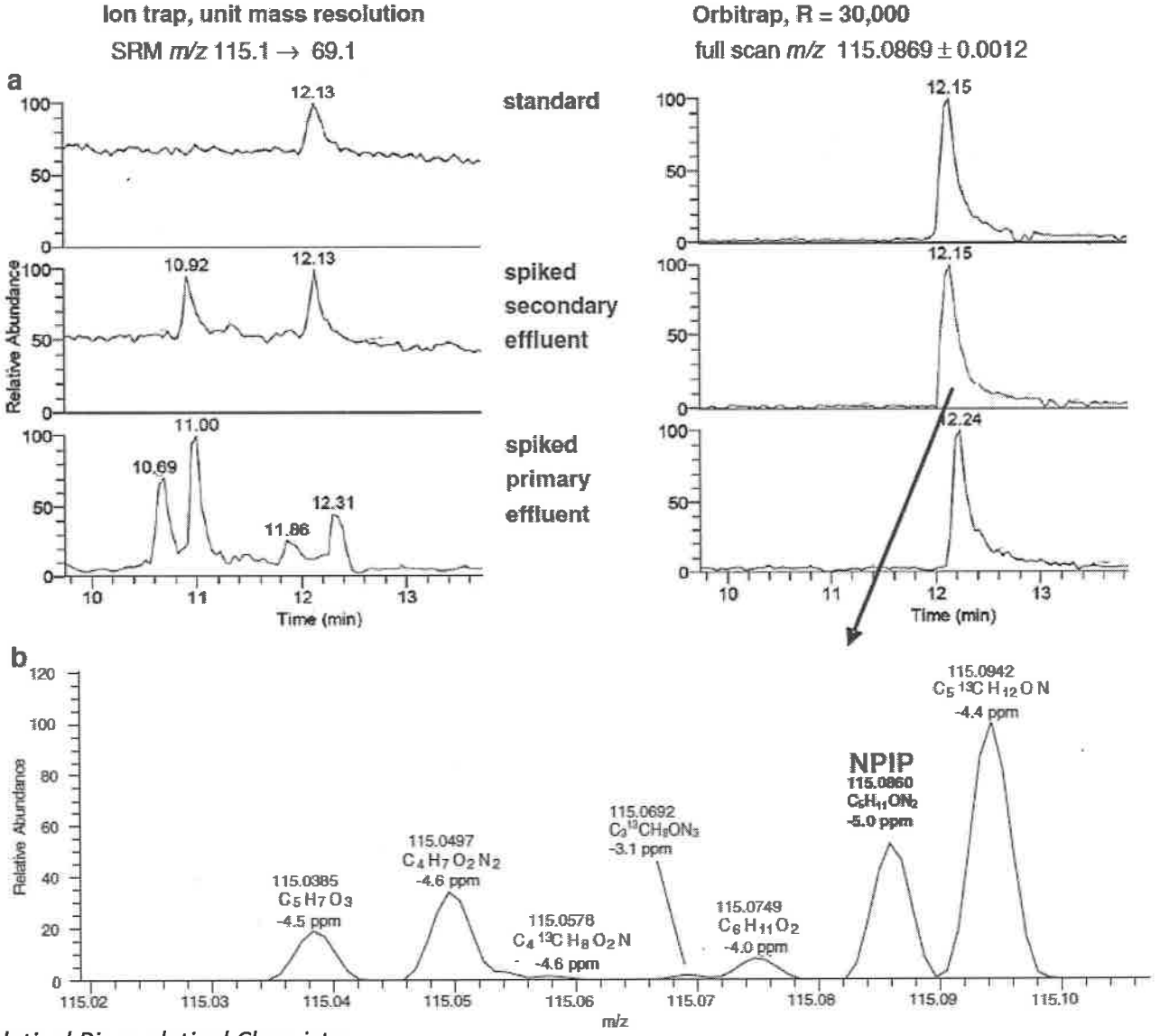
Matrix Spike Experiments: 1,4-Dioxane

Matrix	Background concentration (µg/L)	Recovery of matrix spike	RSD
Drinking Water A	<0.15	95-106%	4-5%
Drinking Water B	8.72	93%	2-5%
Groundwater A	<0.15	95-97%	5-9%
Groundwater B	1.36	86-95%	2-6%
Surface water A	<0.15	104-115%	7-8%
Surface water B	58.08	108-115%	2-3%
Wastewater A	2.15	99%	5-9%
Wastewater B*	118.45	103-113%	2-5%

* After 5 times dilution

Sun et al. 2016. ES&T

Enhanced selectivity with high resolution mass spectrometry



Krauss et al. 2010. *Analytical Bioanalytical Chemistry*

Thank you!

Questions:

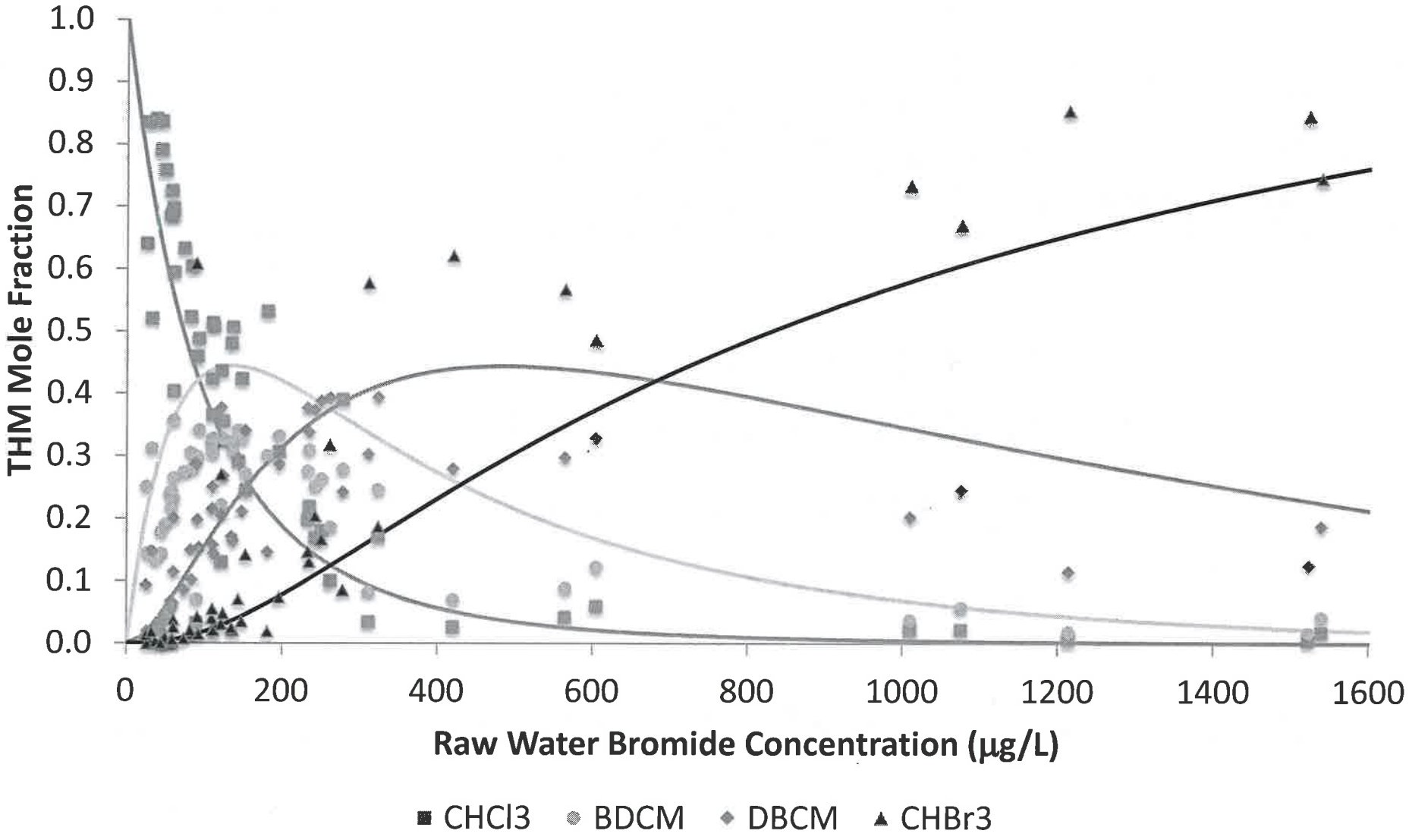
knappe@ncsu.edu

Bromide Impact on THM Compliance

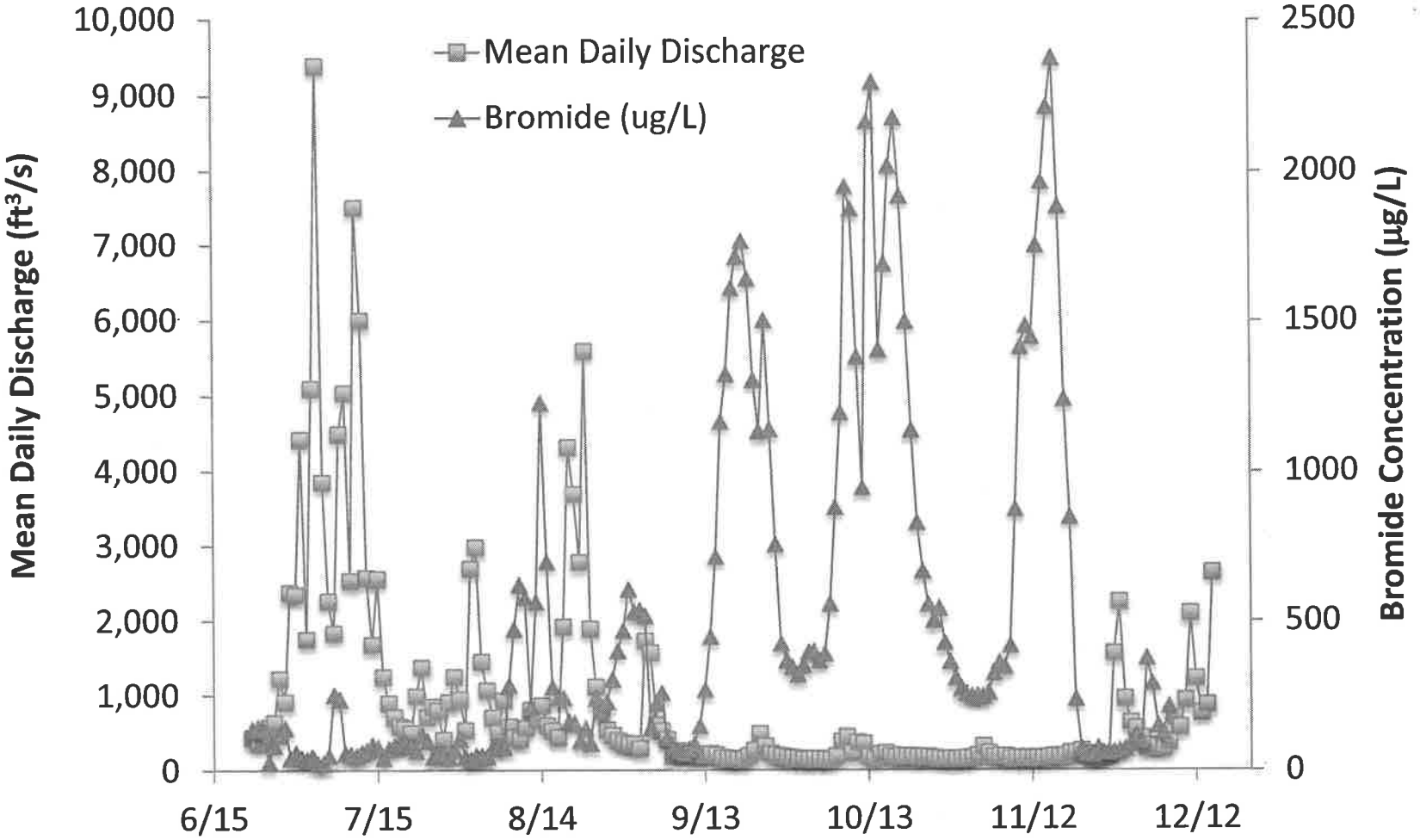
- Bromide reacts with HOCl to form HOBr
- HOBr shifts speciation to brominated DBPs
- Bromine weighs 2.25x chlorine….so shift towards brominated DBPs leads to higher DBP mass concentrations

	Quarter 3, 2003 (Raw Bromide = 50 µg/L)			Quarter 3, 2012 (Raw Bromide = 106 µg/L)		
	µmol/L	µg/L	Percent	µmol/L	µg/L	Percent
Chloroform	0.44	53	68%	0.21	25	27%
Bromodichloromethane	0.11	18	23%	0.20	32	34%
Dibromochloromethane	0.03	7	9%	0.14	29	31%
Bromoform	0	0	0%	0.03	7	8%
TTHM	**0.58**	**78**	**100%**	**0.57**	**93**	**100%**

Effect of bromide concentration on THM speciation

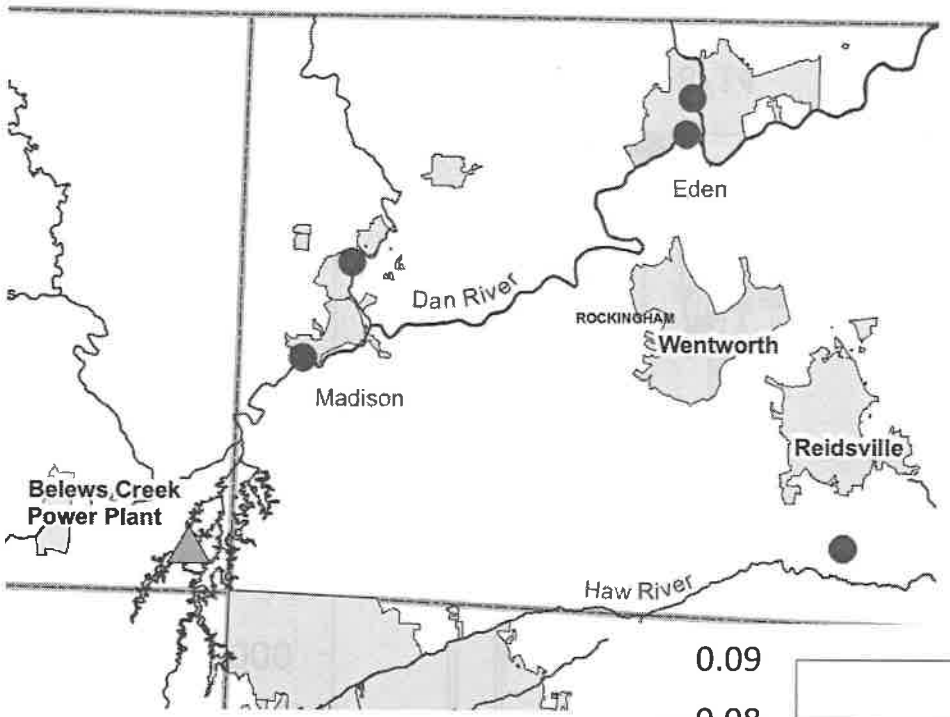


Bromide Concentrations and Streamflow (Community A Intake)

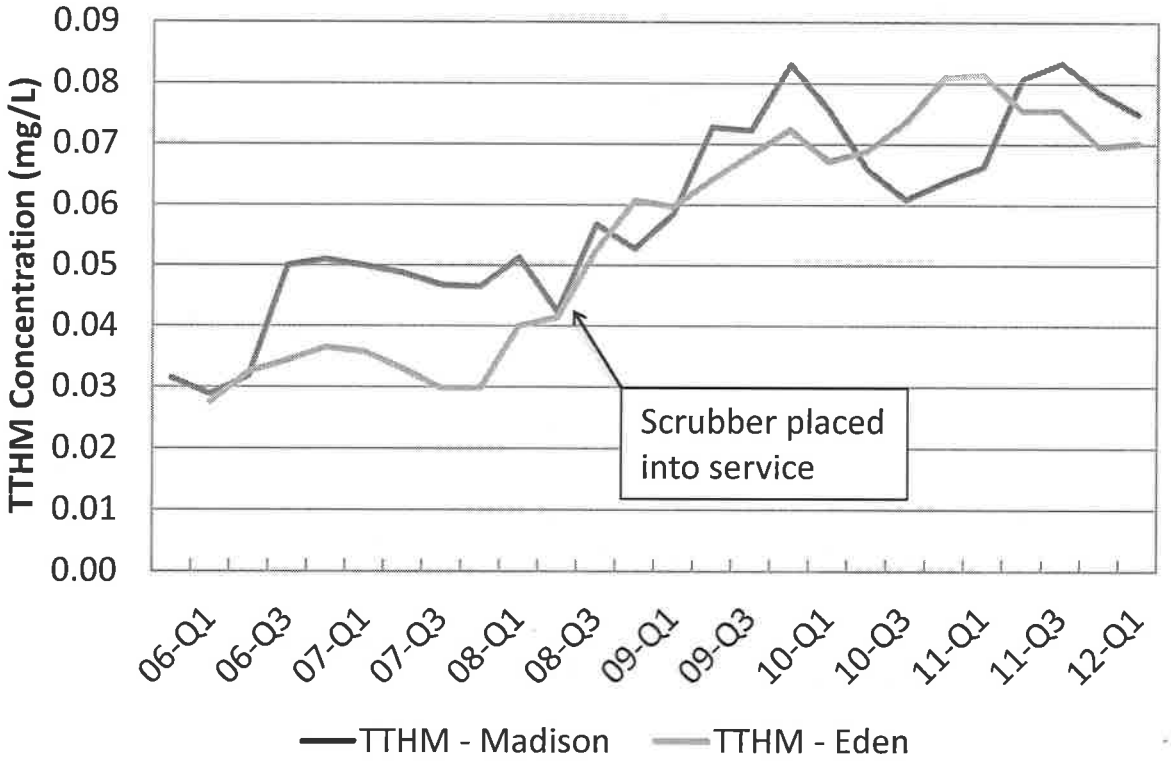


2013 Data

Dan River, NC



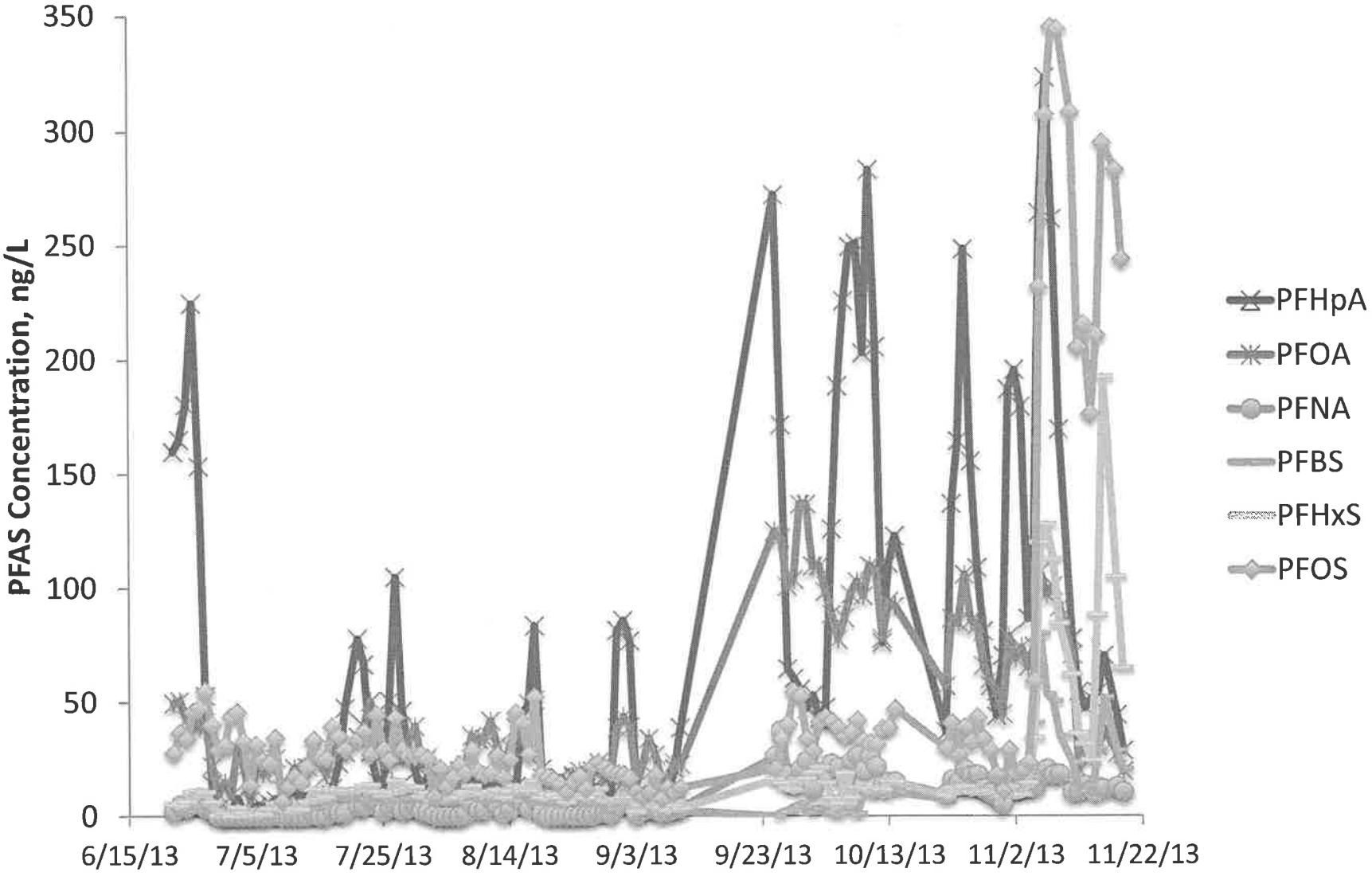
- Wet flue gas desulfurization scrubber went online in 2008
- No baseline bromide data
- 2011 bromide levels in Dan River at Eden reached 430 µg/L



Eden, NC:

- <20% brominated THMs in 2006
- >95% brominated THMs in 2011

PFAS Concentrations in Haw River at Bynum (Pittsboro source)





Nothing Compares
NORTH CAROLINA

Select Committee on North Carolina River Quality

October 26, 2017



Attachment 3

Material Topics

- Latest surface water and groundwater monitoring results
- Information on the air emissions from the Chemours Fayetteville Works facility
- How wastewater from the closed loop system at the facility is disposed of
- Improving the disclosure process for the NPDES permits
- Impact of interbasin transfers
- Description of Departmental resources devoted to the monitoring, analysis, and regulation of emerging compounds

Divisions

- Division of Water Resources
- Division of Waste Management
- Division of Air Quality



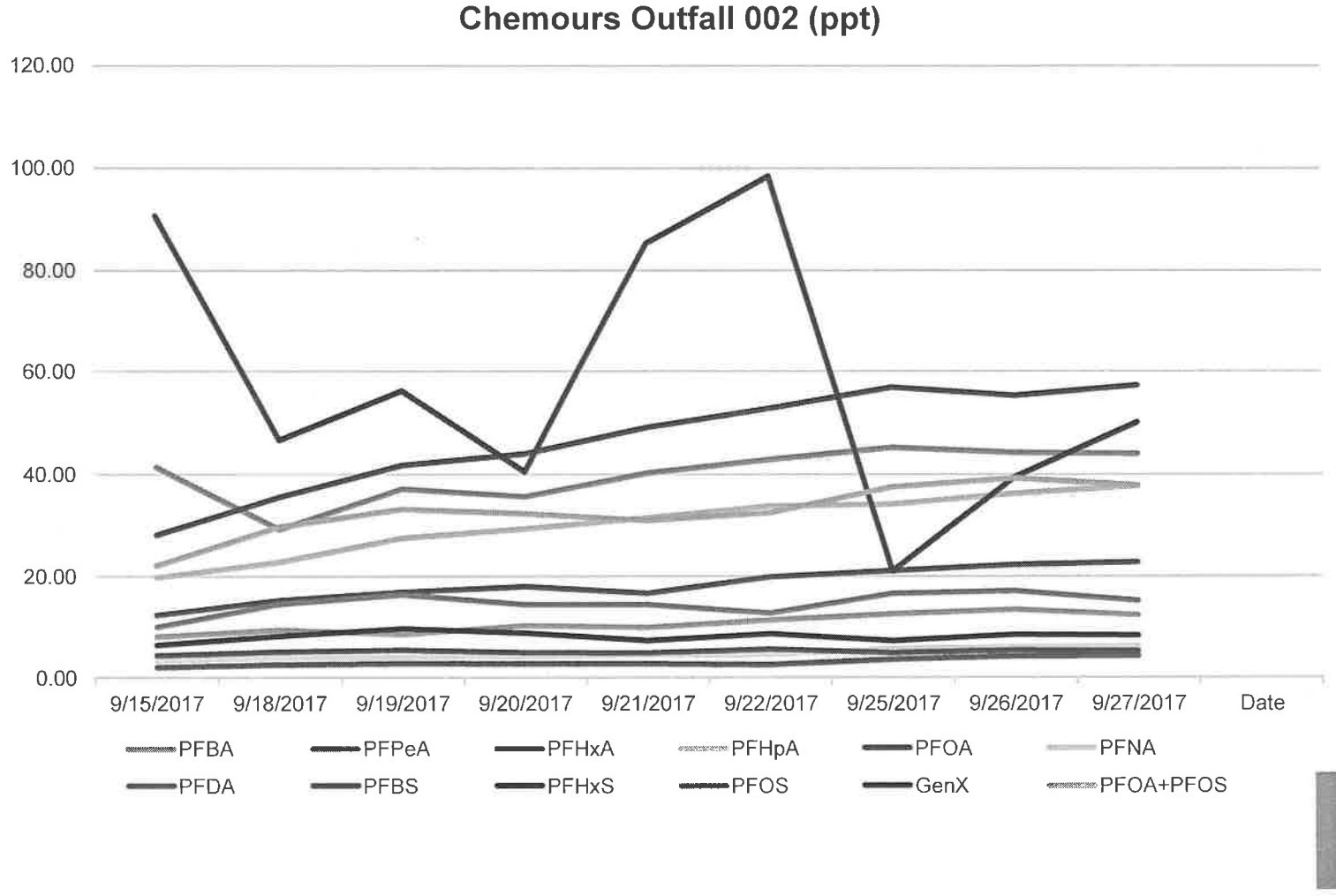
Nothing Compares

NORTH CAROLINA

Division of Water Resources



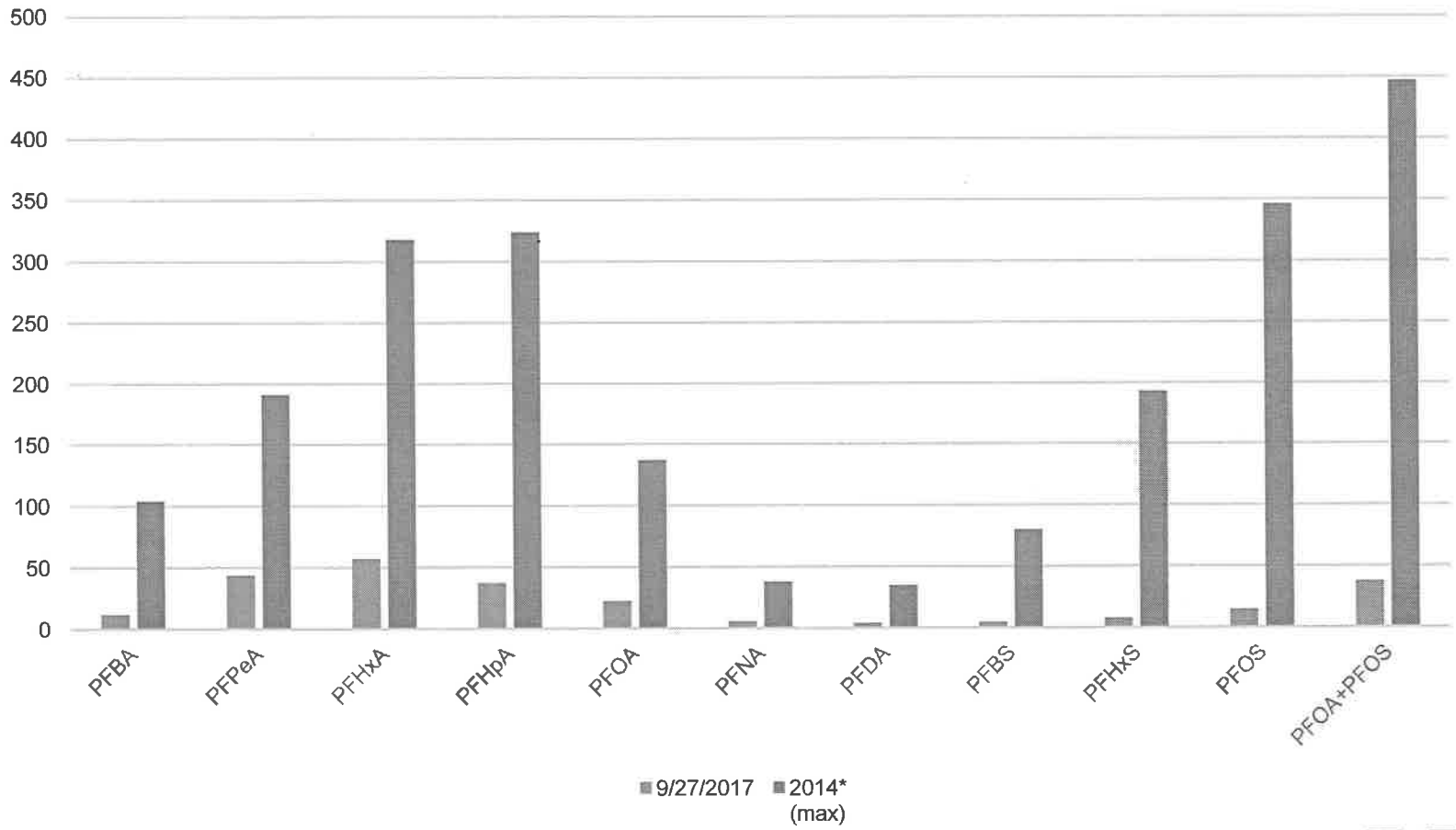
Latest Cape Fear River Sampling Data



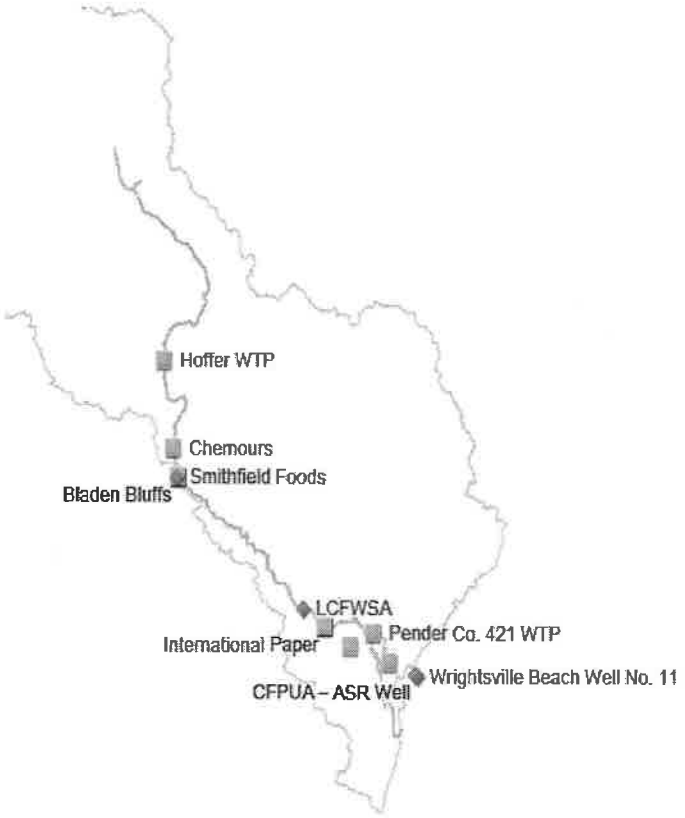
Drinking Water Samples

		Results (ppt)		
		9/14/2017	9/21/2017	9/28/2017
International Paper	PFOA	3.65	2.97	3.74
	PFOS	1.64 (J)	1.21 (J)	1.40 (J)
	PFOA+PFOS	5.29 (J)	4.18 (J)	5.14 (J)
	GenX	30.2	33.4	35.3
Cape Fear Public Utility	PFOA	15.1	10.1	12.1
	PFOS	17.2	17.3	14.5
	PFOA+PFOS	32.3	27.4	26.6
	GenX	33.2	36.1	28.9
Pender County	PFOA	12.2	2.74	2.87
	PFOS	0.544 (J)	1.02 (J)	0.977 (J)
	PFOA+PFOS	4.36 (J)	3.76 (J)	3.85 (J)
	GenX	40.4	41.0	42.4
NW Brunswick County	PFOA	9.98	7.96	8.16
	PFOS	7.78	5.98	7.78
	PFOA+PFOS	16.0	15.7	8.2
	GenX	33.1	35.0	24.3

Historic Comparison



DEQ Sampling



- Process area sampling at Chemours.
- Weekly composite sampling at the Chemours NPDES outfall 002.
- Weekly sampling of finished drinking downstream of the Chemours facility.

Division of Water Resources resources devoted to the monitoring, analysis, and regulation of emerging compounds

- Staff from the Fayetteville and Wilmington Regional Offices continue to conduct sampling initiated June 19th
- Evaluation of current renewal application and Chemours process manufacturing areas and potential contributions to chemical releases
- Onsite verification of wastewater containment
- Review of health studies and consultation with state and federal agencies
- Review of national and international water standards
- Research on wastewater and drinking water treatment technologies and effectiveness
- Coordination with laboratory support for analysis – EPA NERL, EPA SESD and private laboratories
- Quality Assurance review of lab data and research on test methods
- Organizing a workshop to help design future sampling plans to evaluate other end points – sediment, fish tissue, etc.
- Participating in public information meetings to ensure health directors, water utilities and the public have available information

Mass Spectrometer



Improving the Disclosure Process for NPDES Permits

Need to initiate a Deliberative and Transparent process

- Discussions need to include all Stakeholders:
  - Permitees both Industrial and Municipal
  - EPA (NPDES program is federally approved)
  - Environmental and Citizen Groups

- **Benchmark off other states' application processes with an emphasis on immediate surrounding states**

Guiding principles:

- Prioritize Environmental and Health Risks
- Understanding Emerging Science
- Regulatory Cost/Benefits

Impact of Inter Basin Transfers (IBTs)

§ 143-215.22L - Regulation of Surface Water Transfers Water Quality

- § 143-215.22L is about the movement of surface waters between river basins.
- The focus is water supply (water quantity) but does include water quality considerations.
  - *§ 143-215.22L (t) Statement of Policy. - It is the public policy of the State to maintain, protect, and enhance **water quality** within North Carolina. It is the public policy of this State that the reasonably foreseeable future water needs of a public water system with its service area located primarily in the receiving river basin are subordinate to the reasonably foreseeable future water needs of a public water system with its service area located primarily in the source river basin. Further, it is the public policy of the State that the cumulative impact of transfers from a source river basin shall **not result in a violation of the antidegradation policy** set out in 40 Code of Federal Regulations § 131.12 (1 July 2006 Edition) and the statewide antidegradation policy adopted pursuant thereto.*

§ 143-215.22L - Regulation of Surface Water Transfers Water Quality

- Water Quality is included in the permitting process in several ways.
  - *§ 143-215.22L (d) Environmental Documents. - The definitions set out in G.S. 113A-9 apply to this section. The Department shall conduct a study of the environmental impacts of any proposed transfer of water for which a certificate is required under this section. …*
  - *§ 143-215.22L (k) Final Determination: Factors to be Considered. - In determining whether a certificate may be issued for the transfer, the Commission shall specifically consider each of the following items and state in writing its findings of fact and conclusions of law with regard to each item:*
    - *§ 143-215.22L (2) The present and reasonably foreseeable future detrimental effects on the source river basin, including present and future effects on public, industrial, economic, recreational, and agricultural water supply needs,* ***wastewater assimilation, water quality****, fish and wildlife habitat, electric power generation, navigation, and recreation. …*
    - *§ 143-215.22L (4) The present and reasonably foreseeable future beneficial and detrimental effects on the receiving river basin, including present and future effects on public, industrial, economic, recreational, and agricultural water supply needs,* ***wastewater assimilation, water quality****, fish and wildlife habitat, electric power generation, navigation, and recreation. …*
  - *§ 143-215.22L (l) Final Determination: Information to be Considered. - In determining whether a certificate may be issued for the transfer, the Commission shall consider all of the following sources of information:*
    - *§ 143-215.22L (4) Information developed by or available to the Department on the* ***water quality of the source river basin and the receiving river basin****, including waters that are identified as impaired pursuant to section 303(d) of the federal Clean Water Act (33 U.S.C. § 1313(d)), that are subject to a total maximum daily load (TMDL) limit under subsections (d) and (e) of section 303 of the federal Clean Water Act, or that would have their assimilative capacity impaired if the certificate is issued.*

§ 143-215.22L - Regulation of Surface Water Transfers
Lower Cape Fear Interbasin Transfers

- Brunswick County - at the November 2013 meeting the EMC approved a 17 MGD transfer from the Cape Fear to the Shallotte and Waccamaw.

- Pender County has a grandfathered Interbasin Transfer and in March 2016 submitted a Notice of Intent for obtaining an Interbasin Transfer certificate of 14.5 MGD from the Cape Fear to the South, Northeast Cape Fear and New rivers.
  - Current status - the Environmental Assessment was completed in April 2017. DWR is reviewing the final documentation. The public hearing and comment period dates will be established.

- Sampling at the water treatment plants for both Brunswick and Pender Counties indicate GenX is in the finished water and concentrations are consistently below the health goal of 140 ppt.



Nothing Compares
NORTH CAROLINA

Division of Waste Management



Private Well Sampling Results

Private wells sampled:	**110**
Total # wells with exceedance of the GenX NC DHHS provisional health goal:	**40 (36%)**
Total # wells reported as not-detected (ND):	**36 (33%)**
Total # wells with a GenX detection (includes those above the health goal):	**74 (67%)**
Total # wells with a GenX detection less than the health goal:	**34 (31%)**
The maximum detected GenX concentration is	**1300 ng/L (ppt)**



Groundwater Next Steps

- Private wells
  - Chemours will sample wells at approximately 450 additional private properties. Sampling started October 12.
  - The sampling radius will be ~1 mile out from the site boundary line.
- Chemours On-Site Investigation
  - Sample some 40 additional on-site monitoring wells for Gen-X and other compounds of concern to determine groundwater contamination on-site.
  - Install both shallow and deep monitoring wells to refine the groundwater flow model for the site.
  - Conduct shallow and vertical soil profiling of Gen-X into deeper areas of the subsurface to learn the extant of soil contamination and the ability to impact the groundwater through leaching.
- Determine if Willis Creek is a discharge point for groundwater.
- Conduct Aquifer tests to determine transport characteristics of the subsurface.
- Determine the areas of the site that caused the releases of contaminants.

Chemours Sampling Map (Northern Area)



Chemours Sampling Map (Central Area)



Chemours Sampling Map (Southern Area)



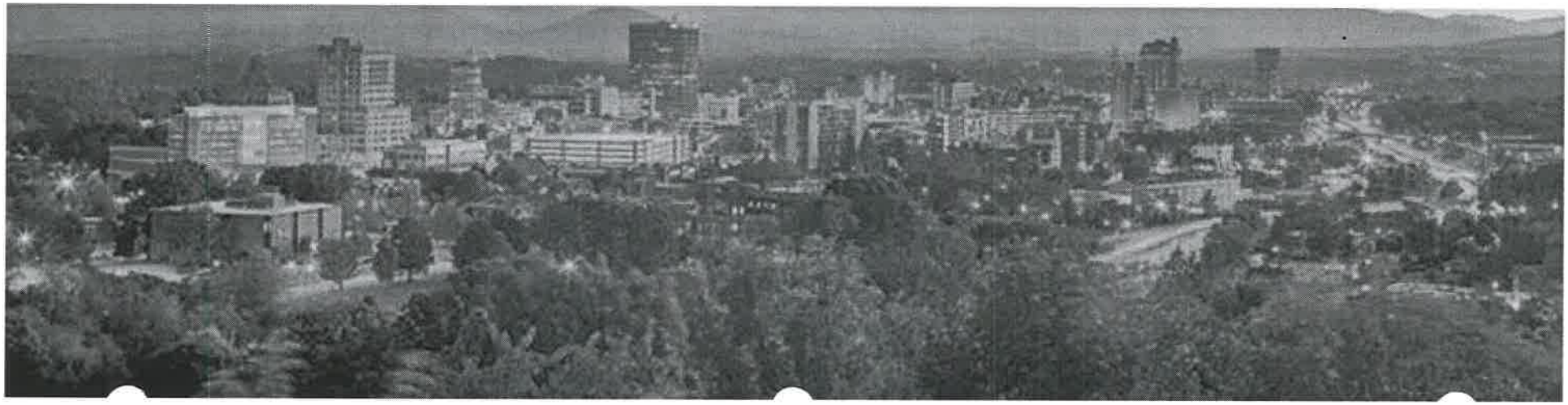
Division of Waste Management resources devoted to the monitoring, analysis, and regulation of emerging compounds

- 25 DWM staff are currently working on the GenX issue:
- Performing field sampling of private wells and surface waters
- Reviewing private well water data from Chemours and DEQ for data analysis,
- data QC, HREs, planning and mapping
- Reviewing on-site groundwater and soil data as part of the RCRA process
- Participating in public information meetings
- Participating in regular informational meetings and calls with external partners
- Working on press releases and responding to data requests
- Answering phone calls and email inquiries from the public and external partners
- Meeting and communicating with Chemours



Nothing Compares
NORTH CAROLINA

Division of Air Quality



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.
- Air emission data for other emerging contaminants has been received and is being analyzed by staff.
- Source information, emissions data, and stack parameters needed to conduct air dispersion modeling has been received.

Stack Testing

- DAQ and Chemours discussing/evaluating appropriate methods
- No "off the shelf" method. Developing test methods that will capture and measure the contaminants of interest
- Chemours has indicated that they will test to better quantify air emissions as soon as measurement issues are resolved.

Ambient Air Quality Monitoring

- DAQ and EPA discussing/evaluating appropriate methods, equipment and lab capabilities
- Do the contaminants act as a gas or a particle?
- What analytical detection limits are possible?

Air Deposition Modeling

- Source information, emissions data, and stack parameters needed to conduct air dispersion modeling have been received.
- Modeling will provide additional information about fate of air emissions.
- Could help inform ambient monitoring and groundwater sampling efforts.

Division of Air Quality resources devoted to the monitoring, analysis, and regulation of emerging compounds

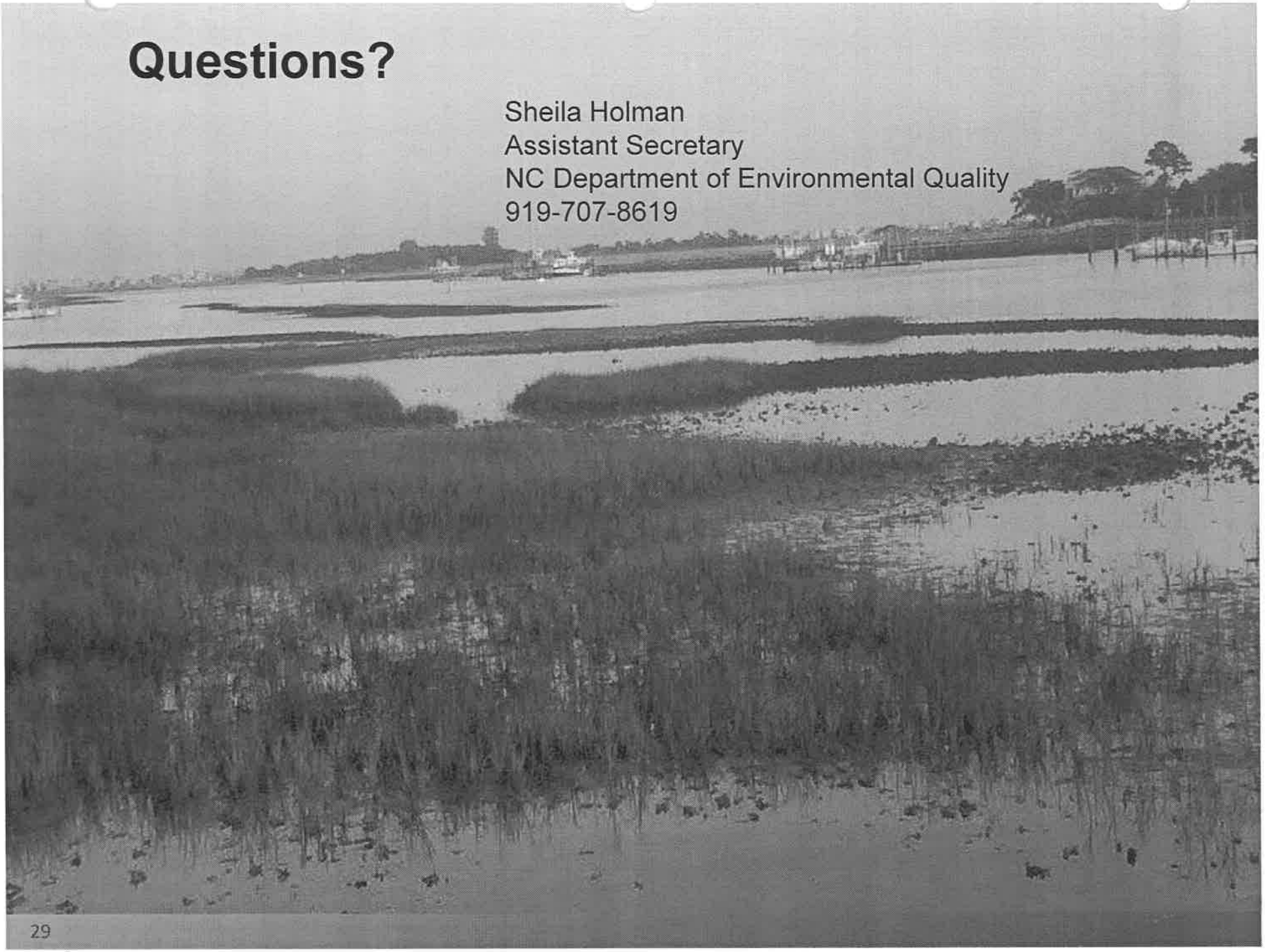
- Regional, permitting, monitoring, and compliance staff are all contributing to the analysis.
- Review information provided by Chemours
- Interactions with Federal/State and International contacts with experience with the contaminants of interest.
- Complex chemistry.
- Chemical and physical transformations of emissions in different conditions.

RECAP ACTIVITIES

- Monitoring the Facility for surface water and groundwater and
- Air emissions modeling
- Continuing to delineate off-site groundwater contamination and its potential sources
- Reviewing private well water data from Chemours and DEQ for data analysis, data QC, HREs, planning and mapping
- Evaluating chemical pathways (chemicals created and transformed)
- Determine future sampling needs
- Continuing to host community meetings
- Engaging Federal/State and International partners

Questions?

Sheila Holman
Assistant Secretary
NC Department of Environmental Quality
919-707-8619



Secretaries' Science Advisory Board

Elizabeth Cuervo Tilson, MD, MPH
State Health Director
Chief Medical Officer
NC DHHS

October 26, 2017

https://deq.nc.gov/news/hot-topics/genx-investigation/secretaries-science-advisory-board

Attachment 4

Secretaries' Science Advisory Board

- New charter expanded scope of the Secretaries' Science Advisory Board on Toxic Air Pollutants to include contaminants in the soil, groundwater, surface water, sediment, and air

- Advise and assist the Departments of Environmental Quality and Health and Human Services to protect the environment and public health

- Meet at least 6 times per year.

Functions

- Review and evaluate contaminants released to the environment
- Assist the agencies in identifying emerging contaminants and helping determine whether further study is needed
- Act as consultants on DEQ's determinations to regulate releases of contaminants
- Assist DHHS in the evaluation of the human health impacts of exposure to hazardous contaminants
- Giving input to DHHS as the agency establishes health goals for emerging contaminants

Members

- New charter increases membership of the board from eight to 16 members.
- Experts in toxicology, public health, ecology, engineering and related fields
- All members of the board are appointed by the DEQ and DHHS secretaries
- Combination of academic institutions, public, and private sectors.

https://deq.nc.gov/news/hot-topics/genx-investigation/secretaries-science-advisory-board/secretaries-science-advisory

Meetings

- First meeting - Oct 23rd, 2017
- Suggested initial priorities
  - Gen X
  - Other emerging compounds in the perflourinated alkyl substances (PFAS) family
  - Hexavalent chromium
  - Trichloroethylene (vapor intrusion)
- Future Meetings – tentative dates
  - Dec 4th
  - Jan 29th
  - March 19th

Attachment 5

Secretaries' Science Advisory Board

Member	Title	Background, expertise, affiliation
Jamie Bartram, Ph.D. (Chair)	Don and Jennifer Holzworth Distinguished Professor of environmental sciences and engineering at UNC's Gillings School of Global Public Health	Dr. Bartram is a professor and founding director of The Water Institute at the University of North Carolina at Chapel Hill. He is the Don and Jennifer Holzworth Distinguished Professor of environmental sciences and engineering at UNC's Gillings School of Global Public Health.
Tom Augspurger, Ph. D.	Ecologist/Environmental Contaminants Specialist at the U.S. Fish and Wildlife Service in Raleigh	Dr. Augspurger is an adjunct associate professor in the Toxicology Program at N.C. State University. He has expertise in ecology and environmental contaminants. He works for the U.S. Fish and Wildlife Service and has a certificate in toxicology.
W. Greg Cope, Ph.D.	Department Extension Leader, Applied Ecology and coordinator of N.C. State's Agromedicine Program	Dr. Cope is a professor in toxicology and fisheries biology at N.C. State University. His research areas include linkages among sentinel organisms, environmental health and human health, bioavailability, transport and fate of contaminants in aquatic ecosystems. His focus areas include pesticides, persistent organic pollutants, metals, sediment impacts, toxicological effects, reduction of non-point source pollutants and ecosystem function.
Richard T. Di Giulio, Ph.D.	Sally Kleberg Professor of Environmental Toxicology at Duke University's Nicholas School of the Environment	Dr. Di Giulio is a professor of environmental toxicology at Duke University's Nicholas School of the Environment. He is also the director of the Duke University Superfund Research Center and the integrated toxicology and environmental health program.
David Dorman, DVM, Ph.D., DABVT, DABT	Associate Dean, N.C. State University, College of Veterinary Medicine	Dr. Dorman is an associate dean for research and graduate studies at the N.C. State College of Veterinary Medicine and a professor of toxicology at N.C. State University. He is the chairman of the national research council

Member	Title	Background, expertise, affiliation
		subcommittee on emerging and continuous exposure guidance levels for selected submarine contaminants. He has been a member of the Science Advisory Board since 2011.
Elaina Kenyon, Ph.D., DABT	Research Toxicologist at the Environmental Protection Agency in Research Triangle Park	Dr. Kenyon is a toxicologist at the U.S. EPA and has experience in modeling, experimental design, metabolism studies and mechanistic toxicology. She has published research on air toxics, risk assessment and toxicological modeling. She has been member of the Science Advisory Board since 1996.
Thomas Starr, Ph.D.	Principal, TBS Associates	Dr. Starr has 30 years of professional experience in quantitative assessment of health and environmental risks from exposure to toxic substances and is well published in exposure assessment. He was a past member of the U.S. EPA's Science Advisory Board on halogenated organics.
Woodhall Stopford, MD, MSPH	Physician at the Duke University Medical Center, Dept. of Community and Family Medicine	Dr. Stopford has written more than 80 publications focusing on occupational toxicology and risk assessment of metals, volatile organic chemicals, pesticides, respirable quarts and contaminants in consumer products. He served on an EPA panel assessing the risks of dioxins in ceramics. he has been a member of the Science Advisory Board since 1990.
Michael Stoskopf, DVM, Ph.D., D.ACZM	Professor, Aquatics, Wildlife, and Zoological Medicine	Dr. Stoskopf is a professor of aquatics, wildlife and zoological medicine at N.C. State University. His research has included population, ecosystem and landscape approaches to health management of wildlife species.
John	National Program Director,	Dr. Vandenburg has led EPA's integrated science

Member	Title	Background, expertise, affiliation
Vandenburg, Ph.D.	Human Health Risk Assessment Program for the U.S. EPA	assessments for the criteria air pollutants and the integrated risk information system for high priority hazardous air pollutants. He has developed risk assessment guidelines in conjunction with California.
Betsey Tilson, M.D., MPH	State Health Director and Chief Medical Officer for the N.C. Department of Health and Human Services	Dr. Tilson is a pediatrician and preventive medicine physician. She currently serves as the state's health director and chief medical officer with the N.C. Department of Health and Human Services. Her focuses have included public health and prevention, as well as clinical quality standards.
Phillip Tarte, MPH	New Hanover County Public Health Director	Dr. Tarte is the New Hanover County Health Director with more than 21 years of experience in the public health arena. He previously served as the Union County Public Health Director.
Viney Aneja, Ph.D.	Co-Director Graduate Programs, and Professor at N.C. State University	Dr. Aneja is a professor in the Department of Marine, Earth and Atmospheric Sciences at N.C. State University. He was recently appointed to the U.S. EPA's Board of Scientific Counselors Executive Committee and serves as the chair of the subcommittee for the Air, Climate and Energy research program.
Jaqueline MacDonald Gibson, Ph.D.	Associate Professor at UNC's Gillings School of Global Public Health	Dr. Gibson has a multi-disciplinary background in mathematics, engineering and science that she has applied to study risk assessment, policy and communication for more than 25 years. Much of her research centers on predicting population health impacts of alternative environmental policy decisions.
)etlef Knappe, Ph.D.	Professor at N.C. State University, Dept. of Civil, Construction and Environmental Engineering	Dr. Knappe is a member of the Drinking Water Committee of the U.S. EPA's Science Advisory Board, a trustee of the American Water Works

Member	Title	Background, expertise, affiliation
		Association's (AWWA's) Water Science and Research Division, a Topical Editor for the Open Access Journal Drinking Water Engineering and Science, and a member of the AWWA's Organic Contaminants Research Committee and the Standards Committee for Activated Carbon. In November 2016, Dr. Knappe and co-authors at the EPA and UNC-Charlotte published research showing elevated levels of GenX in drinking water at a plant near Wilmington.
Gina Kimble, Ph. D.	Laboratory supervisor for the city of Charlotte	Dr. Kimble works at Charlotte Water as a laboratory supervisor. She has participated in Water Research Foundation projects related to water quality and analytical method development. She serves as the Charlotte Water representative for the N.C. Urban Water Consortium and an advisory committee member for the N.C. Water Resources Research Institute.

N.C. DHHS Staffing for GenX Response and Calculation of Provisional Health Goal

Danny Staley, MS
Director, Division of Public Health
NC DHHS

Zack Moore, MD, MPH
State Epidemiologist
Division of Public Health, NC DHHS

October 26, 2017

Attachment 6

N.C. DHHS Staffing for GenX Response

- Public health roles in response
  - 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
- Identify Department resources/staff performing these functions and provide relevant detail

Occupational and Environmental Epidemiology

Program Manager

Office Assistant 2

OCCUPATIONAL SURVEILLANCE

Public Health Epidemiologist – 1

PRIVATE WELLS

Environmental Program Consultant – 2

CLIMATE AND HEALTH PROGRAM

Environmental Program Consultant

Public Health Educator

CHEMICAL PREPAREDNESS AND RESPONSE

Environmental Program Consultant*

Public Health Epidemiologist

HEALTH ASSESSMENT, CONSULTATION AND EDUCATION PROGRAM

Environmental Program Consultant*

Environmental Program Consultant*

Public Health Educator*

MEDICAL EVALUATION AND RISK ASSESSMENT

Medical Consultant*

Public Health Epidemiologist*

Environmental Toxicologist* 4

Office Assistant

INDUSTRIAL HYGIENE CONSULTATION

Industrial Hygiene Consultant

Industrial Hygiene Consultant 3

Processing Assistant

OCCUPATIONAL NURSE CONSULTATION

Nurse Consultant 1

KEY

Federal: 9 FTE | State: 10 FTE

* Involved in GenX response

Staff Resources for GenX Response

- Environmental Toxicologist
- Environmental Program Consultants
- Public Health Educator
- Medical Consultant
- Public Health Epidemiologist

Timeline of Environmental Epidemiology

2002–2008:

2 FTE PhD-level Toxicologist positions

2008–2015:

1 FTE PhD-level Toxicologist position

2015–present:

Emerging contaminants (hexavalent chromium, PFAS)

N.C. DHHS Provisional Health Goal

- Describe research and studies that contributed to the establishment of the 140 parts per trillion health goal for GenX
- Provide relevant detail regarding sources of data (studies, etc.) and processes used in developing the health goal

What is a Health Goal?

- Level of contamination below which no adverse health effects would be expected over a lifetime (70 yrs.) of exposure
- Calculated based on the most vulnerable population
- Non-regulatory, non-enforceable
- Change as new information becomes available

Health Goal: Requirements

- Must have sufficient health-related information
  - Animal studies usually form the basis to establish a goal
  - Epidemiologic studies (human health)
  - Other laboratory studies
- Some health-related information not in public domain
- Health-related information often lacking for emerging compounds

Health Goal: Calculations

- Health Goal = (*Reference Dose* x *Relative Source Contribution* x Body Weight) ÷ Water Intake Rate
- Reference dose = *No Adverse Effect Level* ÷ *Uncertainty Factors*
- Terms to define:
  - No Adverse Effect Level (NOAEL)
  - Reference dose (RfD)
  - Uncertainty Factors (UF)
  - Relative Source Contribution (RSC)

https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments

Definitions: No Adverse Effect Level (NOAEL)

- Used as Point of Departure for calculations
- Experimentally determined dose at which there is no statistically or biologically significant indication of the toxic effect of concern - derived from animal studies
- Usually based on laboratory animal studies

https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments

Definition: Uncertainty Factors (UF s)

- Factors used in calculations to represent specific areas of uncertainty in the available data
- Standard UFs include
  - **Intraspecies UF**: Accounts for variation in sensitivity among the members of the human population
  - **Interspecies UF**: Accounts for uncertainty involved in extrapolating from animal data to humans
  - **Subchronic to chronic UF**: Accounts for uncertainty involved in extrapolating from less-than-chronic NOAELs to chronic NOAELs

https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments

EPA Guidance for Use of Uncertainty Factors

- Use a 10-fold factor when extrapolating from valid experimental results in studies using prolonged exposure to average healthy humans
- Use an additional 10-fold factor when extrapolating from valid results of long-term studies on experimental animals
- Use an additional 10-fold factor when extrapolating from less than chronic results on experimental animals when there are no useful long-term human data

https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments

Definition: Reference Dose (RfD)

- Daily dose below which health effects are not expected in human populations (mg/kg/day)
- Derived from the NOAEL by consistent application of generally order-of-magnitude uncertainty factors that reflect various types of data sets used to estimate RfDs
- RfD = NOAEL ÷ UF

https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments

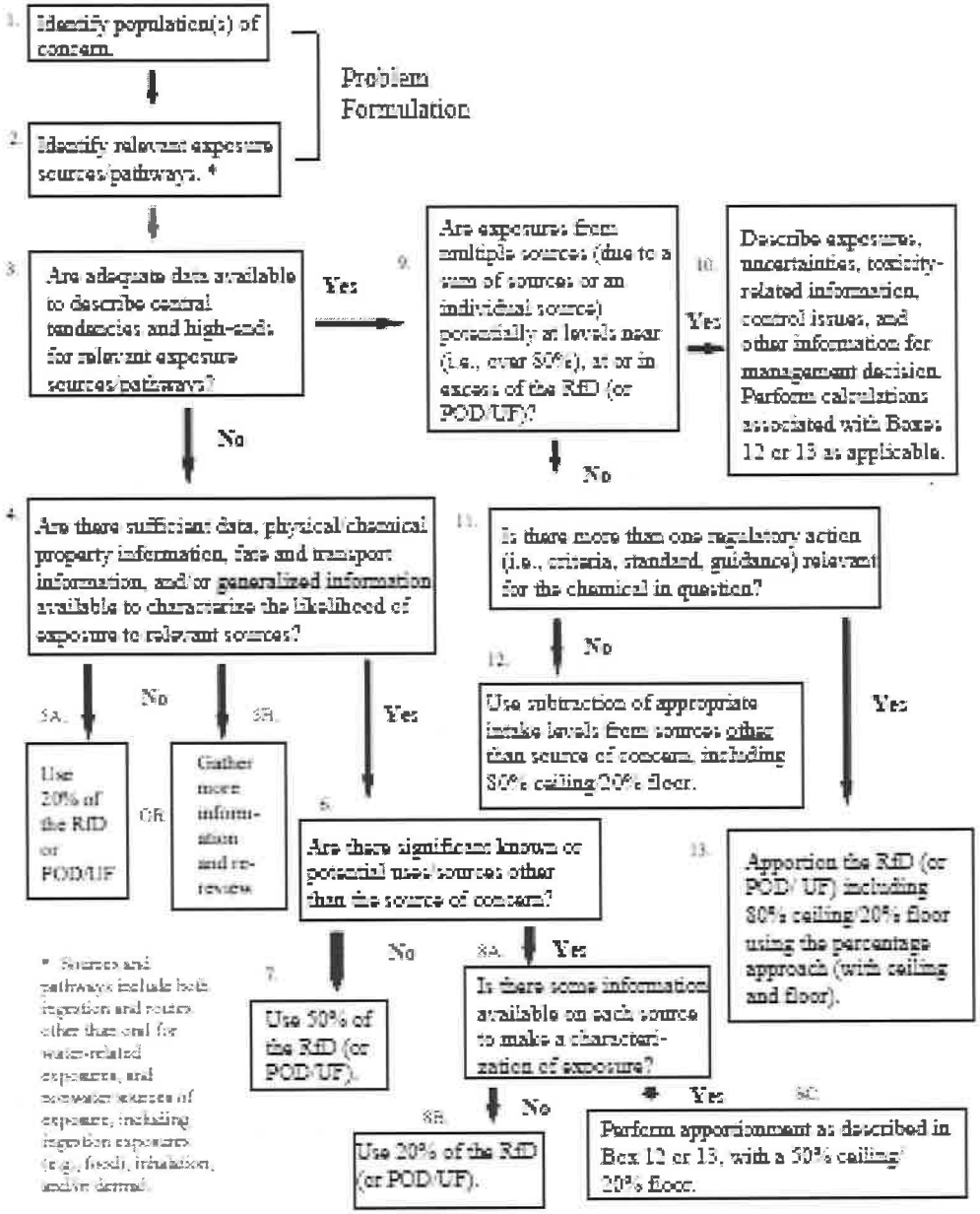
Definition: Relative Source Contribution (RSC)

- Percentage of reference dose exposure attributed drinking water
- Accounts for possibility of non-water sources of exposure, such as
  - Foods
  - Inhalation
  - Skin absorption
- Guidelines available from EPA for compounds with limited data
- 20% RSC used for GenX health goal calculations

https://nepis.epa.gov/Exe/ZyPDF.cgi/20003D2R.PDF?Dockey=20003D2R.PDF

Figure 4-1

Exposure Decision Tree for Defining Proposed RfD (or POD/UF) Apportionment



Point of Departure for GenX Health Goal

- NOAEL = 0.1 mg/kg/day
- Based on 28-day oral ingestion mouse study conducted by Chemours (2008)
  - 0 mg/kg/day.....(20 male, 20 female)
  - 0.1 mg/kg/day...(10 male, 10 female)
  - 3 mg/kg/day.....(10 male, 10 female)
  - 30 mg/kg/day.....(20 male, 20 female)
- NOAEL based on liver effects in male mice

https://echa.europa.eu/registration-dossier/-/registered-dossier/2679/7/6/2/?documentUUID=7fde65ec-5187-42ef-8e05-58436035a555

Calculation of GenX Reference Dose

- Reference dose (RfD) = NOAEL ÷ UF
  - NOAEL = 0.1 mg/kg/day
  - UF = 1,000
    - 10 intraspecies
    - 10 interspecies
    - 10 subchronic to chronic
- RfD = 0.1 mg/kg/day ÷ 1,000
- RfD = 0.0001 mg/kg/day

https://ncdenr.s3.amazonaws.com/s3fs-public/GenX/NC%20DHHS%20Risk%20Assessment%20FAQ%20Final%20Clean%20071417%20PM.pdf

Calculation of GenX Health Goal

- Health Goal = (Reference Dose (mg/kg/day) x RSC x body weight (kg)) ÷ intake rate (L/day)
- Used body weight and intake rate values for bottle fed infants to calculate the most health protective goal to protect the most vulnerable
- Health Goal = (0.0001 mg/kg/day x 0.20 x 7.8 kg*) ÷ 1.113 L/day**
- Health Goal = 0.00014 mg/L = 140 ppt

* EPA EFH Table 8-1: Weighted average of mean body weight from 0-12 months [EPA 2011, ATSDR 2016a]

**EPA EFH Table 3-1: Weighted average of 95th percentile for consumers from 0-12 months [EPA 2011, ATSDR 2016b]

Provisional Health Goal: Considerations

- Applies only to GenX, not related compounds
  - Sufficient information not available to calculate health goals for other emerging per- and polyfluorinated compounds
  - Sufficient information not available to assess additive risk of all per- and polyfluorinated compounds in combination
- Represents level of chronic exposure which is not likely to result in adverse effects to humans
- Subject to change based on new information

Questions?

Cape Fear
Public Utility Authority
Stewardship. Sustainability. Service.

Update on CFPUA Response to Cape Fear River Water Quality Concerns

October 26, 2017

Attachment 7

House Bill 56 – Interim Report

1. Study identification and deployment of treatment alternatives ($100,000)

2. Ongoing water monitoring ($85,000)

3. Information sharing
   - Interim Report (no later than December 1, 2017)
   - Final Report (no later than April 1, 2018)

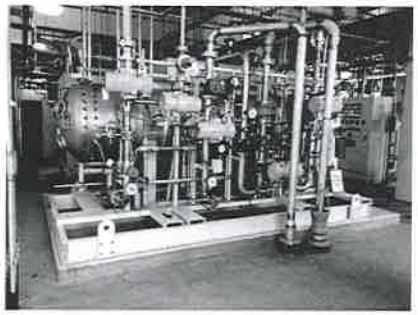
Response Measures Underway

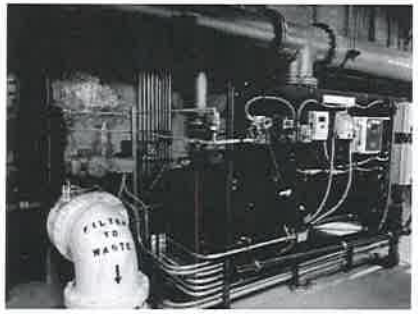
1. Water treatment alternative evaluation for removing PFASs, Gen-X and emerging compounds
   - Screening technologies
     - Desktop study
     - Bench-top study (ACT column)
     - Pilot Scale Study

2. Water supply monitoring
   - UNCW support contract
   - Routine testing

3. Information sharing through website
   - Water test results
   - Monthly report deliverables from Black & Veatch

Advanced Treatment in Place



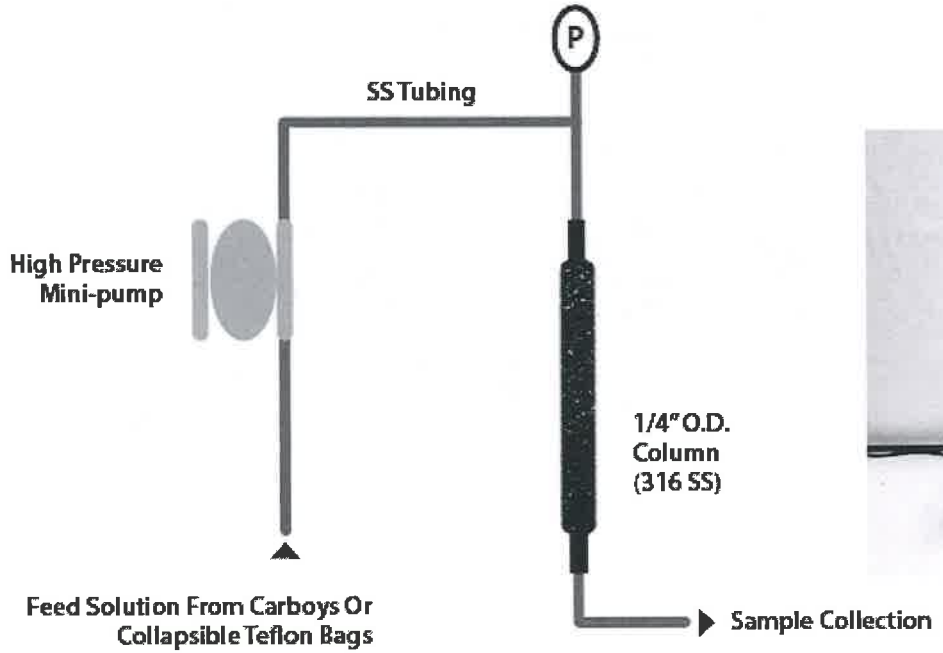


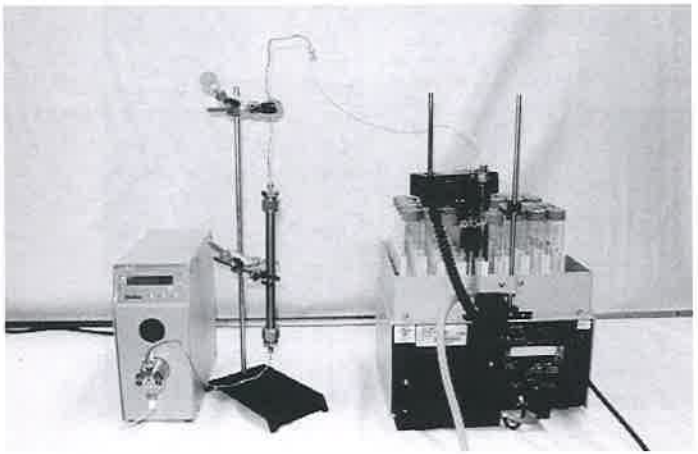


Technology	Barrier to Contaminant
• Ozonation	• Pathogens • Pharmaceuticals • Endocrine disruptors • Taste & odor causing compounds
• Biological Filtration	• Taste & odor causing compounds • Disinfection byproduct precursors
• Ultraviolet Disinfection	• Cryptosporidium (disinfection)

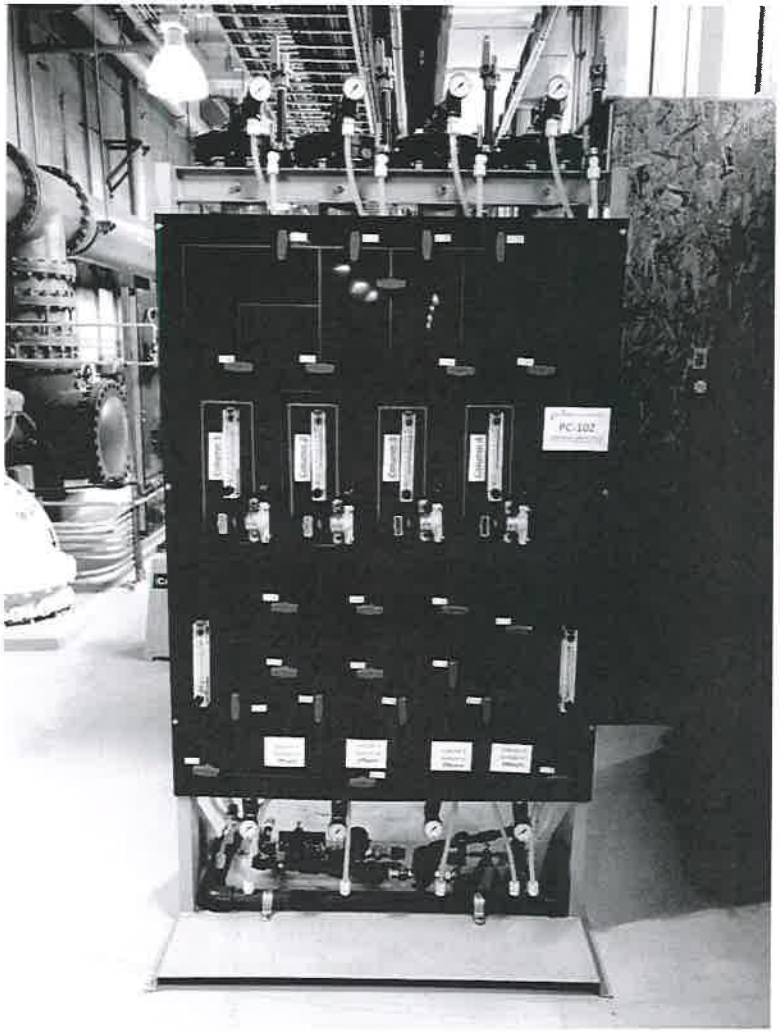
Accelerated Column Test (ACT)

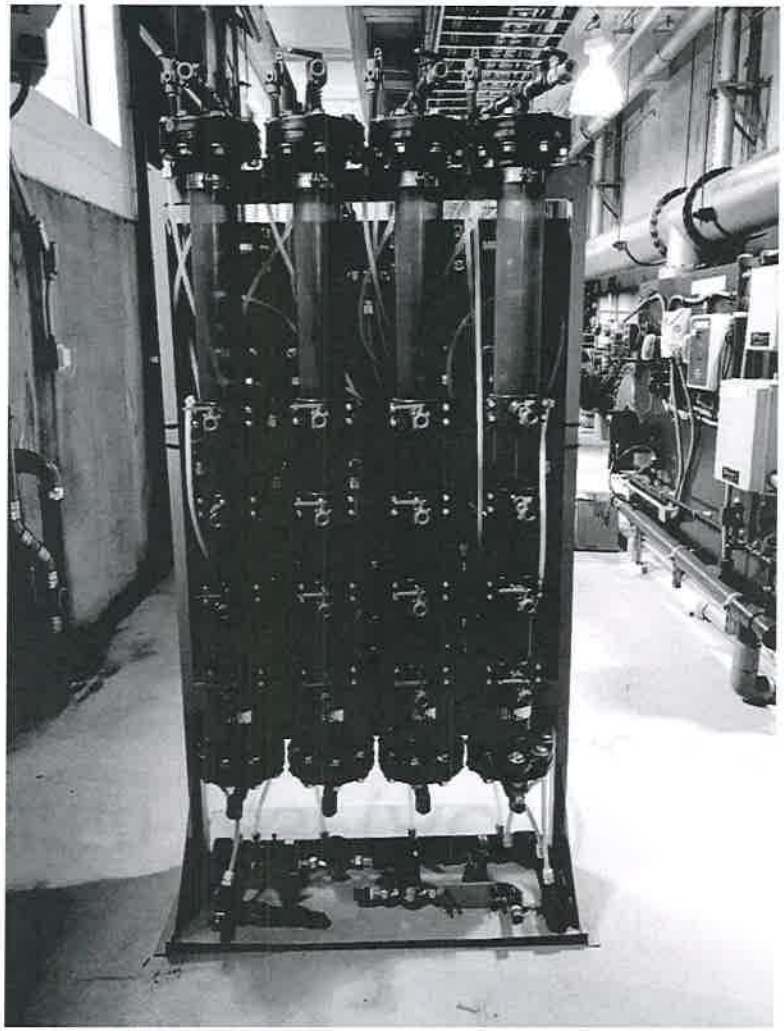
Completed in late Sept, 2017



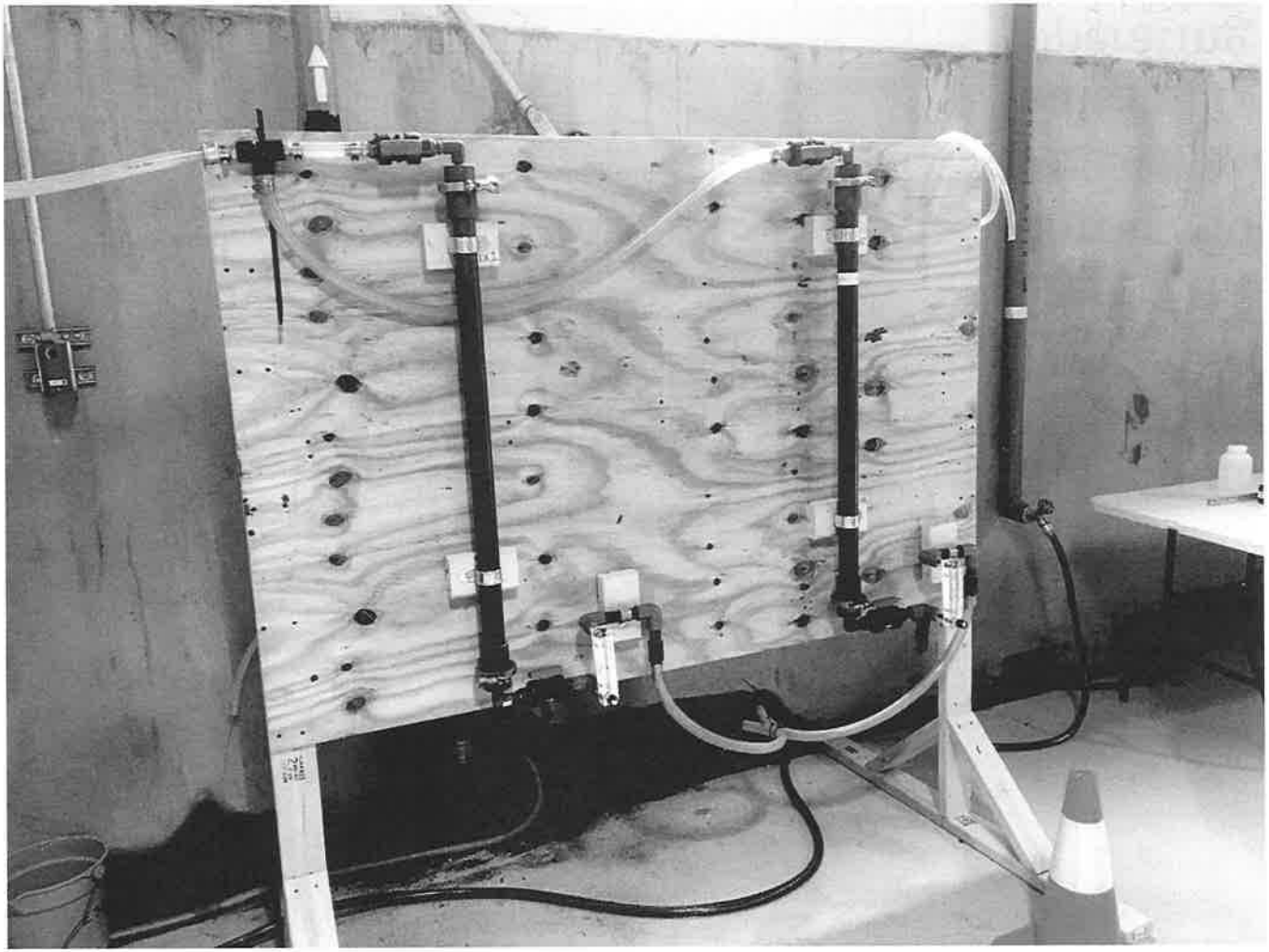


GAC Pilot Testing

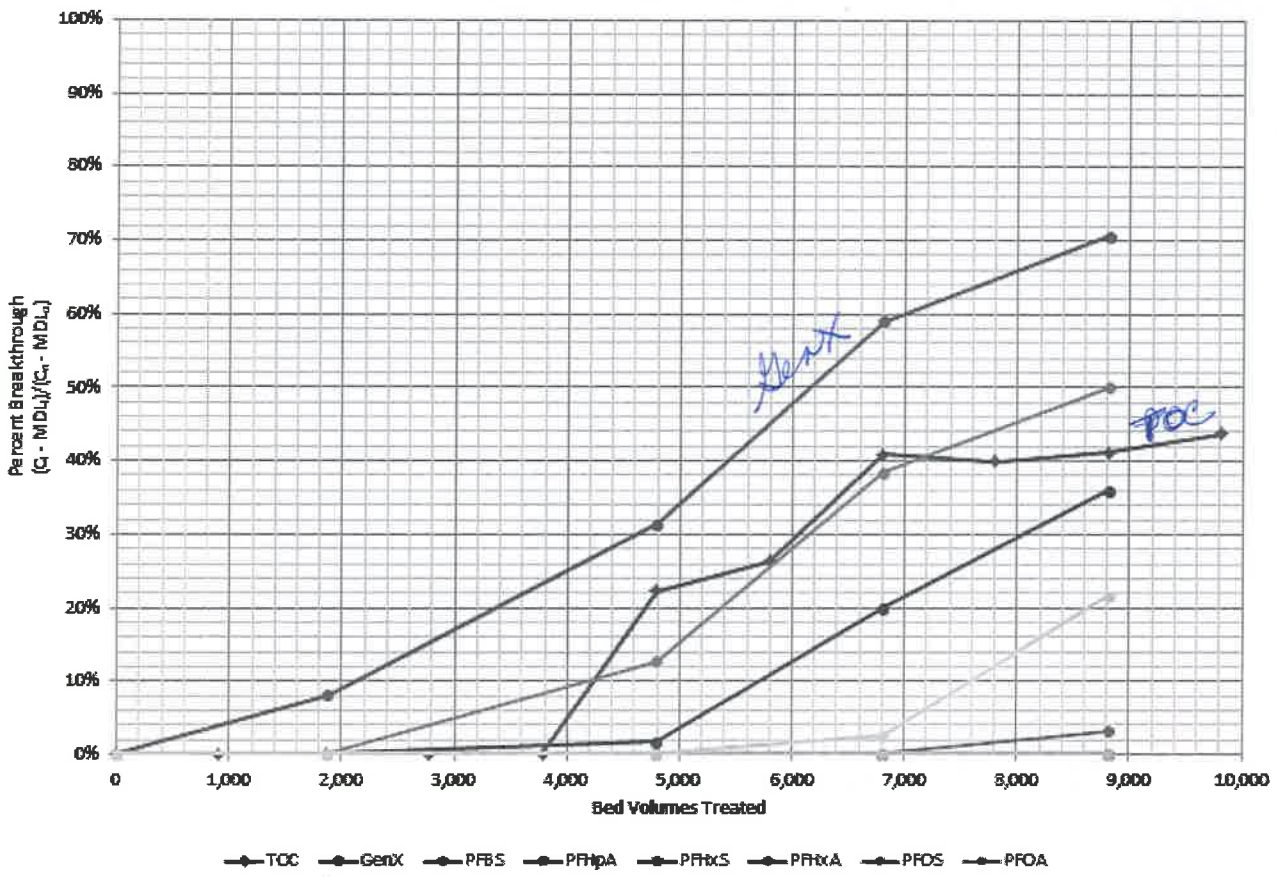




Ion-Exchange Resin Testing

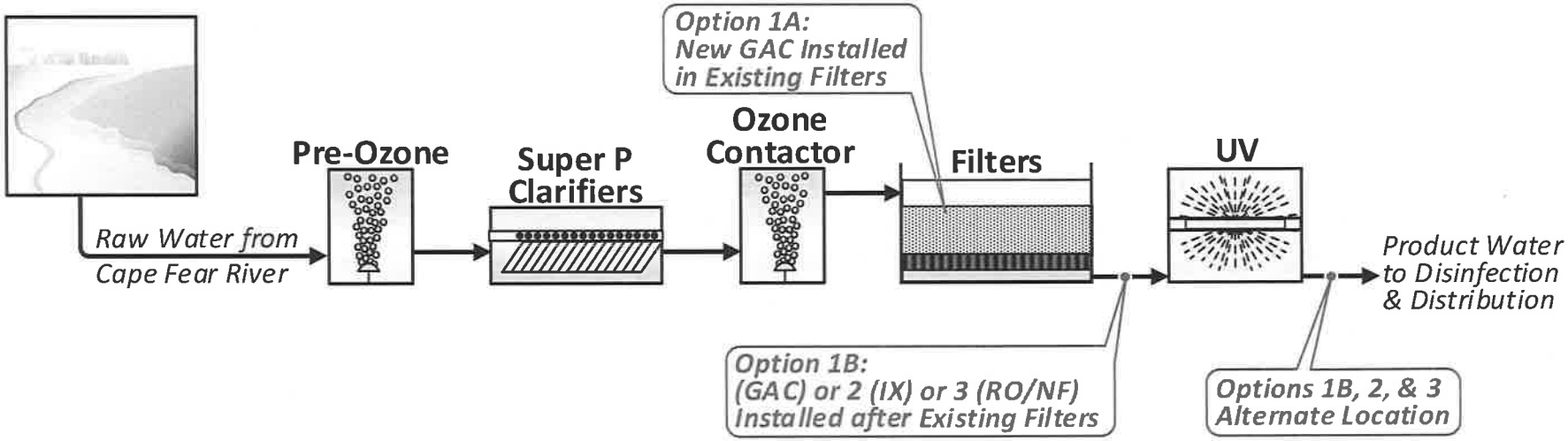


Preliminary GAC Data



- Evaluate multiple fluorinated compounds and others of emerging concern
- Determine break-through over time
- Determine suitability and operating cost
- 6-12 months before treatment decisions are made

Location of Options on Treatment Process Diagram

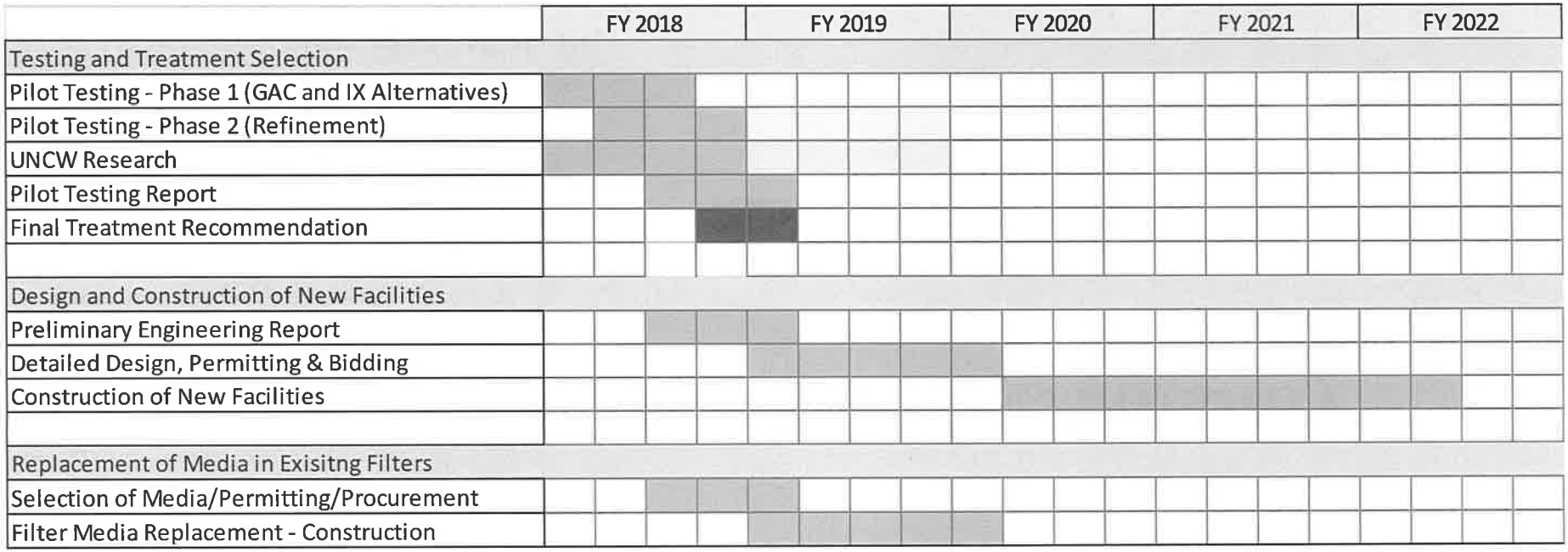


Summary

DESCRIPTION	GAC in Existing Filters	OPT 1-B, GAC Contactors Post-Filtration	Deep Bed Version of 1B	RO/NF Post-Filtration
Initial Cost	$1.7 million	$28 million	$32 million	$113 million
Annual Operating Costs	$2.0 million minimum/yr	$3.3 million/yr to $6.3 million/yr	$3.4 million to $6.4 million/yr	$3.3 million/yr

- GAC operating costs are based on 6,000 to 12,000 Bed Volumes (BV) based on experience elsewhere with PFAS removal, but not Gen-X. Site specific GAC testing is being conducted to determine the correct BV to assume for treating Cape Fear River water.
- Option 1A's initial cost includes an initial load of GAC media and one-time replacement of sand and gravel. (e) The options would have higher initial costs if standby filters/contactors were added to provide full capacity when units are off-line during GAC replacement events.
- A detailed cost opinion was not prepared for Ion Exchange (IX); however, it is the engineer's opinion that TPW for IX would be roughly in line with Post GAC. As a contingency CFPUA is conducting IX testing.

Schedule



* Subject to CFPUA Board approval.

Cape Fear Public Utility Authority

Jim Flechtner, PE
Executive Director

Frank Styers, PE
Chief Operations Officer

Attachment 8

notes from mtg

DEQ

- Latest river monitoring results
  - Cape Fear and private wells
- Air emissions follow up/status report
  - Determination of how/if deposits GenX?
  - Any violations/notices?
- Closed loop system wastewater disposal details including incineration
- Update on improving NPDES disclosure process (CFPUA references in complaint filed since last mtg)
  - CWA degradation clause
  - Referenced in last meeting
- Number/roles of current DEQ FTEs doing monitoring/analysis
  - Resources devoted to monitoring/analysis
- IBT Impact
- Description of Science Advisory Board and its work (include DHHS; Knappe is on the Board)
- Decision to not revoke Chemours Permit?

DHHS

- Use and cost profile of ultra-high resolution mass spectrometer
  - Closest lab with this tech?
  - Better to lease than purchase?
  - Constraints of using tech – do operators need special skills?
- What groups produced info affecting 140/ppt health standard?
  - Do these groups have more useful info on other compounds?
- Overview of public health unit/DHHS
  - Resources devoted to monitoring/testing/analysis

CFPUA

- Most likely cannot speak on lawsuit filed since last meeting`
- Pilot testing overview/if any test results are available yet
  - GAC testing
- Update on how H56 funds are being spent
- Latest news on suit against Chemours/Dupont
- Aquifer contamination latest

Knappe

- Research overview, including international and within Cape Fear Watershed
- Significance of targeted vs. nontargeted approach to monitoring and testing

Kemp Burdette

- Regulatory gap within NC

November 10, 2017 by Catherine Clabby (https://www.northcarolinahealthnews.org/author/cclabby/)

DEQ has stepped up studies on the scale and source of well water and land contamination from a DuPont-built chemical facility.

Related Articles

- Keeping Local Water Supplies Safe (https://www.northcarolinahealthnews.org/2017/09/28/keeping-local-water-supplies-safe/)
- More Scuffles Over Hexavalent Chromium (https://www.northcarolinahealthnews.org/2017/07/13/scuffles-hexavalent-chromium/)

By Catherine Clabby

For 20 years, Bobby Joe Swilley paid little heed to a DuPont-built chemical plant close to his roomy home in rural Cumberland County.

No more.

Like some other Gray's Creek township residents, Swilley recently learned that the industrial chemical GenX produced at that faculty has seeped into his well water.

Now he is trying to understand any short-term and long-term health risks to his family, how to get cleaner water to his tap, and how badly the value of his property may have been affected.

"I may have been exposed to this for 20 years," said Swilley, a local business owner who lives about a mile from the Fayetteville Works industrial site. "I don't want to panic, but we need answers, honest and truthful answers."

For more than five months, public attention in a portion of eastern North Carolina has been riveted (https://www.northcarolinahealthnews.org/2017/10/18/local-scientists-uncovered-cape-fear-river-genx-saga/) on the detection of GenX and related industrial per- and polyfluoroalkyl substances (PFASs) into the Cape Fear River and drinking water systems downstream.



But state regulators have expanded their probe on land. They particularly are interested in the fact that GenX has been detected farther from the industrial site than they would have expected. That is



(https://1lbxcx1bcuig1rfxaq3rd6w9-wpengine.netdna-ssl.com/wp-content/uploads/2017/11/DEQ_map.png)

The state Department of Environmental Quality and Chemours are testing private wells one mile from the boundaries of Fayetteville Works. Photo courtesy of DEQ

one piece of growing evidence that polluted air emissions may be in play here, as well as tainted groundwater.

"We are very concerned for the community regarding their potential exposures over the years," said Michael Scott, director of the DEQ Division of Waste Management.

Revving up inland

Last summer DEQ testing detected GenX in groundwater in 13 out of 14 industrial wells tested on the Chemours property which stretches from Bladen into Cumberland County. On Sept. 6, Scott and a second DEQ director notified Chemours (https://files.nc.gov/ncdeq/GenX/Notice%20Of%20Violation%20And%20Notice%20Of%20Intent%20To%20Enforce%20-%20Chemours.pdf) that the company had violated a state standard forbidding contamination of groundwater by human-made substances.

Sometimes it's unclear whether a contaminant in a well has shown up because an offending chemical has been introduced or has occurred naturally. This has been an issue, for instance, with chromium and arsenic contamination near coal ash impounds. (https://www.northcarolinahealthnews.org/2016/10/27/study-points-to-risks-in-nc-wells-from-nature-not-coal-ash/)

At other times, Scott said, there's no ambiguity.

"If it's not naturally occurring, it's a clear, bright line," Scott said, regarding North Carolina regulations designed to protect groundwater.

Since September, the chemical has been found in 50 private wells off the industrial property at levels exceeding the state's provisional health goal of 140 parts per trillion (ppt). The highest well reading received by the state, which is also testing wells, is 1,300 ppt so far.

Of the 128 wells tested and analyzed to date, 43 were contaminated by GenX at levels below the health goal and 35 showed no detections of GenX, said Laura Leonard, a spokeswoman for DEQ's Divisions of Waste Management

To find the edge of whatever plume has spread the contamination, DEQ has had Chemours expand the number of private wells it is testing to close to 570 (http://www.eenorthcarolina.org/resources-ecoaddress-groundwater.html), all the wells, in all directions, one mile beyond the Fayetteville Works' property line.

Only traces of the potentially harmful

only traces of the potentially harmful compound, below the state health goals, were detected recently in Gray's Creek Elementary School, tested at the request of residents. But its presence there could point to air emissions, not only groundwater contamination, as the reason GenX has been found away from the Chemours compound.

"That's three-plus miles out," Scott said. "We don't expect that."

The detection of GenX in wells at levels above 140 ppt on the opposite side of the Cape Fear River from the Chemour sites is further evidence. A sizable river usually would block groundwater contamination on the opposite bank.



(https://1lbxcx1bcuig1rfxaq3rd6w9-wpengine.netdna-ssl.com/wp-content/uploads/2017/11/DEQ_FacebookGroupImage.png)

Neighbors to Fayetteville Works are using Facebook to share information and spread word of meetings.

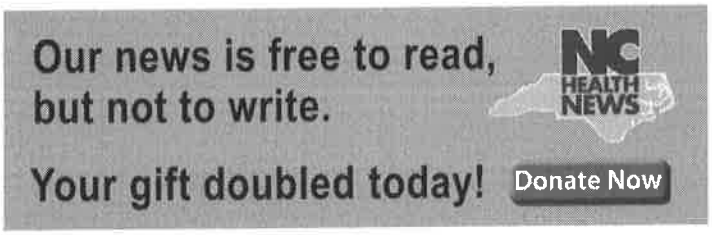
"To have groundwater go under and then go up up-gradient, that is not likely," Scott said.

DEQ's Division of Air Quality has requested Chemours records (https://files.nc.gov/ncdeq/GenX/DAQ_to_Chemours_Sept20_2017.pdf) on any releases of GenX and related contaminants at Fayetteville Works. The agency is also working on reliable methods to test stack emissions for GenX and related compounds at Fayetteville Works, DEQ's Assistant Secretary of the Environment Sheila Holman told the House Select Committee on River Quality last week.

Replacing tainted water

Chemours is now required by DEQ officials to provide bottled water (https://deq.nc.gov/news/press-releases/2017/10/17/state-directs-chemours-provide-bottled-water-nine-more-well-owners)to well owners with GenX contamination above 140 ppt in their drinking water. The company is voluntarily offering water to other neighbors who want it as well.

The company and state and county officials are also discussing three methods to provide alternative drinking water to those with polluted wells. Those alternatives include whole-house carbon filters, digging deeper wells, if that would definitely shield people from any pollution, or linking property owners to municipal water lines, often an expensive enterprise.



(https://www.northcarolinahealthnews.org/support-health-journalism-matters/)

SPONSORED

When asked if Chemours would pay for new water supplies and who might qualify if they do, company communications manager Gary Cambre declined to get into specifics. "Chemours continues to work closely with local, state and federal officials to determine the appropriate next steps," he said.

Chemours and DuPont repeatedly have said there is no evidence that chemicals released from Fayetteville Works, where multiple companies are located, pose health threats to anyone.

David Howard, Bladen County's Health and Human Services director, said testing of any water treatment will be needed to determine what will shield people from GenX. It's among a category of compounds that are well known for not breaking down easily, even in water treatment plants.

"The quickest short-term, perhaps long-term solution, is a whole-house filtration system. It's being tested by Chemours in a residence in Cumberland County where the readings are pretty high," Howard said.

The hard-to-destroy quality of PFAS compounds has allowed the substance to accumulate within the blood of some people, one factor that has raised concerns (https://www.epa.gov/pfas/basic-information-about-and-polyfluoroalkyl-substances-pfass#what) about their health threats (https://www.atsdr.cdc.gov/pfc/health_effects_pfcs.html).

Helping themselves

Neighbors to Fayetteville Works, in the meantime, are not sitting back and waiting for answers. They share information online and have been meeting (http://www.fayobserver.com/news/20171005/genx-forum-gets-contentious-as-state-orders-more-testing)with state and county officials, scientists and lawyers to better understand their risks and their rights.

Swilley already has a whole-house carbon filter on his home to reduce mineral amounts in his drinking water. Tests by Chemours from his tap turned up GenX at levels lower than the 140 ppt. But he asked DEQ to test water in the well and is awaiting those results.



In the meantime, he has taken up Chemours on its offer to provide bottled water, which he collects by driving across Route 87 to Fayetteville Works.

A founder of the local marketing product company Carolina Specialties, Swilley says he thinks getting linked to municipal water is currently the only route he would find acceptable to protect his family, including a 3-year old granddaughter living nearby.

He thinks that Chemours should also be held liable for any drops in his and his neighbors' property values, a hit that could persist for a long time.

"This is not a storm that is going to blow through and then you rebuild your house. This is going to take years," Swilley said.

"I would not buy this house."

Action Against Chemours



The N.C. Department of Environmental Quality plans to take additional action against Chemours because an increased concentration of GenX was found in wastewater discharge at its Fayetteville Works facility.

Coastal Review

Support quality journalism that matters! Donate today. (https://www.northcarolinahealthnews.org/support-health-journalism-matters)

About Catherine Clabby



Catherine Clabby (senior environmental reporter) is a writer and editor. She is senior editor of EO Wilson's Life on Earth, the free seven-unit, digital-only biology series, and editor / co-author of An Evolutionary War: Humanity Versus Malaria. A former senior editor at American Scientist magazine, Clabby won multiple awards reporting on science, medicine and higher education for the The News & Observer in Raleigh, NC. She is an alum fellow of year-long Knight Science Journalism Program at MIT. Contact: catherine.clabby@gmail.com

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep Ted Davis, Jr.

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 280
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep Holly Grange

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Holly Grange
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep Frank Iler

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ON FILE
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Frank Iler
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep Bob Steinburg

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage same
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Rep. Bob Steinburg
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep Pricey Harrison

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file) 162

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep. William Brisson

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 180
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

William Brisson
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: October 26, 2017

Member: Rep Jimmy Dixon

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Thursday, November 30, 2017
TIME: **9:30 AM**
LOCATION: **643 LOB**

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 12:10 PM on Monday, November 20, 2017.

___ Principal Clerk
___ Reading Clerk – House Chamber

Judy Lowe (Committee Assistant)

House Select Committee on North Carolina River Quality
Thursday, November 30, 2017 at 9:30am
Room 643 LOB

MINUTES

The House Select Committee on North Carolina River Quality met at 9:30 AM on Thursday, November 30, 2017 in Room 643. Representatives Davis, Grange, Iler, Dixon, Floyd, Hall, Harrison, McElraft, Muller, Steinburg, Stone, and Yarborough attended. The list of visitors is **Attachment 1.**

Representative Ted Davis, Jr., Senior Chair, presided.

He began by introducing the Sergeants at Arms, Jonas Cherry, Rey Cooke, Reggie Sills, and Dean Marshbourne. He thanked them for what they do for the legislature.

Chairman Davis then welcomed Representatives Bob Muller and Elmer Floyd to the Committee. He publicly thanked Speaker Tim Moore for appointing these members because they both represent areas within the Cape Fear Region and he feels they have a place at the table.

He then recognized his Co-Chairs for comments. Representative Grange said they had another ambitious agenda today and felt like they could discern from their previous meetings that this is a very complex issue. She said there was still some fact finding to do but looks forward to formulating legislative solutions for this issue. Representative Iler had no comments.

Chairman Davis said that there was a Department of Environmental Quality (DEQ) update which includes certain things that are on the agenda before the Committee, see **Attachment 2**. He recognized the speakers from DEQ; Sheila Holman, Assistant Secretary for Environment; Linda Culpepper, Deputy Director, Division of Water Resources (DWR); Michael Scott, Director, Division of Waste Management (DWM); and Mike Abraczinskas, Director, Division of Air Quality (DAQ). Chairman Davis said the Committee looked forward to hearing their presentations.

Sheila Holman was recognized to present first. She informed the committee she had also 3 other staff members with her to help with questions. She would be working through various topics providing general updates and also following up on several questions that were asked at the end of the last meeting. Ms. Holman said she would be providing information where they are monitoring for surface water, where they are monitoring for ground water, enforcement actions and any other general updates.

Ms. Holman began with DWR. She would focus on Surface Water Quality, DWM, who is working on ground water contamination, and finally DAQ. Within DWR, there were several questions last time about National Pollutant Discharge Elimination System (NPDES). See **Attachment 3, page 15, the correct number should be 64 not 96 as it shows on the attachment.** She covers this again to help to help the Committee understand the different parts of the permitting program and to help them understand the Department's duties look at various water flows.

Ms. Holman discussed the permit backlog history, see **page 16, Attachment 3**, over the time period from January 2008 through July 2017. In 2008, 10-15%, the backlog at any given time has increased over time and the NPDES permits are operating under expired permits.

The next slide showed a little more detail in terms of staffing and resources. It has been steady at 14 to 14 ½ full time employees (FTE) from the 2008 period. In 2012 there was a decrease to 11 FTEs; in 2013 there were 9 ½ FTEs. In addition, they had a network clone training on tax certifications added to this staff's duties. Another factor contributing to the backlog in 2016-2017 was a directive to focus on the necessary NPDES permits for the coal ash managements. She hoped this explained some of the reasons for the backlog and questions about the staffing over time. She also, how the nine FTEs in NPDES were funded–four were funded with receipts and five were funded with federal grants. There are no appropriations going to those particular positions. On **page 18, Attachment 3**, she gave a quick update of the total number of Water Resources staff who are working at least part time on GenX and emerging compounds issues. This also breaks down how the different people are funded.

On **page 19, Attachment 3**, Ms. Holman talked briefly of the ongoing sampling that is being done by the DEQ staff from the June time period, roughly June 19; they were sampling weekly at the Chemours outfall until August. In early August, they started sampling daily through the work week. Most recently, they are using a composite sampling device that collects a sample of wastewater every couple of hours. It could sit in a collection vessel and from that vessel they take a sample twice a week and so they have a more comprehensive look at waste stream over time. It saves not only staff resources but it also gives them a better overall picture of what's being discharged throughout the whole work cycle and they are not missing Saturdays and Sundays with this approach.

Staff prepare the sample containers, they pack them in ice, travel to the site, they inspect the composite sampling equipment to make sure it's operating correctly. They take the sample and complete the chain of custody report prior to shipping the sample containers to the lab. Drinking water samples at the downstream drinking water systems are collected weekly. Again, the staff prepare the sample containers at their regional offices and then go out and collect the samples and complete the tracking papers, then ship the containers to the lab each time. Once they get the results back from the labs, the water sciences section goes through those lab results and does a quality assurance review of the lab reports and then moves to post the data on the website.

Ms. Holman then spoke about the data at the Chemours outfall. This shows various compounds that are being monitored, see **page 20, Attachment 3.** The purple one with the spike is GenX. The date here is coming from the spill that occurred on October 6. They became aware of the spill on November 1. They sent some sample data to the United States Environmental Protection Agency (U.S. EPA) lab and they called to let them know that there had been an unusual spike in GenX of the outfall at Chemours and that they wanted to rerun the lab sample to make sure that there was, in fact, a spike.

They reached out to the company because they knew they were also sampling on a daily basis and asked if they had any data from that time period. They shared their data and at that time indicated there had been a spill. Ms. Holman shared the data of the concentrations they were aware of from Chemours. It showed the discharge outfall increasing to 250 parts/trillion on October 6, peaking at 3,700 parts/trillion on October 9, and then dropped back to 740 parts/trillion on October 12 and down to 380 parts/trillion on October 16. Prior to the spill, the water samples on October 2 and October 5 were 35 and 69 parts/trillion, respectively.

On October 9, concentration of GenX at Bladen Water Facility was 253 parts/trillion, well above the State goal. Also, the NW Brunswick Drinking Water Facility had a GenX level of 250 parts/trillion on October 19. They think, certainly, the spill impacted the Bladen Bluffs finished water sample. She was

not quite sure about the NW Brunswick given the timeframe between the spill and when the spike was observed. There are lots of different things that could lead to that spike in NW Brunswick, including lower river flow as well as some GenX being disturbed in the sediment and getting into the uptake. They again believe there was a correlation between this spill on October 6 and the high value in Bladen Bluffs. It also could be contributed to Brunswick spike on October 19. Then again they learned of the spill when Chemours shared their data with them on November 1.

Later on, Chemours reported to them that data from the water quality at the outfall showed concentrations of GenX at 2,400 parts/trillion for samples collected October 27 through 30 and 2 of the 90 parts/trillion on October 31 through November 2. They are awaiting test results to see whether or not there is an impact on downstream drinking water facilities. The company has indicated working with their internal lab. Their internal lab until recently could test down to the parts/billion level. They now have the ability to test down to 100 parts/trillion. To get more detailed data they are shipping to an off-site lab. Going forward they will be able to test in house at least down to 100 parts/trillion so the spikes should be able to be seen sooner from that information, should they occur.

The theory of this latest spike, October 27 through November 2, from the company's perspective is they were gearing back up from shut-down mode between, roughly, October 17 through 26 and the wastewater treatment system 6 million gallons/day; typical 22 million gallons/day. They believe that part of the spike was due to that low flow, obviously with a much slower volume of water you get a much higher spike. They also believe a couple of rain events may have contributed. There may have been some residual from the October 6 spill that got caught up in the stormwater and made its way to the wastewater discharge.

They are in the process of evaluating their stormwater system and they will be sampling at nine different points and will be providing information to the agencies shortly. When they learned of the spill of October 6, they had staff at the site on November 3. Ms. Holman showed a picture of the general area where the spill occurred. The rain event may have sent GenX into a culvert area which led to the waste water stream.

As DEQ continued to evaluate the situation, the Agency did decide on November 13 to issue a Notice of Violation (NOV) with intent to access a civil penalty related to the spill on October 6. Later that week, they determined what they believe to be partial suspension of the permit was necessary and they did a 60 day notice of intent to partially revoke the NPDES permit. Specifically, they are talking about the company's manufacturing process, wastewater streams, and prohibiting the Company from delivering to those to wastewater treatment systems. Ms. Holman said a letter had been sent asking them to comply with this by today, November 30. They received a response per a letter just last night that said they intend to do so. There is staff on site today verifying that they are doing that.

Ms. Holman advised the Committee that the next step in the NPDES permit (with a proposed new permit), would not include the manufacturing wastewater discharge as part of the permit. That would go to public comment and that will take a few months to complete.

Chairman Davis had two questions for Ms. Holman. The first was does Chemours give DEQ any justification for why they did not timely report that discharge like it's supposed to?

Ms. Holman answered that she does not believe they have received any clear explanation of why it was not reported.

Chairman Davis then asked is that why DEQ is proceeding with the permit violation?

Ms. Holman responded that the permit violation would have happened anyway.

Chairman Davis asked would there be any action by DEQ against Chemours because they did not report the discharge like they should have?

Yes, there will be a civil penalty accessed per Ms. Holman.

Chairman Davis asked if she knew when.

Ms. Holman said it should be a couple of weeks. She then recognized Linda Culpepper, Interim Director of DWR. Ms. Culpepper said they had received a response this past week and are still going through it. She agrees with Ms. Holman that it's probably not complete and they will have additional questions. She thinks it may be a difference of thought of whether it is required to be reported and that's exactly what they will continue to evaluate.

Chairman Davis asked if the latest spill, the October 6 discharge, was a violation of the partial consent order that was done in Bladen County? He knows they are pursuing a permit violation, is there any way to justify DEQ pursuing a partial consent order?

Ms. Holman says they have looked carefully at the consent order. They have talked with attorneys at DEQ and the Attorney General's Office and the intent of the language in the consent order was to address normal operating conditions. The spill is not normal. They believe it is difficult to determine if there has been a violation of the consent order.

Chairman Davis then recognized Representative Steinburg. Representative Steinburg said that a notice of violation is because of a consent order is not necessary because of previous approved permits. His understanding is that GenX is an unregulated contaminant, which if they had discharged the 700 parts/trillion under normal process that would not normally be a violation of the permit because it is an unregulated contaminant. There is no limit to how much they can discharge, so if they were discharging directly and didn't intend to do, would it be a violation?

Ms. Holman answered that she believes it is a violation of permit, not consent order. She believes that a violation of reporting requirements in the permit for upset events that lead to discharges to pollution into the environment.

Representative Steinburg asked if the discharge of any unregulated contaminants, whether GenX or anything else, would it be a violation, even though it's not explicitly stated or has discharge limits in the permits?

Ms. Holman answered there are specific reporting requirements when events like this occur. It's not specific to regular pollutants.

Representative Steinburg then asked if new permits would not allow the discharge, is it just GenX or any industrial waste water?

Ms. Holman said the intent right now is to propose not to discharge any process wastewater.

Representative Steinburg asked if she was suggesting that Chemours cannot discharge any industrial wastewater through their permit, which is the other two manufacturers on site as well?

Ms. Holman said that is not correct. What they suggest is that wastewater coming from the manufacturing process at Chemours should be diverted. They can still process the boiler blowdown, cooling water, sanitary wastewater--all of which goes through the wastewater treatment system, along with the manufacturing process wastewater from both DuPont and Kuraray.

Chairman Davis asked for clarification, if it is deemed to be a pollutant, you cannot put in the water but if it is a non-pollutant, then you can put in water?

Ms. Holman answered that she thinks there is a general concern on the part of the Agency about the various compounds coming from the manufacturing process system.

Chairman Davis commented that speaking from New Hanover County, how many times is Chemours going to be allowed to do this before the hammer is brought down? It is a great concern from where he lives.

Representative Grange was then recognized. She asked with the Nafion standards set by the U.S. EPA in an office in Georgia, how is this going to affect all of this here?

Ms. Holman said that action was taken in terms of partial suspension and that was done to inform Chemours that their manufacturing process wastewater whether from the Nafion manufacturing is in the area. All of that needs to be collected and disposed of differently than going through the wastewater treatment system. That takes effect today so in terms of the message to citizens worried about continued wastewater discharge, DEQ believes they have taken appropriate actions. Regarding the question on Nafion by-products, they learned as an agency that the U.S. EPA had done some non-targeted analysis and identified Nafion by-product as two other compounds that were in the discharge from Chemours. At that time, while they knew the chemicals were there, they could not verify the concentrations because there was no lab test standard to be able to accurately quantify that. DEQ has been working with the U.S. EPA and Chemours has been participating. They have offered pure samples of the products and are very close to being able to analyze for the Nafion by-products.

Representative Iler was recognized for clarification. He asked if plants were monitoring on a weekly basis, at the October 6 spill at NW Brunswick. Did he understand Ms. Holman to say that they did not know the impact on the treatment plants?

Ms. Holman responded there was a good correlation of the October 6 spill and the spike at the Bladen Bluffs treatment plant. The later spike at NW Brunswick treatment plant was later in time, she thinks the spill probably did have some influence and some other contributing factors to spike at NW Brunswick plant.

Representative Iler commented that he hears a lot from his area that this dumping might have been intentional? He asked if there was any evidence of that or possible criminal activity?

Ms. Holman responded that they have referred this to the State Bureau of Investigation to explore.

Representative Iler asked if she said that all wastewater containing chemicals at Chemours is supposed to be diverted at this point?

Ms. Holman said that was correct. Their manufacturing process, any wastewater coming from their different manufacturing processes needs to be contained and disposed of differently than going through the wastewater treatment system.

Representative Iler asked if that was effective today?

Ms. Holman answered that was correct.

Staff from the Fayetteville office was onsite today to verify that.

Representative Iler thanked her for her answers.

Chairman Davis recognized Representative Dixon. Representative Dixon questioned about the start back-up process and decrease in volume. He believed he understood Ms. Holman to say that was at least a portion of Chemours possible explanation of the spike. He asked if she would repeat the figures of what a normal flow is and what the start-up flow is?

Ms. Holman said the samples they saw were composite samples of October 27 through October 30. Over that timeframe, the average flow through the wastewater treatment plant was about six million gallons per day. She said she believe it started at two million and went up to eight million, but on average it was six million over the three days. The normal flow is about 22 million gallons per day.

Representative Dixon asked if there is a legitimate parallel here that the intensity of the spike was directly proportional to decrease in release volume?

Ms. Holman answered that they normalized for that and with that normalization, they showed under normal flows that the value would have been around 650 parts/trillion. So, it was due, in part, to the lower flow but when they tried to normalize based on what the concentrations might have been under a 2,200 million gallon flow, she thinks the value they estimated was 650 parts/trillion.

Representative Dixon said in the whole attempt at permitting what is being done to protect the waters is taking harmful stuff and diluting it with volumes of water to a level where it is not harmful. Is that applicable to the process over there?

Ms. Holman said certainly as they consider the permit, they look at what the concentrations would be in typical flows, high flows, etc. That is part of the process, but also understanding the receiving waters if they're already impaired, so there's a lot of things that get factored in but that is correct about the dilution aspect.

Representative Dixon then said that there is this company here that is producing something that's real bad and that "we automatically know is harmful to our health and we say to them, 'if you dilute it enough, we'll let you put it in the water anyway.'" He asked if this was correct.

Ms. Holman answered there is an evaluation to determine what is a safe concentration level to discharge into the receiving stream.

Representative Dixon addressed the chairman saying "maybe we need a paradigm change in the way we're looking at this stuff. Why aren't we more intense with our efforts to find out this bad stuff and not let it be discharged in any amount. There are technologies out there that are available that can take the bad stuff out and treat it in a whole different way than we're doing. I think we're going to see across the nation, the state, and everywhere, that this idea of diluting to solve dilution has reached its time, it's no longer going to work."

Chairman Davis commented that this is something this Committee can discuss when looking at long term solutions.

Representative Dixon said that he would like to look at the public record of the discussions that took place during the time of the original permitting process for Chemours. He asked if the Committee had done that yet?

Ms. Holman answered no and Chairman Davis said he was not aware of that.

Representative Dixon said there is a lot of misinformation that need to be corrected.

Chairman Davis said to get him any specific information and he will request the proper person(s) to get the corrected information on behalf of the Committee.

Representative Floyd was recognized next. Representative Floyd asked how did the Chemours Fayetteville Works Facility get its name in Fayetteville?

Ms. Holman responded that it was most likely DuPont's name for it years ago but she will check on that.

Representative Floyd's stated that this was his first meeting and he was clarifying they thought they should report before it came in.

Ms. Holman agreed with Representative Floyd and said that is why they issued the notice of violation for failure to report the incident that occurred on October 6.

Representative Floyd then asked for clarification on staff, **page 18, Attachment 3,** that Ms. Holman had stated earlier. Which was correct?

Ms. Holman explained that at the last meeting it was asked about the number of staff that were specifically on NPDES permitting program. That would be the nine that she talked about and of those nine, four are receipt reported and five are federal reported. They obviously have many more employees. The slide shows that DWR staff currently working on the GenX issue and the full number of staff that are dedicated working to address this situation.

Representative Floyd asked about the drinking water facilities downstream on **page 19, Attachment 3.** He stated that DEQ had her own separate report about the effects, is it possible that the Committee might get a copy?

Ms. Holman responded she would share that with them.

Representative Floyd commented that any meetings held in Cumberland County with the City officials, please notify the Committee, in case they would like to attend.

Chairman Davis commented he was glad the Speaker had appointed Representative Floyd to the Committee for Cumberland because he definitely has a place at the table for this issue. He then recognized Representative McElraft.

Representative McElraft said of the 22 million gallons permitted to go into the river, what percent was from the manufacturing will now be stopped?

Julie Grant, NPDES, DWR, was recognized to respond. She said that out of the 22 million gallons, it would be 1 million gallons, which was less than 5%.

Representative McElraft asked how often the one million gallons was stopped?

Ms. Grant responded that it was a daily volume, both 22 and 1 million gallons.

Representative McElraft asked if they had any idea what they will do with the one million gallons now?

Ms. Holman said they have been collecting a portion of the manufacturing waste streams since, roughly, June 21. Initially, they were bringing tanker trucks in and those were moved to Arkansas to be incinerated. Recently, they were notified they are being changed to railcar and shipping wastewater to Texas, she believes for deep well injection.

Representative McElraft said that she understood and is pretty sure this contaminant is a carcinogen. She feels they have to be careful when they talk about all of the discharges because as long as they know what is going into the water, the dilution process is probably the only way to cost effectively do manufacturing in the US and it is not just North Carolina. Drinking water is one of the most important things we have so we should not be putting things that we know are unsafe in the water, but we know there are a lot of discharges that are diluted and are safe once they get into the drinking water. Is there any filtration system that would take these molecules out?

Ms. Holman answered that the company is actively looking at a variety of alternative solutions. She stated she could not speak in detail to those yet.

Representative Yarborough was then recognized. He asked if he understood correctly that most of the testing to be done is only accurate to 100 parts/trillion.

Ms. Holman answered no. She said that the labs that have been used, whether it is Test America, which Chemours has used; the Agency has used SGS in Wilmington, NC and Gel Labs.in Charleston, SC. Those labs, as well as the U.S. EPA labs at the Office of Research and Development and now the U.S. EPA lab in Athens, GA, can get detections down to below 10 parts/trillion. The company also has an on-site lab that they can detect GenX down to 100 parts/trillion.

Representative Harrison was recognized next. She thanked Ms. Holman for the presentation. She then referred to the chart with chemical concentrations that they have been testing with the GenX spike. She

understands there were other chemicals of concern and does not know if they are necessarily associated with the Chemours plant, but thought she remembered Dr. Detlef Knappe's study referencing perfluoro-2-methoxyacetic acid (PFMOAA) and other chemicals of concern. This water quality monitoring is specific to Chemours. Aren't there other contaminants associated with that plant that are of a health concern?

Ms. Holman responded there are other contaminants. From most of their testing going forward, they are going to be using what is called U.S. EPA method 537, which determines selected perfluorinated alkyl acids in drinking water by solid phase extraction and liquid chromatography/tandem mass spectrometry. She believes that it tests for approximately 24 per- and polyfluoroalkyl substances (PFAS) compounds, that include perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), GenX, and many other chemicals, which have health advisories set. Many of those other compounds have no health advisory, no water quality standards, and no health goals set. Their focus has been on the compounds that do health advisories or health goals. Working with U.S. EPA and the Secretary's Science Advisory Board to look at the prioritization of those other compounds to determine which of those we need to invest significant resources to better understand those potential health effects.

Representative Harrison asked if they are doing these types of testing around the State.

Ms. Holman said they are looking at how to use ambient monitoring around the State and how to take additional samples and have those tested. To characterize what's in the water across the State and then help with prioritizing how to move forward on the various emerging compounds.

Representative Harrison then asked about NPDES permitting, referring to land application standards, there was a sludge issue because that contains a number of the problematic contaminants. Is that part of NPDES permitting or separate permitting process?

Julie Grant responded that it takes a separate process that is done by their non-discharge group but it is all under the water quality permitting section that is separate from NPDES.

Representative Harrison asked if we are able to determine by analyzing which of these emerging contaminants are contained in the sludge?

Linda Culpepper responded they do not have any data as of yet. It would be a process to go and test the sludge for potential emerging contaminants.

Representative Harrison confirmed she was talking about sludge that is land applied.

Ms. Grant replied yes.

Ms. Culpepper added they had just talked with their folks who do land application permits and they have tentative plans in place to look at the biosolids and that kind of monitoring.

Chairman Davis recognized Ms. Holman to present the next part of her presentation, DWM. She begins with **page 24, Attachment 3**. She talked about the work that is ongoing within DWM. It has been primarily focused on evaluating the groundwater not only at the site but looking at drinking water wells in the neighboring communities. Phase 1 has been completed. Phase 1 was about 1-1/2 miles from the center of the processing plant, **page 25, Attachment 3.** Phase 2 is covering the initial boundary in phase

1 out to a mile from the property boundary. The Chemours facility owns about 2200 acres. The Agency has data back from 107 wells and they are still seeing data come in. Of the data received, they have 34 wells about the health goals and the highest level detected is 1,200 parts/trillion. Because of this, the Agency does not think they have explored the full universe of the potentially affected private wells so they are in discussion on what phase 3 will look like.

She then explained the maps, see **Attachment 4**. She showed the Committee the maps and explained why they are proposing to go north of the facility as well as south and west of the facility. If a private well is found to be above the health goal, bottled water is provided and they are still working with both Cumberland and Bladen Counties and Chemours on the long term solutions. She explained about additional DEQ sampling and the ongoing work by the company. They are sampling 40 additional monitoring wells on the property as well as conducting some shallow and vertical soil profiling of GenX. The Agency is trying to understand the extent of the groundwater and soil contamination.

Chairman Davis asked for questions from the Committee. Representative McElraft was recognized and asked if there was any possibility these tests are picking up other things and if so, how accurate?

Ms. Holman answered that this is a man-made chemical so it should not be occurring naturally but DEQ should probably look further and test the theory.

Representative Harrison was recognized. She asked who was paying for the bottled water that is being provided to the residents with contaminated water.

Ms. Holman responded that Chemours was.

There was no further questions and Chairman Davis recognized Ms. Holman for the next part of the presentation, DAQ. She began with the staff working on GenX, see **page 34, Attachment 3.** Next, she talked about the Chemours air emissions. She said she had spoken last time about the fate of these emissions and what impact they might have on the environment. These are all estimates from a computational model that is based on massed balance principles. They need wind data and air dispersion modeling as they contemplate the role of air emissions. They started with calculating a Wind Rose, see **page 37, Attachment 3.** Basically, it shows a typical wind direction in the area from 19 years of data from Fayetteville Regional Airport. It shows two predominant wind directions from the southwest and the northeast. With this information, they have hypothesized that winds that frequently blow from these directions would impact air emissions to the northeast and to the southeast of the facility. As they contemplate how some of the private wells were contaminated, one of the theories is that atmospheric deposition may be playing a role.

The staff within Air Quality have worked to do some preliminary deposition modeling, using the emissions provided by the company, such as evenly hourly distributed emissions being released--they're emitting at the same hourly rate, 365 days per year. The meteorological data was taken from over five years from 2012 through 2016. They match that with the emissions and actual stacked parameters from the emissions releases and from that it calculates where the emissions would likely be deposited. The numbers in this are irrelevant because this is a coarse way to look at where the emissions may be deposited and it lines up with what we already know from the wind rose data. This will help guide and look for potential affected private wells.

Ms. Holman continued to say that testing is to be concluded in the next few weeks. They are still working on the review and approval of the modeling protocol. She said she does have one more follow-up item, the interstate chemicals clearing house. The question was asked about DEQ and the Department of Health and Human Services joining the chemicals clearing house. They found that the fees were based on population and the cost would have been about $10,000. The focus is more on the commercial products and as they contemplated it they were focused on the chemicals in the environment, so they were able to get similar kinds of information that they needed through other sources such as U.S. EPA, the Environmental Council of States. Thus, they decided not to join. This concludes the presentation.

Chairman Davis asked if there were any questions about air quality. Representative Stone was recognized.

Representative Stone asked Ms. Holman what is discharged per year? Is it 500 pounds per year? And your background is in air?

Ms. Holman answered yes.

Representative Stone asked Ms. Holman from her years there, what is the worst air pollutant and what is the typical permitted volume for one of those pollutants?

Ms. Holman clarified with Representative Stone about what he was asking. She asked if he could be more specific on the area of concern. She said that it is case dependent and depends on the size of the property. In the air world, she said, they are looking at the concentration of the property boundary so if it's a small property, you can get concentrations above an accepted ambient level at the property boundary much easier than a 2,200 acre site. The modeling that has been done is more to understand the fate of the emissions. If they are contributing to the contamination in the wells, are they going far enough out so that it does not characterize air quality concern beyond the property boundary.

Representative Stone stated that he understood but it did not answer his question. He asked, in her experience in working for DEQ and Air Quality, what the worse contaminant that is a typical allowable permit discharge volume into the air, is it 500 pounds a year, is it 1000, 10,000-what would DEQ allow for discharge on an annual basis?

Ms. Holman said she was not trying to be difficult but it is very dependent upon the emissions from the facility, how close a community is, what the concentration would be at the property boundary so it's based typically on air quality modeling to characterize the concentrations and it varies.

Representative Stone then asked if it was common to have discharge air permits to have the contaminant levels measured in tons.

Ms. Holman said that for criteria pollutants, he is correct. For toxic pollutants, it tends to be in pounds; for example, benzene and mercury.

Representative Stone asked that this is not even a regular contaminant.

Ms. Holman answered that was correct. She wanted to emphasize that they are not trying to regulate air emissions at this juncture here, they are simply trying to understand whether these air emissions

played a role in contamination of the wells and if they are testing out far enough to capture any of the contaminated wells.

Representative Stone commented that he thinks it is a reasonable approach and would like to get more context about this going forward.

Representative Yarborough was recognized and asked how deep does a relatively inexpensive well have to be in this part of the state?

Ms. Holman said she thought a lot of these wells are in the 50 to 100 feet level range. She asked Michael Scott, Director, DWM, for the correct answer.

Mr. Scott said the majority of wells they are receiving data on are around 100 feet.

Chairman Davis recognized Representative Floyd.

He asked about the wind from his airport is southwest and the northeast.

Ms. Holman said they used data from the airport to predict what they thought the wind flows would look like at the facility so they are not using on-site facilities meteorological data, they are using the airport data to create that.

Representative Floyd then asked if it's coming from the south, it's then blowing west?

Ms. Holman responded that typical wind flows in that area, especially in the summer, would be from the southwest, across the plant property to the northeast of the property.

Representative Floyd said that given this is new for all of them and they are trying to have the best information and make the best decisions, he suggested to join the clearinghouse if $10,000 will help everyone through a difficult time and have a better understanding.

Ms. Holman responded that she thinks they already get the majority of the data that they would receive through the clearinghouse. Much of the clearinghouse work is on commercial products which has not been the Agency's focus in regulating water quality, air quality, and the environment. There may be other reasons to join but it wouldn't necessarily help in this situation.

Representative Dixon was recognized to speak. He asked Ms. Holman about the 5,000 pounds she spoke of in her concluding statements. He asked if this was an estimate.

Ms. Holman responded that it was an estimate. He then asked her if she foresaw a point where air quality is concerned, the 17 staff, the allocation of resources, could that be reallocated somewhere else? Also, he questioned if we were at a point where we can say that the air quality or the deposition of harmful things that you can leave on and discount that?

Ms. Holman responded that she thinks they would like to see the results from the Stacked Test information and have a better understanding of the emissions and then figure out whether there's more work to do on the air side or not. Ms. Holman also said it would turn the estimates into more concrete estimates.

Representative Dixon commented that he was pleased with how the Department had conducted themselves during this situation. It is an impossible task trying to have everything filtered to the point when it gets to the public that it is out there in the proper context. The greater attempt they can make to put things in context and if they can get some help from the media on a regular and consistent basis moving from the sensational to the factual.

Chairman Davis asked if there were any more questions from the Committee. Representative Harrison was recognized.

She had a question about the Interstate Clearinghouse. She said that many states have more robust toxic contaminant programs than NC does and she wonders if we are able to access the kind of information they are sharing in terms of chemicals they have found to be of concern to their constituents.

Ms. Holman responded that most states are like NC where they make their assessments publicly available on their websites. Our agency does spend time working and talking with counterparts in other states.

Representative Harrison then asked where you find the contamination with the wells that are upstream? Is there speculation that it is coming from atmospheric deposits?

Ms. Holman responded that it was and that is what led them to the work in terms of looking into emissions and potential deposition patterns.

Chairman Davis asked Ms. Holman about the role of the monitors--how many on staff do this, who supervises them, who makes the decision of where they go, how many hours per week they work, what days do they work, what do they do when they work, what happens to the data they gather?

Ms. Holman said that she could speak broadly about it first. They have monitored staff in each of their seven regional offices. They typically have more than monitoring roles. They are also doing compliance inspections, complaint investigations, etc. She said they can provide the details of actual staff per regional office. Typically, their day to day work is managed by a regional supervisor in that regional office. In this situation, Linda Culpepper, Deputy Director, DWR, is providing more day to day direction especially if they are needing to take additional samples for this situation. There is also a broad ambient monitoring network that is done so there is routine monitoring at the sites. In addition, there is monitoring at the various industrial sites. She said they can provide a more detailed description.

Chairman Davis said that would be helpful to the Committee. He also asked what do they say when you say "I'm going to go monitor a river" and what happens to any data they may gather?

Ms. Holman said each monitoring method has its own special preparation; they go to the site, they take the sample, they bring that back. Previously, she had spoken about the chain of custody. A lot of times, that data is coming to the water sciences lab in Raleigh. It stays internal to the State but still the chain of custody is important. The monitoring is just a piece, though; they are going out to various facilities doing facility inspections. There is much in terms of field work investigations.

Chairman Davis commented if there was any information that Ms. Holman could provide the Committee to better understand what the staff does and also any information that would help with long term solutions. He asked if there were any other questions from the Committee. There were none and he thanked the presenters from DEQ for being there and appreciates all their responses to the Committee's concerns.

The next item on the agenda pertained to the schedule and plans for future committee meetings. Chairman Davis said, "Based upon the extensive presentations, information obtained, and discussions by this Committee to date, it is abundantly apparent that the pollution of our rivers, which is the source of our drinking water, is a very complex issue with no end in sight. This committee will be making a final report with recommended legislation to be considered during the 2018 Short Session, but in my opinion, we cannot wait until then and this Committee needs to move forward with recommended short-term solutions that the House can consider at the Special Legislative Session on January 10, 2018. Staff is presently working on possible legislation that this committee can consider. When completed, those recommendations will be forwarded to each committee member during December for your review and comment. During this time, if any committee member has any suggested short term solution that they would like to have addressed as potential legislation for discussion at our January Session, please submit to my office. The target date for the next meeting is January 4; not definite but proposed. A notice will be sent out when the date is confirmed. It will be a very important meeting because we will be voting and will want as many members as possible attending. In addition to the Committee discussion on January 4, I also plan to include a Public Comment portion whereby the Committee can receive input from the Committee concerning a proposed short term solution. The Committee will then vote and decide what legislation will be considered by the House during the January 10 Session. The Senate is being informed as to what the House is doing, so that hopefully after any legislation that is passed by the House will then go to the Senate for consideration during the January 10 Session. Thereafter, this committee will return to the task of determining more long term solutions to be considered during the 2018 Short Session. Depending on the legislation that is recommended by this committee, these will also be an appropriations request for any necessary funding to implement that particular long term solution. "

Representative Floyd asked about the January 4 meeting, if having public input, if there is some information that they want to use to bring forth in the report to the House, will there be time to add those suggestions?

Chairman Davis said his idea is that whatever the proposed legislation is, it might be a good idea to post it and the agenda on the website and let the public speak to that. Short term solutions will be the focus.

Representative Iler commented that it seemed plausible to have a meeting in the Cape Fear area, specifically in Wilmington to get public input.

Chairman Davis said he was not sure that would be practical because of the time frame. He will talk with staff.

Representative Harrison commented that yesterday that they had received two sets of comments from Citizens in the Cape Fear River Basin and a coalition environmental group. She wanted to make a request that it be a part of the record because she thought the Committee was going to be talking about legislative ideas today instead of the January 4 meeting.

Chairman Davis explained that he had looked at those and will look at them again with staff. He explained that he will only be hearing short term solutions for the time being.

Representative Floyd asked if the Chair will be limiting the amount of time the public can speak.

Chairman Davis said he will wait closer to the meeting and see how many they have. He agreed that a time limit is good but he also wants people to address different issues about this situation.

There were no further questions and no announcements. The meeting adjourned at 11:20am.

Respectfully submitted,

Representative Ted Davis, Jr., Chair

Judy Lowe, Committee Clerk

Ted Davis - speaker

Introductory Remarks

amend to add notes

Based upon the extensive presentations, information obtained, and discussions by this Committee to date, it is abundantly apparent that the pollution of our rivers, which is the source of our drinking water, is a very complex issue with no end in sight.

This Committee will be making a final report with recommended legislation to be considered during the 2018 Short Session, but in my opinion, we cannot wait until then and this Committee needs to move forward with recommended short-term solutions that the House can consider at the Special Legislative Session on January 10, 2018.

Staff is presently working on possible legislation that this Committee can consider. When completed, those recommendations will be forwarded to each Committee member during December for your review and comment.

During this time, if any Committee Member has any suggested short-term solutions that they would like to have addressed as potential

10?
Jan. Session

legislation) for discussion at our ~~next committee meeting on January 4, 2018~~, please submit to my office.

The target date for the next mtg is → January 4 not definate, but proposed
Notice will be sent out when the date is confirmed
It will be a very impt mtg because we will be voting + will want as many as possible attending.

In addition to the Committee discussion on January 4, I also plan to include a Public comment portion whereby the Committee can receive input from the Committee concerning on proposed short-term solutions. The Committee will then vote and decide what legislation will be considered by the House during the January 10 Session.

The Senate is being informed as to what the House is doing, so that hopefully after any legislation that is passed by the House will then go to the Senate for consideration during the January 10 Session.

Thereafter, this Committee will return to the task of determining more long-term solutions to be considered during the 2018 Short Session.

Depending on the legislation that is recommended by this Committee, there will also be an appropriations request for any necessary funding to implement that particular long-term solution.

Attachment 1

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — 11-30-17

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Tom Berry	EDF, NCWF
Lindsey Dowling	FSP
Ashton Godwin	WRC
Detlef Knappe	NC State University
Shannon Deaton	NC WRC
Cyndi Karoly	NC DWR
Jason Green	NC DWR
Tommy Stevens	Stevens Lobby
A.R. Rubin	NC EMC
Jill Lucas	NCDEQ
Drew Moretz	VNC GA

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — 11/30/17

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Matthew Starr	Riverkeeper
Jean Zhuang	SELC
Brian Mendold	WM
Brian Powell	NC Conservation Network
LT McCrimmon	DHHS
Kimberly Neptune	NCGA
[illegible]	CSC
Preston Howard	LCMA
Doug Austin	NCSTA
Jessica Cannon	Smt Vp Wilmington
Emily Donovan	Clean Cape Fear

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — 11/30/17

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
A. B. Swindell	WASTE INDUSTRIES
Jon Carr	Jordan Price Law Firm
David McGowan	NCPC
TYLER NEWMAN	BASE
Rob Lamm	RLA

Committee Sergeants at Arms

NAME OF COMMITTEE HOUSE COMM ON NC RIVER QUALITY

DATE: 11-30-2017 Room: 643

House Sgt-At Arms:

1. Name: JONAS CHERRY
2. Name: REY COOKE
3. Name: REGGIE SILLS
4. Name: DEAN MARSHBOURNE
5. Name:

Senate Sgt-At Arms:

1. Name:
2. Name:
3. Name:
4. Name:
5. Name:

Attachment 2

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. ELMER FLOYD
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB MULLER
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER MCGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

JUDY LOWE
COMMITTEE CLERK

AGENDA
9:30 a.m. Thursday, November 30, 2017
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Davis, presiding

2. Introductory remarks by Cochairs
   Representative Davis
   Representative Grange
   Representative Iler

3. Department of Environmental Quality update on response to emerging compounds and responses to previous questions, including:
   - Latest surface water and groundwater monitoring results
   - Information on air emissions from the Chemours Fayetteville Works facility
   - Enforcement actions, including enforcement actions related to an unreported chemical spill at the Chemours Fayetteville Works facility
   - Discovery of additional emerging compounds
   - Information on Departmental water quality monitoring

   (2 hours)

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

Mike Abraczinskas, Director, Division of Air Quality
Department of Environmental Quality

4. Discussion of schedule and plans for future committee meetings

5. Announcements

6. Adjourn

ADDITIONAL INFORMATION:

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578, or may visit the Committee's website at:
http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

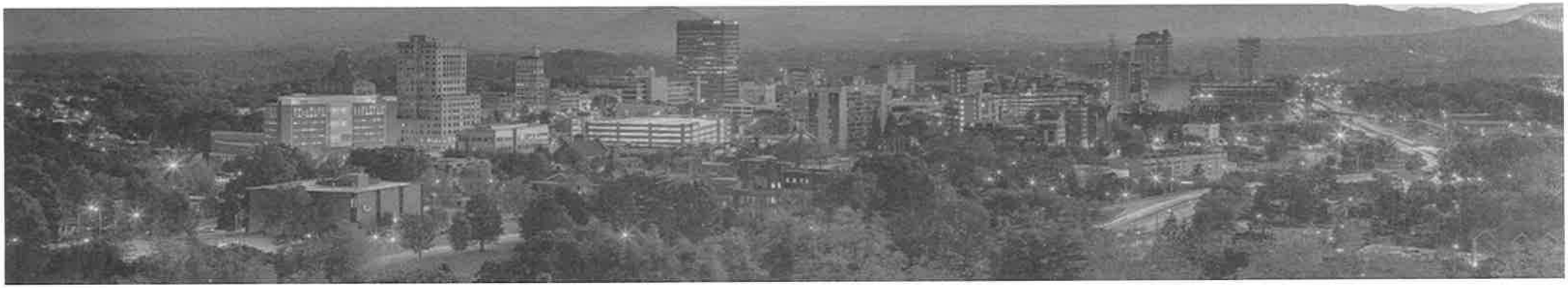
Attachment 3



Nothing Compares
NORTH CAROLINA

Select Committee on North Carolina River Quality

November 30, 2017





Material Topics



- Latest surface water and groundwater monitoring results
- Information on air emissions from the Chemours Fayetteville Works facility
- Enforcement action update
- Additional emerging compounds
- Information on water quality monitoring – including follow up from the November meeting



Divisions

- Division of Water Resources
- Division of Waste Management
- Division of Air Quality



Nothing Compares
NORTH CAROLINA

Division of Water Resources



NPDES Wastewater Permitting



National Pollutant Discharge Elimination System (NPDES)

- Program Established in 1972 by the Clean Water Act (Federal Water Pollution Control Act)
- 1975- EPA delegates NPDES permitting authority to NC
- 1992- EPA delegates authority to issue general permits to NC

NPDES Wastewater Permitting

Wastewaters Permitted Through NPDES Program



- √ Domestic wastewater
- √ Industrial process wastewater
- √ Municipal wastewater
- √ Groundwater remediation
- √ Water treatment plants
- √ Process area stormwater

NPDES Wastewater Permitting

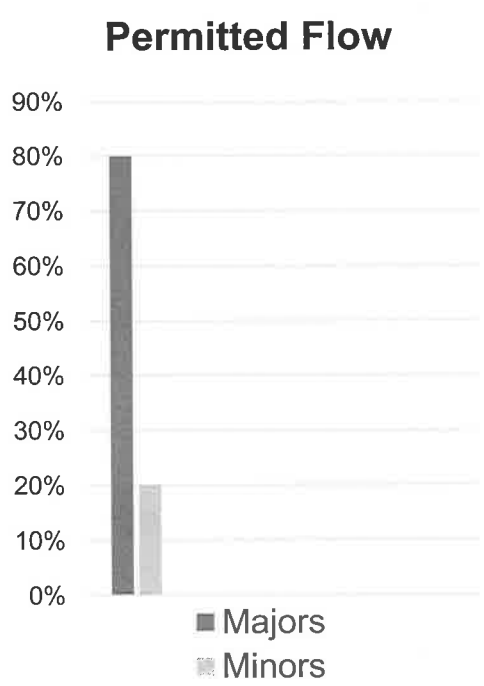


Types of Wastewater Permits Issued

- Majors - 230 Total
  - Municipal
  - Industrial

- Minors - 891 Total
  - Municipal
  - Industrial
  - 100% Domestic
  - Groundwater Remediation
  - Water Treatment Plants

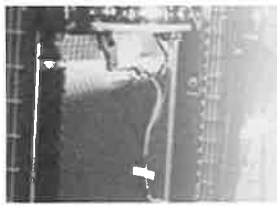
- Authorizations to Construct (ATC)
  - Issued 34 ATC permits in 2016



NPDES Wastewater Permitting

- **General Permits (1,773 Certificates of Coverage Issued)**
  - NCG500000: Non-contact cooling water, boiler blowdown
  - NCG510000: Groundwater remediation
  - NCG520000: Sand dredging runoff wastewater
  - NCG530000: Fish farms: Seafood packing & rinsing operations
  - NCG550000: Single-family residences <1000 GPD
  - NCG560000: Pesticide application runoff
  - NCG590000: Water treatment plants

PERMITS REVISED AND REISSUED EVERY FIVE YEARS

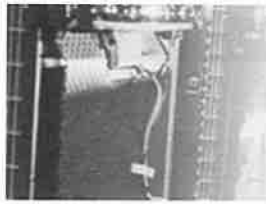


NPDES Wastewater Permitting



Permit Renewal Process

- Draft Permits are Public Noticed in Newspapers and on DWR website
- Draft permits are subject to a 30-Day Public Comment Period
- Draft Permits receive input from stakeholders, including applicant, public, EPA (majors), PWS, DMF, USFWS, and other agencies
- Permits Issued for 5 year period (maximum) based on a basin wide schedule



NPDES Wastewater Permitting

Pollutants of Concern



Conventional Parameters

- Total Suspended Solids (TSS), Fecal Coliform, pH, Oil and Grease, Biochemical Oxygen Demand (BOD), and ammonia-nitrogen

Nutrients

- Total Nitrogen, Total Phosphorus

Toxicants

- Ammonia-nitrogen, Heavy metals (copper, lead, zinc, chromium, etc.), Organic chemicals (benzene, phenol, etc.), Unregulated chemicals



NPDES Wastewater Permitting

How NPDES Permits Protect Water Quality

- Considers Assimilative Capacity of Receiving Stream
- Uses conservative approach in limits calculation
  - Low stream flow (7Q10)
  - Maximum design flow
- Evaluates existing conditions
  - Upstream influences
  - Waterbody impairments



NPDES Wastewater Permitting

NPDES Responsibilities Beyond Permitting

1. Compliance & Enforcement
2. Issue Tax Certifications [NCGS105-275.(8)]
3. EPA Reporting
4. Fee Recovery
5. Electronic Discharge Monitoring Report (eDMR Overview)
6. Modelling for Smaller Facilities
7. Speculative limitation letters for municipalities

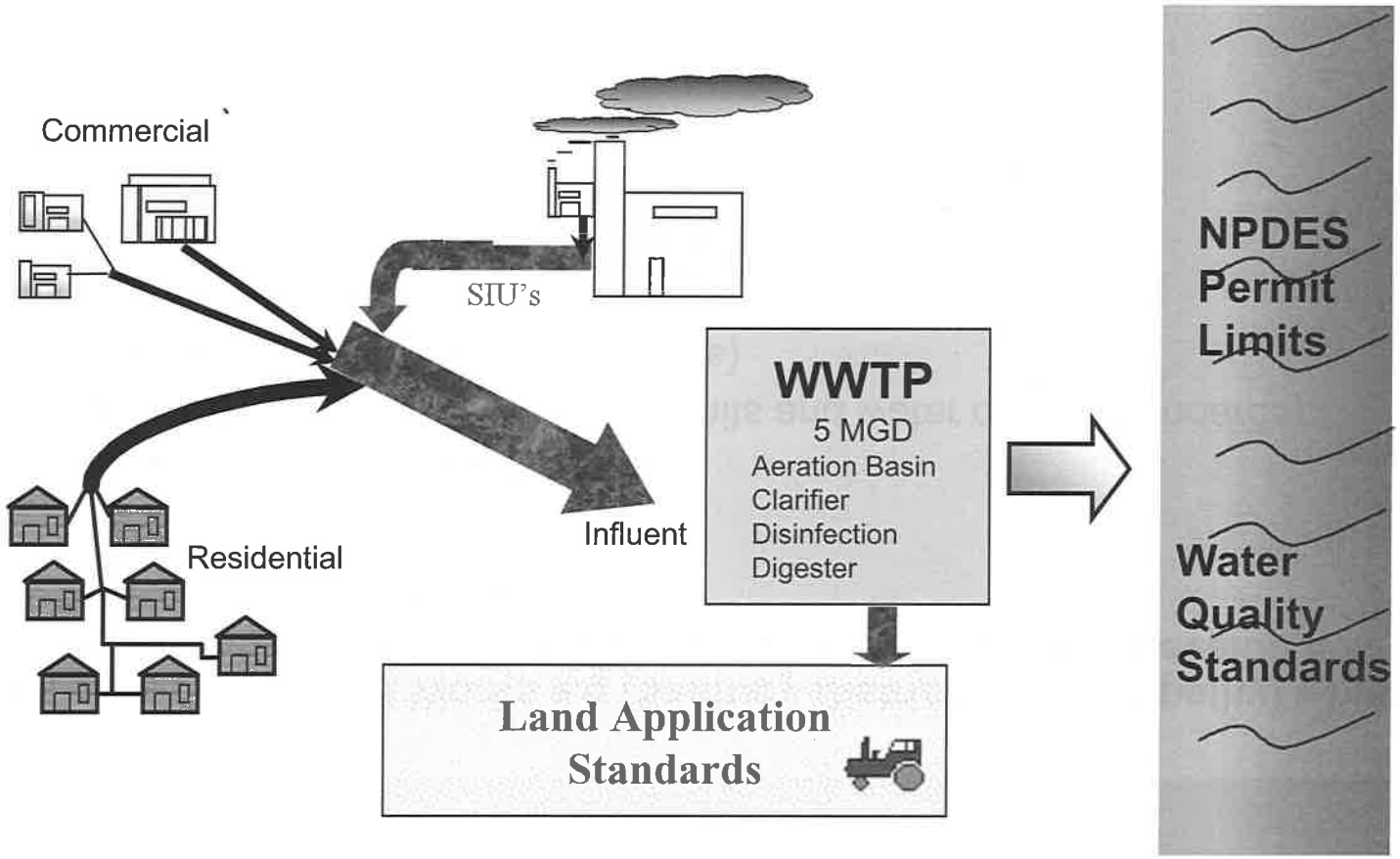
Pretreatment Program



- **A Publicly Owned Treatment Works e.g (Sanitary District or municipality) which accepts wastewater from a Significant Industrial User (SIU) must develop a pretreatment program (40 CFR 403)**

- **The purpose of the Pretreatment Program**
  - Protect the stream (meet NPDES permit limits and water quality standards)
  - Protect the WWTP (healthy microorganisms)
  - Allow for Beneficial reuse of biosolids

Pretreatment Typicalville



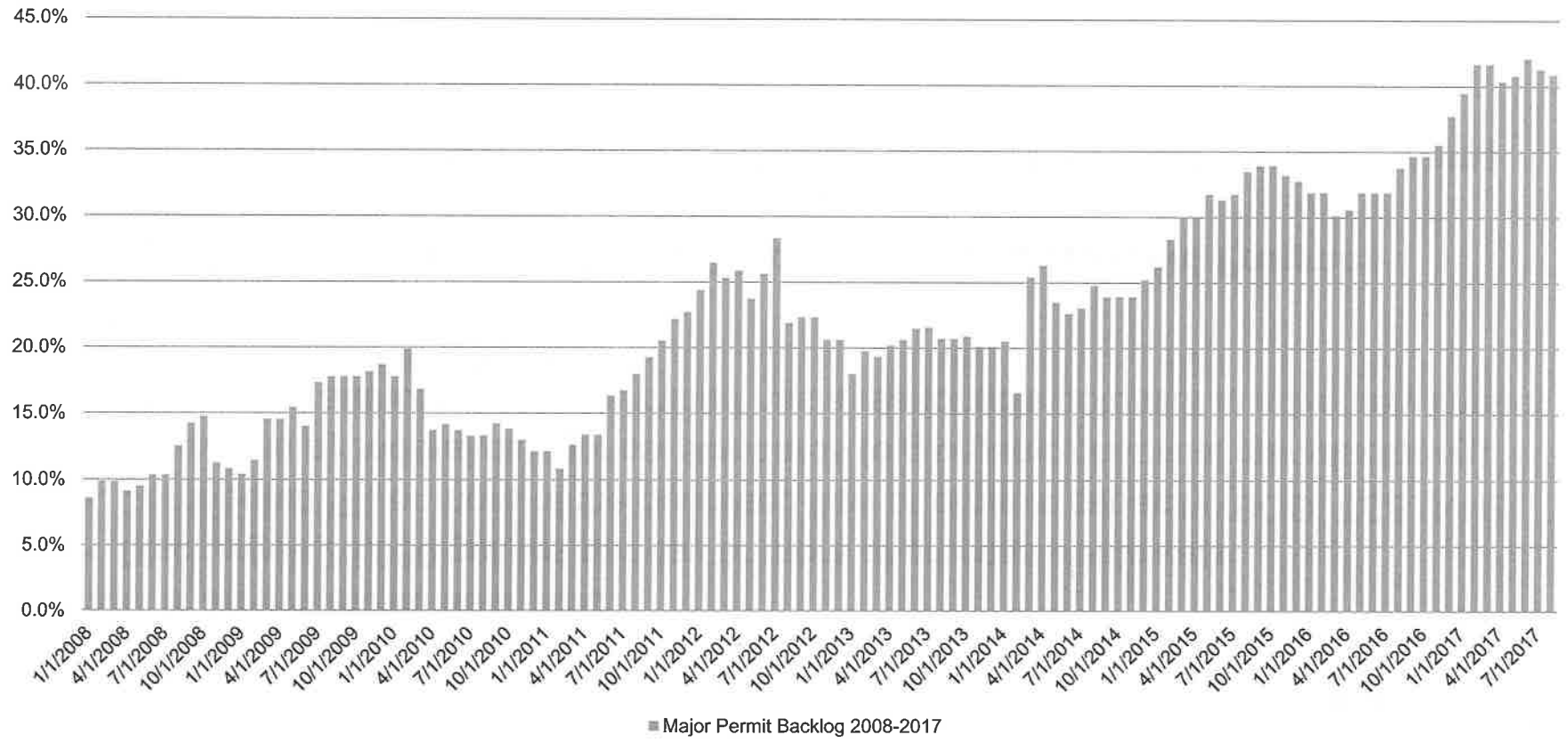
Pretreatment Program

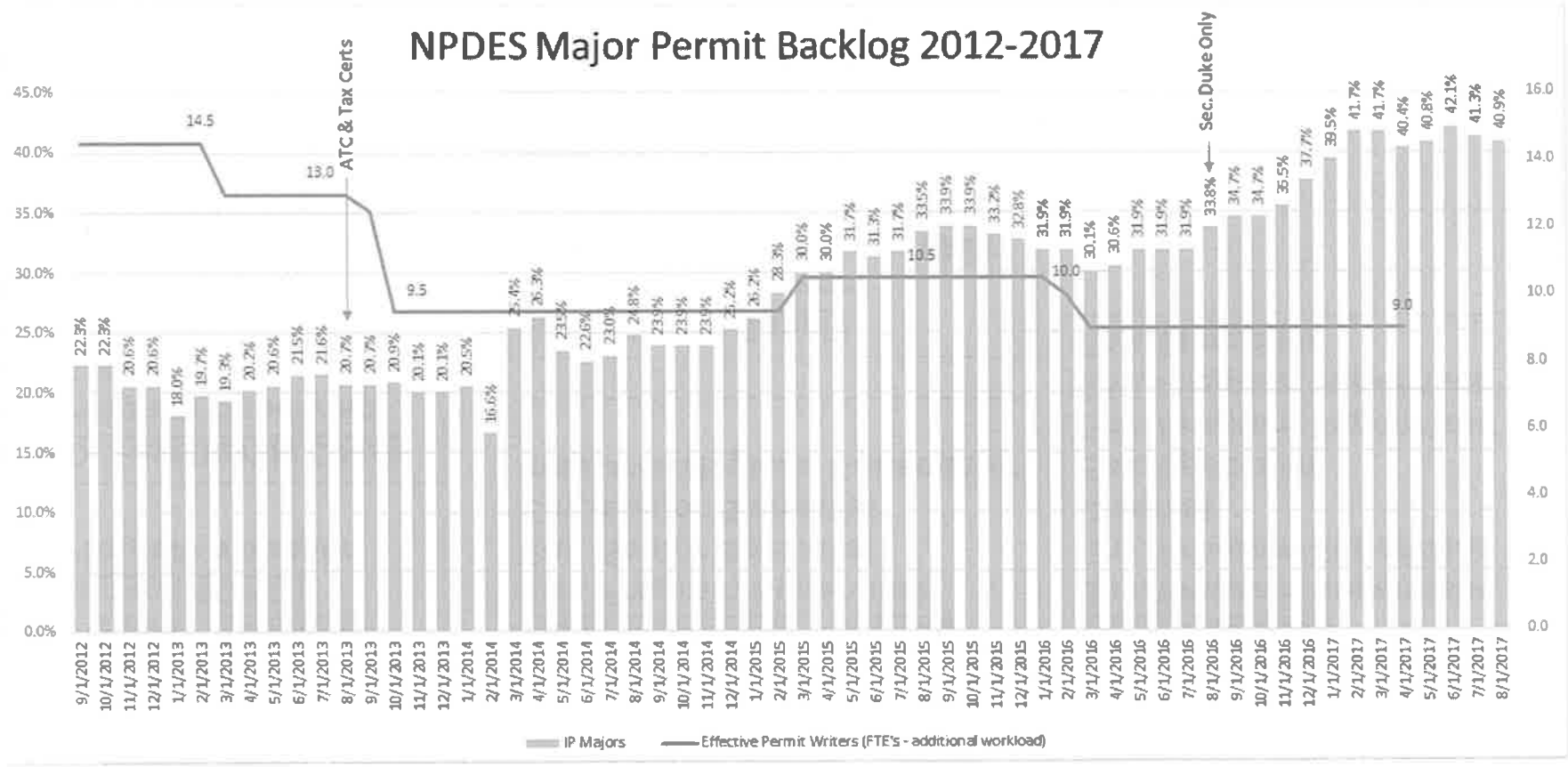


- **A SIU is an industrial user who:**
  - Discharges 25,000 gallons per day or more of process wastewater
  - Contributes 5% or more of the permitted flow or organic capacity (BOD, TSS, NH3)
  - Is covered by federal categorical standards (e.g organic chemical manufacturing)
  - The control authority has determined has a reasonable potential to adversely impact the operation of the POTW

- **Comparison of NPDES Direct River Discharge vs. Pretreatment Program**
  - 96 Major Industrial NPDES Permits
  - 636 Significant Industrial Users in 114 different municipal Pretreatment Programs

Major NPDES Permit Backlog History




NPDES Major Permit Backlog 2012-2017
ATC & Tax Certs
Sec. Duke Only
IP Majors
Effective Permit Writers (FTE's - additional workload)

Division of Water Resources - 31 Staff Working on GenX

Interim Director, Interim Deputy Director, Administrative Assistant

Water Quality Regional Operations (WQRO)
Env. Program Manager

WQRO: Fayetteville Office
Env. Program Supervisor
Env. Specialist
Env. Program Consultant
Env. Senior Specialist

WQRO: Wilmington Office
Env. Program Supervisor
Env. Specialist
Hydrogeologist
Env. Program Supervisor
Engineer
Env. Senior Specialist*

Water Resources Planning
Env. Program Supervisor
Env. Senior Specialist
Env. Senior Specialist*
Industrial Hygiene Consultant*

Public Water Supply
Engineering Manager
Engineering Supervisor-FRO
Env. Senior Specialist-FRO
Engineering Manager*

Water Quality Permitting
Env. Program Manager
Env. Program Supervisor

Water Sciences
Env. Program Supervisor
Env. Program Supervisor
Chemist
Env. Specialist
Env. Program Supervisor*
Env. Program Supervisor*
Env. Specialist*

Key

Federal: 11 FTE | State: 13 FTE
* Receipt: 7 FTE

Current Weekly Sampling

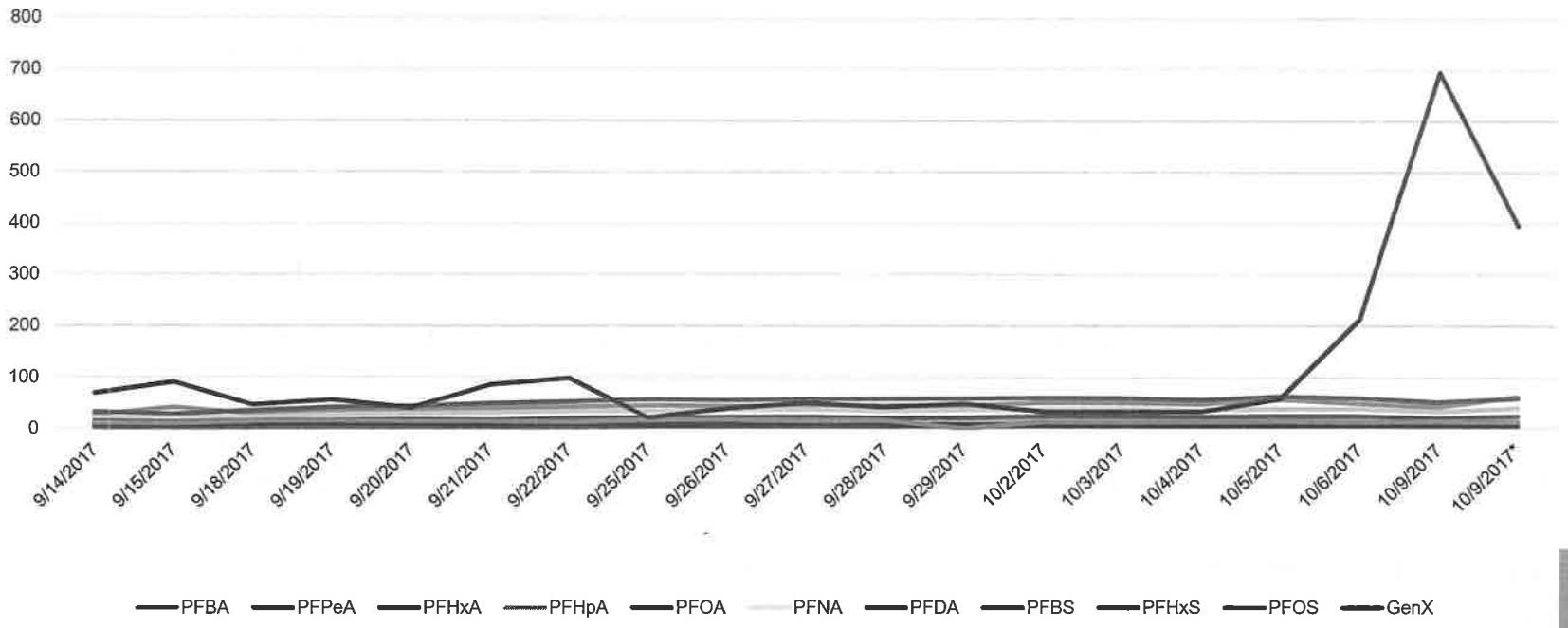


Division of Water Resources Staff Conduct Weekly Sampling

- The Chemours outfall 002 has two composite samples:
  Monday - Thursday and Friday - Sunday

- Drinking water facilities downstream are sampled weekly:
  Bladen Bluff
  International Paper
  NW Brunswick
  Pender County
  CFPU Sweeney

Data at Chemours Outfall 002 (parts per trillion)



Site inspection



Area of Chemours plant where Oct. 6th release occurred and entered the waterway that discharges to outfall 002.

Enforcement Summary



- Sept. 5th - 60-day Notice of Intent to Suspend NPDES Permit
- Sept. 6th - NOV & Intent to Assess Civil Penalty for Groundwater Violation
- Sept. 8th – Partial Consent Order, Bladen County Superior Court
- Oct. 24th – Lifted Sept. 5th Intention to Suspend NPDES Permit
- Nov. 13th – NOV & Intent to Assess Civil Penalty related to release on Oct. 6th
- Nov. 16th – Notice of Partial Suspension and 60-Day Notice of Intent to Partially Revoke NPDES Permit

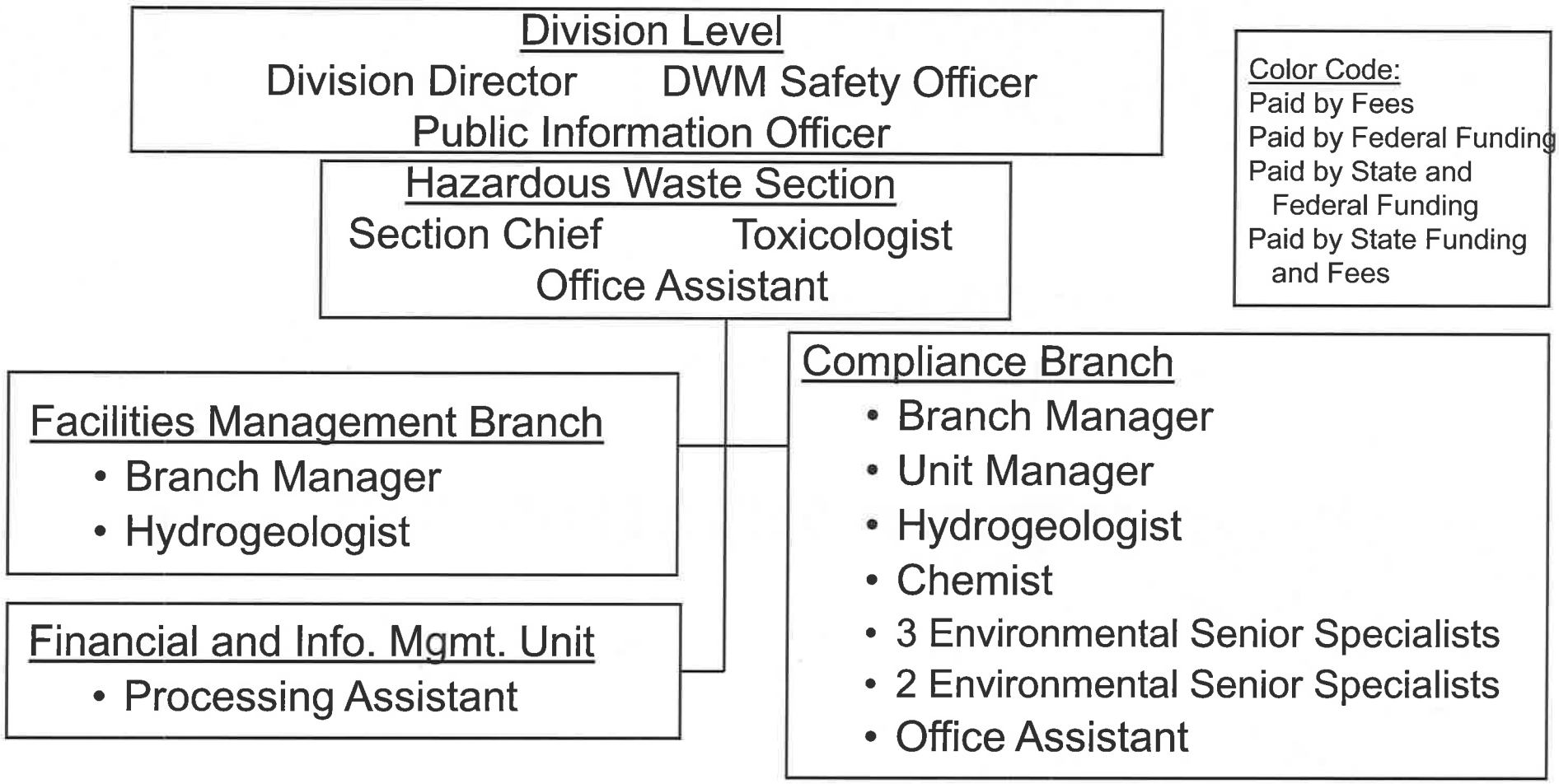


Nothing Compares
NORTH CAROLINA

Division of Waste Management



Division of Waste Management: 19 Staff Working on GenX



Private Well Sampling Results

Private Wells Sampled (Phase 1):	**141**
Total # wells with exceedance of the Gen X NC DHHS provisional health goal:	**51**
Total # wells reported as non-detect (ND):	**35**
Total # wells with a Gen X detection (including those above the health goal):	**106**
Total # wells with a Gen X detection less than the health goal:	**55**
The maximum detected Gen X concentration (ppt) is:	**1300**



Private Well Sampling Results (Phase 2)

Private Wells Sampled: 107

- **Total # wells with exceedance of the Gen XNC DHHS provisional health goal: 34**
- **Total # wells reported as non-detect (ND): 25**
- **Total # wells with a Gen X detection (including those above the health goal): 82**
- **Total # wells with a Gen X detection less than the health goal: 48**

The maximum detected Gen X concentration is: 1200 ppt

Chemours Sampling Map (Northern Area)



Chemours Sampling Map (Central Area)



Chemours Sampling Map (Southern Area)



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.

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.

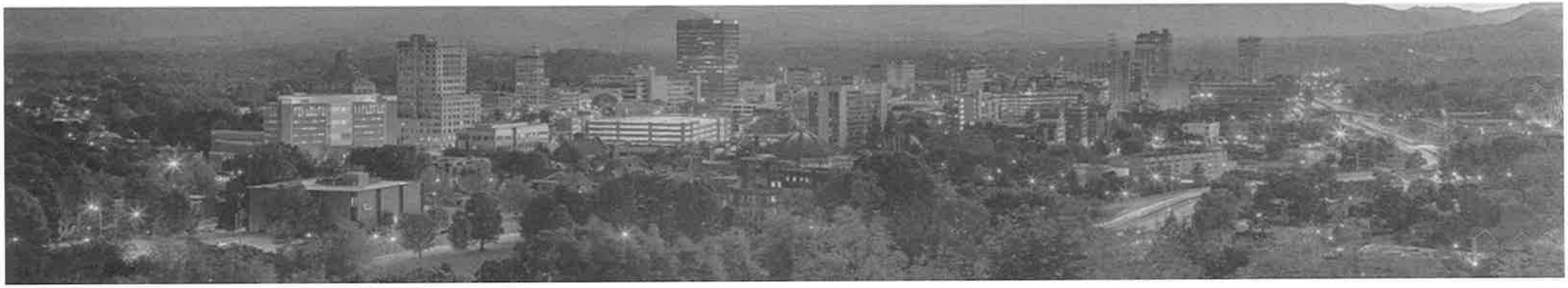
Groundwater – Next Steps

- Chemours On-Site Investigation
  - Sample some 40 additional on-site monitoring wells for GenX and other compounds of concern to determine groundwater contamination on-site.
  - Install both shallow and deep monitoring wells to refine the groundwater flow model for the site.
  - Conduct shallow and vertical soil profiling of GenX into deeper areas of the subsurface to learn the extent of soil contamination and the ability to impact the groundwater through leaching.
- Determine if Willis Creek is a discharge point for groundwater.
- Conduct Aquifer tests to determine transport characteristics of the subsurface.
- Determine the areas of the site that caused the releases of contaminants.



Nothing Compares
NORTH CAROLINA

Division of Air Quality



Division of Air Quality: 17 Staff Working on GenX

- **Resources devoted to emerging compounds have increased as the Chemours situation has unfolded.**

Director
Deputy Director

Fayetteville Regional Office	Compliance	Permitting	Ambient Monitoring
Journey Engineer	Section Chief	Section Chief	Section Chief
Environmental Senior Specialist	Journey Engineer	Engineering Supervisor	Lab Supervisor
	Journey Engineer	Journey Engineer	Environmental Chemist
	Contributing Engineer	AQ Analysis Supervisor	
	Contributing Engineer	Meteorologist II	

Department of Environmental Quality

Division of Air Quality

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.**

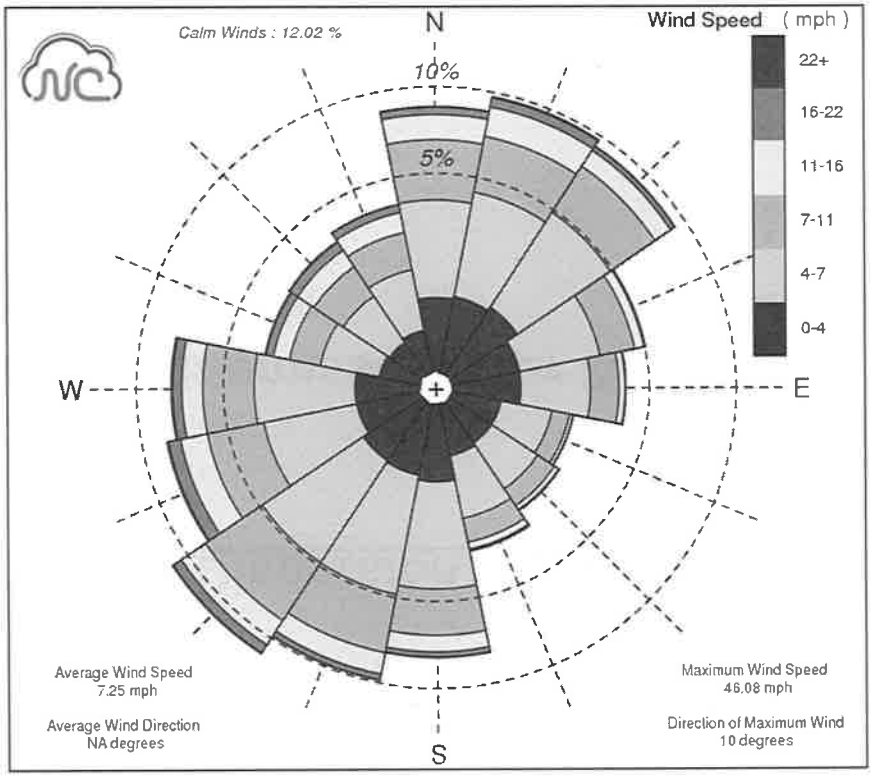
Department of Environmental Quality
Division of Air Quality

What's the role of air emissions?

- Wind data
- Air dispersion modeling

Department of Environmental Quality
Division of Air Quality

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



Department of Environmental Quality

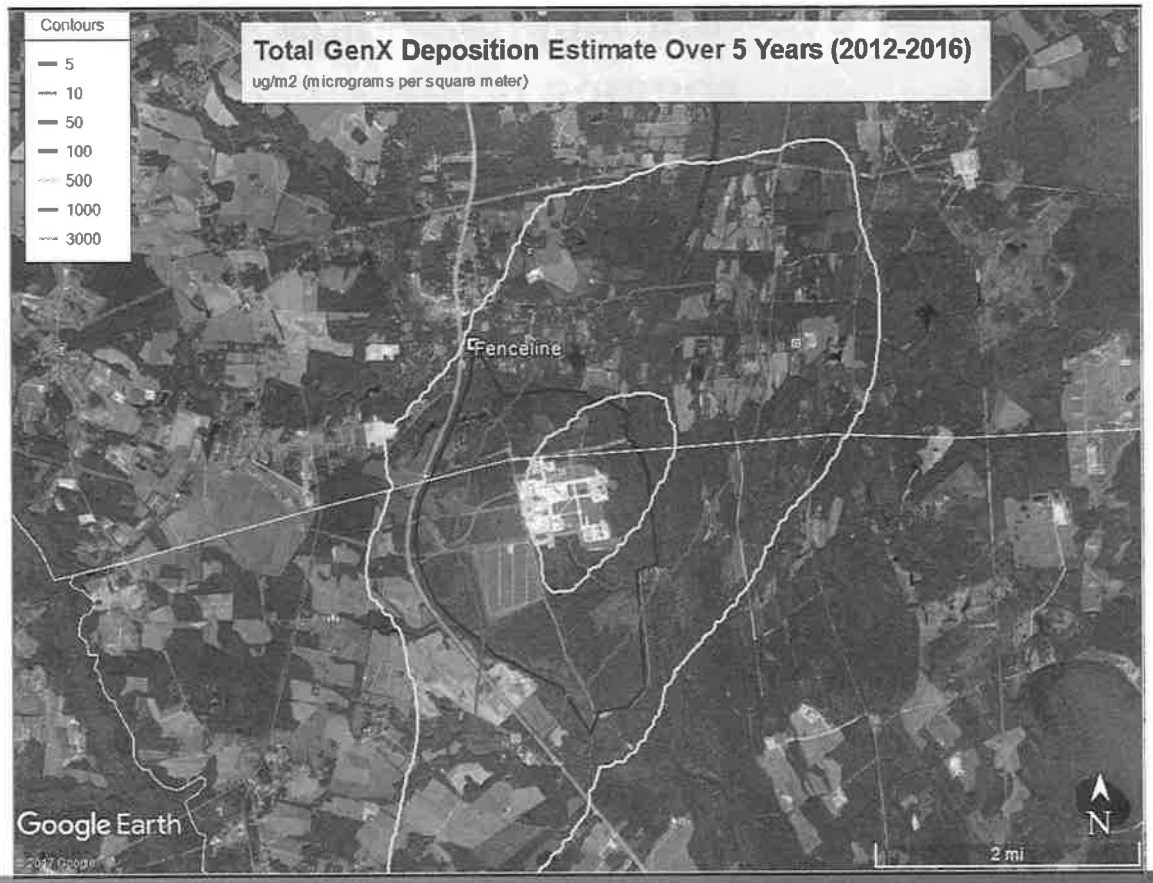
Division of Air Quality

Air Dispersion Modeling

- Chemours actual air emissions for 2012-2016
  - GenX compounds only
- Actual stack characteristics
- Actual hourly meteorology over the 5-year period

Department of Environmental Quality

Division of Air Quality



Department of Environmental Quality

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.

pg. 40

Department of Environmental Quality

Division of Air Quality

Target contaminant - HFPO Dimer Acid (GenX)

Test method – EPA M0010 Modified Method 5 with XAD traps for the capture of volatile and semi-volatile organics

Three 180 minute test runs will be performed during normal process operations

Analysis –liquid chromatography with two mass spectrometry analyzers (LC/MS/MS)

Department of Environmental Quality

Division of Air Quality

Sources to be tested:

Fluoromonomers, Nafion, and Polymer Processing Aid (PPA) Processes

Test Locations - Division, VE South Scrubber and PPA Stacks

Testing will be performed post – scrubber. The goal of the test is to quantify the emissions of GenX to the atmosphere during the test period.

The emissions testing will help verify emissions estimates previously submitted

Follow up item



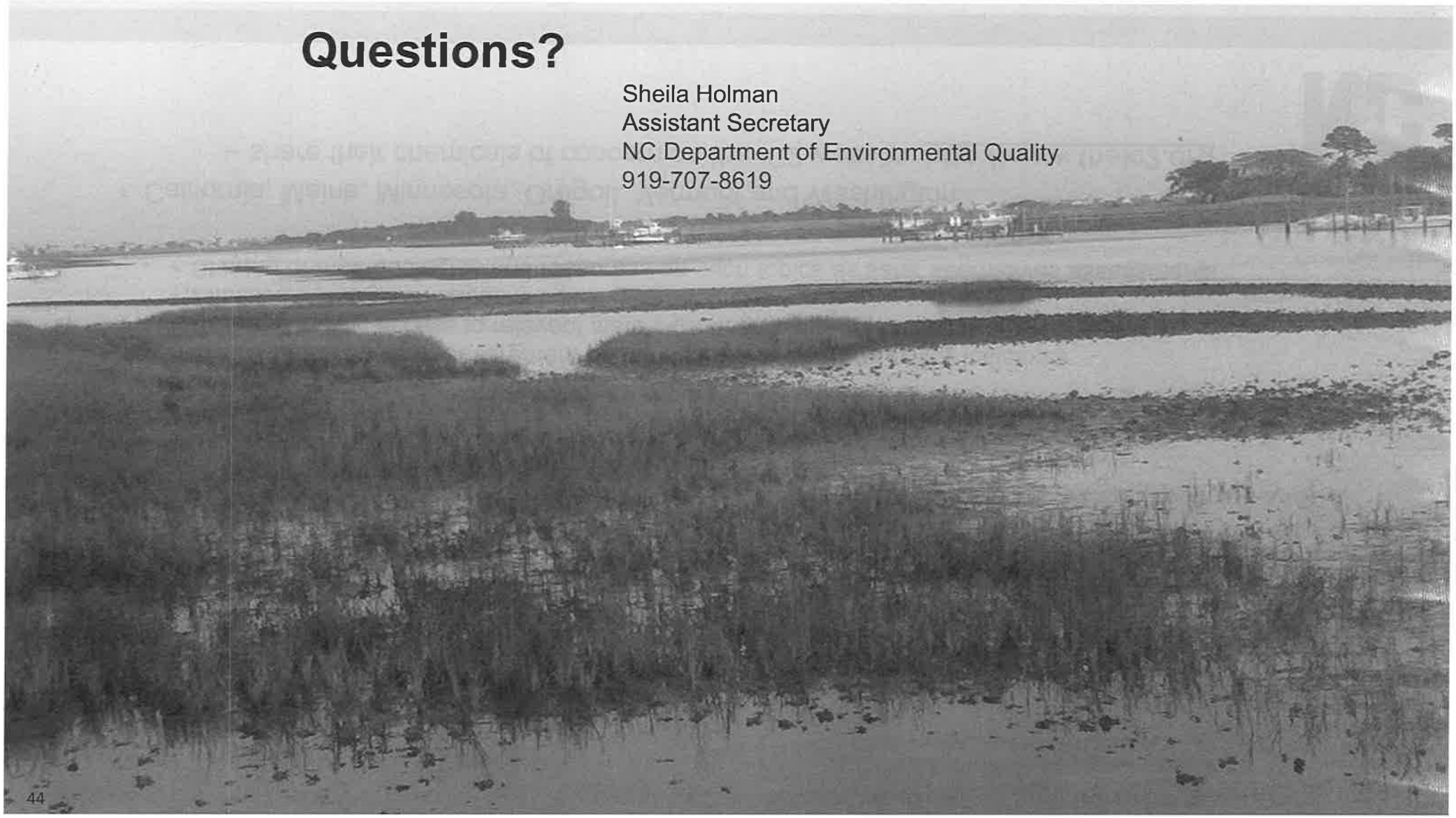
- Interstate Chemicals Clearinghouse (IC2)
  - Annual fees based on population – North Carolina = $10,000

- IC2 Members benefit through:
  - Consistency in state implementation of chemical policies and laws, including product reporting and other data gathering activities, phase-outs and bans, and labeling
  - Interstate communication on legislative initiatives, laws, and rules
  - Efficient and effective communications with the regulated community
  - Interstate collaboration on public education
  - Coordination on the measurement of the impacts of chemical policy initiatives
  - Common public access to relevant state information and guidance
  - Effective training and capacity building opportunities
  - Sharing of methodologies and resources on such topics as safer alternatives assessments

- California, Maine, Minnesota, Oregon, Vermont and Washington
  – share their chemicals of concern on the IC2 website: **http://www.theic2.org**

Questions?

Sheila Holman
Assistant Secretary
NC Department of Environmental Quality
919-707-8619



GenX Groundwater Sampling Results
November 29, 2017

Attachment 4

Legend

NCDEQ Residential Well Samples (GenX)
- Below 10.0 ng/L
- 10.0 - 140.0 ng/L
- Above 140 ng/L

Chemours Residential Well Samples (GenX)
- Below 10.0 ng/L
- 10.0 - 140.0 ng/L
- Above 140 ng/L

Chemours On Site Soil Sample Results (GenX)
- 1.30 - 6.97 ug/kg
- 6.98 - 12.65 ug/kg
- 12.66 - 18.32 ug/kg
- 18.34 - 24.00 ug/kg

Chemours On Site Monitoring Wells (GenX)
- 0.0 - 4700.0 ng/L
- 4700.1 - 15000.0 ng/L
- 15000.1 - 32000.0 ng/L
- 32000.1 - 50000.0 ng/L

1 Mile Buffer of Chemours Property Line

1.5 Mile Buffer of Center of Chemours Facility

Chemours Facility Property

Judy Lowe (Rep. Ted Davis)

3-6215

From: Trafton Dinwiddie (Rep. Tim Moore)
Sent: Thursday, November 30, 2017 11:17 AM
To: Trafton Dinwiddie (Rep. Tim Moore); Judy Lowe (Rep. Ted Davis); Lewis King (Speaker Moore's Office); Kimberly Neptune (Rep. Chuck McGrady)
Subject: RQ Committee Meeting #3

Introduction of two new members

Sheila Holman presenting for DEQ, along with Culpepper, Scott and Abraczinskas

DWR:

NPDES permit program: program established in 1972 under CWA; NC became permitting authority in 1992
230 total major permits for munis and industry
891 minor permits for munis, industry, 100% domestic, etc

Permit Renewal: draft permits published, 30-day comment period, permits reviewed by stakeholders including feds, permit issued for max of 5 years based on basin schedule
Various pollutants of concern are covered; from fecal coliform to total N and P to toxins including heavy metals and organic chemicals
NPDES permitting is more than permitting; compliance and reporting, tax certifications, EPA reporting, fee recovery, etc

Staffing and backlog; 4 funded with receipts, 11 funded with funds from feds
No approps go to permitting

Weekly sampling from two Chemours outfall sites
5 drinking water facilities are sampled also including Sweeney and International Paper
Quality assurance review is performed prior to posting data on site

Data from Chemours outfall show no spikes of any chemicals currently being monitored for except GenX which DEQ became aware of around **Oct 1**
Concentrations of GenX; 250ppt to 3700ppt on Oct 9, 740ppt on Oct 12 at outfall
Brunswick county concentrations were above health goal until at least Oct 19
Awaiting test results on downstream drinking water facilities
Chemours on site lab can now measure down to 100ppt
Operating on 6Mil Gal/Day when spill occurred, normal is 20Mil Gal/Day – contributed to spike because of dilution in runoff and wastewater

Partial suspension and 60-day notice of intent to partially revoke NPDES permit – intend to comply starting today 11/30

Davis – did Chemours give any explanation on why they did not disclose spill at the time it happened? No, they will be assessed a civil penalty in a few week. Chemours statement is not exactly complete – argument on whether they had to disclose technically
Difficult to determine whether consent order was violated because of "normal business practices" clause in order
Stone - is the NOV qualified as a violation of the consent order or reporting requirements of NPDES permit? NPDES reporting requirements

DEQ is intending to see that Chemours will not discharge any wastewater, will not affect manufacturing process as well as other companies that operate under same permit

DEQ: spike definitely could have affected Brunswick county, but investigation has been handed over to SBI
Effective today, with staff on hand to verify, Chemours will begin diverting and not discharging any wastewater
Dixon: does the flow at the time of the spill correlate directly with the spike? Not necessarily, when normalizing for flow, the concentrations should not have been above 600ppt
Does dilution have any role in concentrations? Not just dilution but it certainly plays a role
We would like to see the public record on the original permit issuance for Chemours in 2004.

Floyd: Does Chemours have a responsibility to report? Yes, that is the direct reason for NOV

McElraft: what percentage of the total discharge allowed is attributed to manufacturing solely? 22Mil total, 1Mil gal – **daily**
What will the company do with this 1mil gallons they can no longer discharge? Shipping wastewater to Texas for deep water well injection
Effective filtration methods? Chemours is exploring all options

Yarborough: accuracy of testing to this point capped at 100ppt? labs can test down below 10ppt, company has onsite lab that can detect down to 100ppt

Harrison: other chemicals of concern? Yes, DEQ will be using method to test for 24 different PFAS compounds, known as method 36
Working with EPA and SAB to determine prioritization for compounds
Are we doing this testing statewide? Exploring options for ambient monitoring throughout state, still in the works
Biosolid and land application for pretreatment, is that handled within NPDES permit program? Pretreatment is under water quality permitting but is separate from NPDES
No data on emerging contaminants in biosolid

DWM

19 staff currently working on addressing GenX situation
Phase 1 completed; 141 wells sampled, 51 had exceedances of health goal, with highest at 1300ppt
Phase 2 private well testing; 107 tested total, 34 exceedances, with 1200ppt highest concentration

Additional sampling in Cumberland county, with two schools samples coming in at 5ppt and ND
GenX levels in Marshwood lake and Camp Dixie came in at 915 and 620 ppt respectively - DEQ says safe to swim

Working to determine if north-flowing Willis Creek could be carrying compounds north
Working to provide water through Crystal Springs

McElraft: any possibility testing is picking up PFAS, areas where discharges are not occurring....i.e. bioaccumulation? Not tested, but chemical is manmade so would not usually be naturally occurring

Harrison: who is paying for bottled water? Chemours

DAQ

17 staff working on GenX situation

Data from Chemours are emissions indicate C3 Dimer Acid Fluoride (GenX when it meets water) over 500 lbs/year
When considering historic wind data, atmospheric deposition would persist north east and south west of facility – which goes along with initial sampling

Working on stack testing technologies and will commence 3 80 minute stack samples that will then be analyzed within next few weeks
Interstate Chemicals Clearinghouse membership would cost 10k, but DEQ doesn't see enough data benefit that cannot be found elsewhere

Stone: Typical air discharge levels for permit? Depends on size of property, could certainly be hundreds of pounds per year for toxic pollutants

Yarborough: depth of wells in this part of state? About 100 feet deep

Floyd: wind modeling? Typical wind flows based on Fayetteville Regional Airport data

Dixon: are the air emissions data estimates? Yes
Could DEQ reevaluate air data and the staffing levels devoted solely to air quality issues surrounding GenX? As the actual data comes in, DEQ will always reevaluate.

Harrison: with other states toxics and chemicals programs, can we adequately access data without joining clearinghouse? Yes, most other states function as we do outside of the clearinghouse.

Davis: Role of water monitors? **Committee needs more info!!!**

January 4th next meeting; will be voting on recommended legislation.
January 10th special session will feature short term remedies

Trafton P. Dinwiddie

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Ted Davis, Jr.

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Yes ☑ No ☐

Car Mileage
(Fill out this line if mileage is different than what is certified on file) 280

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Jimmy Dixon

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Jimmy Dixon
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Elmer Floyd

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Elmer Floyd
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Holly Grange

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.) Yes ☒ No ☐

Car Mileage
(Fill out this line if mileage is different than what is certified on file) —

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Kyle Hall

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Pricey Harrison

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.) Yes ☑ No ☐

Car Mileage
(Fill out this line if mileage is different than what is certified on file) 162

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Frank Iler

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ON FILE
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Pat McElraft

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Pat McElraft
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Bob Muller

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Bob Steinburg

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage Same
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Rep. Bob Steinburg
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Larry Yarborough

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, November 30, 2017

Member: Rep. Scott Stone

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

STATE OF NORTH CAROLINA
GENERAL ASSEMBLY

RECEIVED
NOV 30 2017
FINANCIAL SERVICES OFFICE

Interim House Legislative Assistant Committee Payment Form

_House Select Committee on North Carolina River Quality
(Complete Name of Committee)

Location of Meeting (City): _Raleigh, NC

Date of Meeting: Thursday, November 30, 3017

Legislative Assistant's Name: Judith R. Lowe

Temporary or Permanent Employee ***(please circle)***

Judith R. Lowe
(Legislative Assistant's Signature)

(Approval Signature)
[Must be approved by Chairperson]

Ann Luck
(Approval Signature)
[Must be approved by House LA Office]

Please note that Committee pay ($100) is received per committee meeting, not per clerk. Pay may be split if there is more than one clerk for the meeting.

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Thursday, January 4, 2018
TIME: **9:30 AM**
LOCATION: **643 LOB**
COMMENTS: **The agenda will be forwarded to committee members when it is completed.**

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 2:53 PM on Monday, December 18, 2017.

___ Principal Clerk
___ Reading Clerk – House Chamber

Judy Lowe (Committee Assistant)

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. ELMER FLOYD
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB MULLER
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER McGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

JUDY LOWE
COMMITTEE CLERK

AGENDA
9:30 a.m. Thursday, January 4, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Committee consideration and vote on short-term legislative proposals for the January 10, 2018 Session
   Representative Ted Davis

   Public Comment

4. Committee discussion on non-agenda items and announcements

5. Adjourn

ADDITIONAL INFORMATION:
The proposed legislation can be reviewed on the Committee's website designated below. A maximum of one hour will be allotted for public comment. Three minutes will be allotted for each speaker in the public comment period.

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578 or may visit the Committee's website at:
http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

HOUSE SELECT COMMITTEE ON NC RIVER QUALITY

Thursday, January 4, 2018 at 9:30 a.m.
Room 643 of the Legislative Office Building

The House Select Committee on North Carolina River Quality (Committee) met on Thursday, January 4, 2018 at 9:30 AM. The meeting was held in room 643 of the Legislative Office Building. Senior Chairman Ted Davis presided and the following Co-Chairs and staff were in attendance: Representatives Grange and ller, Co-Chairs, Representatives Brisson, Dixon, Floyd, Hall, McElraft, McGrady, Muller, Stone, and Yarborough, members.

Opening Remarks

Representative Davis called the meeting to order and recognized the House Sergeant of Arms, Jonas Cherry, Rey Cook, Dean Marshbourne, and Reggie Sills. He explained that public comment would be allowed for up to one hour at the end of the meeting with a three minute time limit. Anyone that would like to speak should please sign up.

Co-Chairman Representative Frank Iler was recognized and reiterated that this proposed legislation is a short term resolution. This will be an ongoing process, but it certainly won't be solved in one day.

Chairman Davis opened with comments regarding the importance of this meeting because the North Carolina General Assembly will be meeting in a Special Session on January 10, 2018, which is less than a week away. Whatever is passed out of the meeting will allow ample opportunity for the proposed legislation to be forwarded to all members of the House so they can review it before the full body reconvenes on January 10, 2018.

Based on the previous adjournment resolution, the proposed legislation to be discussed today is not eligible to be heard at the January 10, 2018 legislative session. However, the Speaker of the House Tim Moore agrees that the pollution of sources of drinking water is so important we will be allowed to move forward with whatever legislation is passed during our meeting today during the session on January 10, 2018. This shows the House's commitment to move forward and make positive steps in addressing the pollution in our drinking water sources. This proposed legislation

doesn't have everything that everybody wants, however it is a starting point that can be built on and give us momentum as we move to the Short Session. The January 10, 2018 session will be one day, maybe two, so please realize that there is not sufficient time for legislation that is controversial, requires extended debate, or will have to be heard by multiple committees. The legislation will need to be passed by both the House and the Senate during that limited session in order to become law. This committee has been instructed to pursue a non-controversial, short term solution that should be able to pass both the House and the Senate at the upcoming session. The more controversial and time consuming issues can be address during the Short Session.

An effort has been made prior to today to contact stakeholders to be briefed on the proposed legislation. Those who were contacted included Duke Energy, Department of Environmental Quality (DEQ), Coastal Federation, Sierra Club, Southern Environmental Law Center, Environmental Defense Fund, World Water Association, The League of Municipalities, NC Chamber of Commerce, Preston Howard with the Manufacturers Association, the House Democratic Minority Leader Darren Jackson, and Democratic Representative Pricy Harrison who is a committee member and is currently out of the country and unable to attend today. In addition, the Senate leadership has been contacted and briefed so they are aware of the proposed legislation. Any changes made to the proposed legislation could jeopardize the support of this list of stakeholders that currently agree with what we have at this time.

This afternoon, each member of the House will receive a copy of the legislation that is passed today so every member will have the opportunity to review in preparation of the January 10, 2018 Session. An appropriation is an important part of any action that will be taken by the Legislature. The House leadership has been working on possible funding that may be considered with the proposed legislation that is voted out during this meeting at the January 10, 2018 Session. However, this legislation is still a work in progress and a funding package is not ready. If the appropriation piece is ready by the January 10, 2018 Session, the House will move forward at that time. If not, the House will proceed to consider more long term legislation solutions as well as the appropriate supporting funding for consideration during the Short Session, which was the original plan.

Representative Dixon was recognized for comments that seconded Chairman Davis' remarks and highlighted the history regarding the previous administrations and their knowledge of the problems that have been occurring for several years. In 2002, 2003, and 2005 nothing was done to acknowledge the warnings and it seems as if the concerns fell on deaf ears regarding water quality and pollution in the rivers. The current Republican majority in the NC House of Representative is currently working on this issue and taking corrective measures to insure safe drinking water for everyone in the State.

Overview of Proposed Legislation

Jeffrey Hudson, committee staff, was recognized to review the draft legislation that was sent to all committee members on December 22, 2017. Attachment # 2

Following the explanation of section 1, Chairman Davis opened the meeting up for comments on Section 1.

Representative Stone was recognized and commented that the term "consult with" is interpreted by DEQ and the administration as a very collaborative process because the Science Advisory Board (SAB) and its predecessor entity has been made up of very smart individuals with endless academic credentials that looked at the information from a strictly scientific view. He suggested a peer review to validate the 140 parts per trillion number and how that number was established and the possibility of establishing protocols on the health goals and United States Environmental Protection Agency (U.S. EPA) maximum contaminate levels for water quality. The State has the ability to have an interim maximum contaminate level and DEQ and the SAB have established those levels in the past and there are firm numbers which are much more reliable than the health goals. Health goals are just "goals". Goals versus what is allowable are very different and that needs to be transparent to the public. Perfluorooctanoic acid (PFOA), the predecessor entity to Gen X, which is much more toxic than Gen X, has a state interim maximum allow concentration (IMAC) currently of 2,000 parts per trillion. One Hundred Forty seems very low when the PFOA is at 2,000. In 2012, a recommendation was made by the SAB to the DEQ and Governor to lower that number to 1,600 parts per trillion and that was never implemented. Whatever the number is, the public needs to be confident in the number and how that number was determined.

Chairman Davis commented that he had the opportunity to attend the SAB meeting in Wilmington and was able to meet with the Board and speak to the Chairman. He reiterated the desire to work with the Board to come up with common goals that both could support for submission during the Short Session.

Representative Iler was recognized and asked for the makeup of the SAB and is it dictated by statute?

Jeffrey Hudson responded that the SAB charter was adopted on July 28, 2017 and it sets out a number of powers and duties beyond what is discussed in the bill. It also includes some parameters for membership for the Board. Board membership will be subject to the following additional specifications: a minimum of one doctoral level epidemiologist, preferably with a background in public health or environmental science with a strong background in environmental epidemiology; a minimum of one doctoral level toxicologist, public health scientist or environmental scientist in the private sector who has experience in these areas; the State Epidemiologist or the State Health Director; at least on doctoral level toxicologist or epidemiologist who's employed by either a state or federal government and has experience in risk assessment; a minimum of one doctoral level scientist having a minimum of five years experience in exposure assessment to air contaminants; a minimum of one doctoral level scientist having a minimum of five years' experience in exposure assessment to water contaminants; a minimum of one licensed medical doctor, preferably with board certification, occupational or environmental medicine; and a representative from the NC Association of Local Health Directors that serves as a Health Director with experience in environmental health and epidemiology.

The Charter provides that the Board should be composed of 11 voting members appointed by the Secretaries of Environmental Quality and Health and Human Services.

Representative Yarboro was recognized and ask for the definition of "health goals" and if this is a legal term that describes a certain parameter or is this a general term?

Mr. Hudson responded that they have tried to use the terminology that the Department of Health and Human Services (DHHS) has used in the discussion of these emerging compounds, so it is specific to health goals for contaminants, but that could potentially be broader than just the emerging contaminants that are being discussed.

Dr. Tillison, State Health Director and Chief Medical Officer for DHHS was recognized for additional comments. The legality of the term "health goal" is not from a legal or regulatory standpoint, it is not a goal of which regulation could be made on that health goal, so it's not to be used for regulation. There are other goals or levels that can be used for regulation, but the health goal can be used to help set the regulatory level. As to how broad is the scope of the SAB or this legislation in other health goals. Emerging contaminants are relatively new. Most of the contaminants we have known, we have a lot of information on with health goals and regulatory levels. Health and Human services were used to establish health goals or regulatory levels to do the risk communication and health advisories. This is a new world of unregulated chemicals that will not have those set levels. So, as we go forward and work to regulate chemicals and set health goals, the scope of what is discussed may be broadened because it's a world of unregulated compounds. The work between the DEQ, DHHS, and SAB is to be collaborative to take full advantage of the science and expertise.

Representative Floyd was recognized for a question on line 16 regarding recommendations to improve the process. Would those recommendations turn into statutes?

Dr. Tillison was recognized and stated that the health goals are provisional. Where there is limited to no data, we set initial, provisional health goals. As more information, studies and input then that health goal is subject to change based on the new information. The provisional health goals are not regulatory, but DEQ and the regulatory entities that are in place can use that non-regulatory health goal to establish regulatory goals depending on the evidence.

Representative Floyd was recognized for a follow-up question and asked if these goals are in conflict with existing statutes and would recommendations be brought forward to this committee to change the existing statutes to make them more applicable to the legislation?

Mr. Hudson said this legislation is broad enough to encompass the goals if the SAB or other departments determine there are statutory issues that impede the provisional health goals that they would come back to this committee and others in the General Assembly and ask for changes to the statues if necessary.

Representative Stone was recognized and stated that DHHS and DEQ have been using health goals as a regulatory number. If anything is over that certain number then denial of permits and other discussions follow. Health goals are not regulatory but they are being used as a regulatory standard. Emerging compounds and unregulated contaminants are not that new but we are finding more information because the testing methods that we have now are much more detailed than in

years past. Also, the U.S. EPA has a protocol for dealing with unregulated contaminants and emerging compounds with assessment of the chemicals. What is that protocol?

Dr. Tillson was recognized and stated that unregulated contaminants and emerging contaminants are not necessarily new, it's just the way we are dealing with them is relatively new. We have 80,000 chemicals and they haven't been looked for or measured. The methodology has changed when looking for targeted chemicals.

Sheila Holman the Assistant Secretary of Environment with DEQ was recognized for comments. The U.S. EPA process of unregulated contaminant monitoring rule, identifies up to about 30 compounds for each round. They haven't established regulations but they think those particular compounds may present a health risk. This process starts with monitoring by state agencies as well as some of the wastewater dischargers. At the same time, they gather health data on the different compounds and move forward to determine if a new national water quality standard should be established.

Representative McElraft was recognized and asked how many mass spectrometers do we have at DHHS and how many do we have at DEQ?

Sheila Holman responded that currently the DEQ does not have any high resolution mass spectrometers, which is the equipment that is needed to conduct a non-targeted analysis. DHHS doesn't have that high resolution equipment either.

Mr. Hudson was recognized to review the remaining sections of the bill with no questions from the Committee on sections two through five.

Representative Brisson was recognized and asked if all the agencies are in agreement with the draft legislation and are they confident that they have personnel and equipment to move forward or will it require more funding?

Chairman Davis replied that staff had talked with DEQ about the legislation and they are supportive of the draft. The House is looking at an appropriation that would assist in implementing the legislation. If everything is ready on January 10, 2018, the House will proceed. If not, then this committee will resume with more long term goals with consideration during the Short Session that will include an appropriate funding piece to accompany the legislation.

Representative Floyd was recognized and asked if the Senate was on board with the proposed legislation?

Chairman Davis replied that if the Senate doesn't take action, the plan to move forward during the Short Session will continue.

Representative Dixon was recognized for a comment related to funding. The funding is not the first issue. The priorities are listed and if funding is needed, then how much.

Chairman Iler was recognized and asked if this bill needs to go to any other committee prior to the January 10, 2018 Special Session?

Chairman Davis responded that whatever is passed during committee will go straight to the House floor for a vote.

Public Comment Section

Chairman Davis opened up the public comment section of the meeting. These minutes are verbatim.

Matthew Starr, Upper Neuse Riverkeeper

Chairman and members, thank you for allowing public comment even though a majority of the public was not able to attend today. It's been over 600 days since scientists told the Cape Fear Public Utility Authority (CFPUA) that Chemours was dumping GenX into the Cape Fear River and all this legislation does is kick the can down the road for the foreseeable future while asking already crippled agencies to fix a problem without restoring the tools to do so. As we have learned, this is not just a Wilmington problem. It is a state of North Carolina problem. GenX and other types of chlorinated compounds or other chemicals have been found in 11 counties meaning that millions of people's drinking water could be affected. We need more than reactive studies. We need proactive investment in the health of our environment. This committee has the opportunity to take real action, to show the great folks of North Carolina they are more important than a mega polluter who hasn't once apologized or shown a bit of remorse for contaminating our water and endangering our own citizens. Instead, this bill would heap even more responsibilities on agencies already hard-pressed to perform their missions after years of budget cuts and legislative interference. Without additional funding, you are asking agencies to protect our heath and to choose between protecting the air our kids breathe, the water our kids drink, or some terrible other decision. Thank you.

Sam Perkins, Catawba Riverkeeper

Thank ya'll for having me today. My name is Sam Perkins and I represent the Catawba Riverkeeper Foundation. We cover the Catawba River basin. The Catawba is a dense layer cake of discharges and drinking water intakes so this is a major concern for us as well. I have a Master of Science from Chapel Hill in Geo Chemistry and Hydrology and I'm currently engaged in research on the subject of perflourinated and other compounds. This bill is a start, but the race has started. It a takes a shot that is more akin to a few BB's, but you need a well-placed .45 or two and you have some good targets in the crosshairs and I think you've been discussing some of them today. We need it now because it takes a tremendous amount of time to provide the data and resources that will give something to better inform these scientific advisory boards, the state's DEQ, yourselves, and future decision makers. Fund our top universities. I have three degrees from Carolina so I don't say this lightly but we have great work going on at Duke and NC State. Funding them is an investment that you will not regret. Fund DEQ to see if industry and dischargers are being honest. I mean, basically auditing the discharge with a high resolution mass specs are definitely something that we need. These investments are not controversial, they are

common sense and I would really encourage you today to get that ball rolling for proper due diligence to take place. It will show North Carolinians that you truly are serious because there is no commitment quite like financial commitment. There was a time when mercury and PCB's (polychlorinated biphenyls) and lead were emerging contaminants where we didn't know much about them and we have regretted not doing anything sooner. Industry insisted as recently as 1978 that there was no harm caused by blood lead levels being at 75 micrograms per deciliter or less. Long story short, after ratcheting it down, the prevailing regulatory level is less than 5 especially for children. No North Carolinian deserves this trespass on their bodies of chemical that should not be in the natural environment. Thank for the opportunity to comment and I hope we can continue to be a resource.

Mary McClain Asbill, Southern Environmental Law Center

I appreciate the opportunity to speak today. I'm speaking on behalf of my organization and behalf of the Cape Fear River Watch and other groups on the Coast who were unable to travel to Raleigh today because it's state of emergency where they live and as much as they would have loved to come and given public comments, they are unable to. I want to make clear that my organization was afforded the opportunity to meet twice with the Speaker's staff and we really appreciate that dialogue and engagement. But let me be clear, we do not support this bill and I have let Speaker's staff and this committee know that. We have submitted detailed proposals to this committee about what actions we believe you can take right now to begin working on this problem. I would like to emphasize a few points about this draft legislation you've offered today.

This bill starts some studies that aren't due or won't be completed until December which means it's putting off any meaningful action until at least 2019. Meanwhile, people still aren't able to drink their water. Second, it doesn't adequately fund the only agencies able to effectively respond and the only agency that has effectively responded to this crisis, DEQ. Yet it asks them to conduct numerous studies with already strained staff. Thirdly, it doesn't do anything to clarify that the Department of Environmental Quality has the legal authority to set standards now to protect our water, even despite your Hardison amendment. Fourth, it doesn't do anything to address the GenX that Chemours is emitting into the air, which recent studies, data, evidence, show appears to be a major source of contamination in people's wells and in the river. Lastly, there is no reason that this body cannot take the time needed next week to fully address this. We've heard a lot of talk today about "we must have this one day session or we must have this one possibly two day session." No one's given a reason why it has to be so short, why ya'll can't take the time to deliberate and work with the Senate to come up with actual actions that will help this situation. I would encourage you to take the time to do it now since you're coming back to town. In short, this bill asks an already strained agency to do more with less and does nothing to help the people who can't drink their water. As I've said, we've submitted detailed proposals to you yesterday, I hope that those will be included in the record and again thanks for the opportunity to speak. Representative Davis, if I may, you should check with that long list of stakeholders that you read. I'm not sure all of those entities have endorsed or supported this bill. All appreciate being invited I'm sure, but you should check.

Will Hendrick, Waterkeeper Alliance

Thank you Chairman Davis and members of the Committee for allowing this public comment. My name is Will Hendrick and I work with Waterkeeper Alliance. I'm based in Chapel Hill. I have co-workers in New Bern and Boone and we collaborate with Riverkeepers, some of whom you've heard from today throughout the state of North Carolina to address a myriad threats to water quality. It is lamentable that it took a public health crisis to create this committee, but I am sincerely appreciative of the new found focus and concern about water quality that is represented here today. As for the bill under consideration, I believe, and I congratulate it's drafters for showing appropriate deference to the agencies that house and appoint the necessary expertise to respond to this problem. Too often the legislature has been tempted to muddle, despite the lack of requisite credentials. On this committee, honorable North Carolinians trying to do their best but ya'll have rose through the ranks of law and business and farming and there aren't toxicologist, there aren't hydrogeologist, there aren't epidemiologist capable of responding with the necessary expertise at the Legislature. So I do appreciate that this bill recognizes that is not within this building that the solution can arise. However, I would like to also commence to this committee and this larger body to allow those agencies to do what they must. Over the course of recent years, those agencies have been strangled and shackled by this legislature and so I urge you to allow them to protect by restoring the resources necessary. They've labored under a series of draconian budget cuts and you are now literally asking them to do more with less. More to the point, I urge you to restore the regulatory flexibility necessary for them to respond as they deem appropriate. The Hardison Amendment referenced earlier essentially states that North Carolinians working at North Carolina agencies with requisite expertise cannot afford more protection to North Carolinians than federal regulators housed outside of this state with less familiarity than we do. And so I think North Carolinians should be allowed to protect North Carolina's water and I would in closing agree with the lamentations earlier that nothing was done in the past, but also urge the same individual who recognized that lack of activity to heed the voices of warning that you're now hearing. Thank you.

Drew Ball, Environment North Carolina

Thank you Mr. Chairman. I'm Drew Ball the Director of Environment North Carolina. I want to thank the Committee and the Staff for braving the snow to be here today even though there are many concerned citizens who are unable to join us. The formation of this committee has been a positive step, however, on behalf of Environment North Carolina members across the State and the countless number of people concerned about what chemical dumping means to their health and the health of their families--I have to say it's disheartening to see that today's bill fails to put any money towards actually addressing the issue. That fact alone sends the wrong signal. That our elected leaders are not taking this issue seriously. It is good to see this bill ordering review of many processes and requiring that DEQ share its information about GenX and other contaminants with neighboring states, but the bill fails to provide any money for testing, research, permitting staff, or other responses to this widening pollution issue. Given what we know, that GenX and other compounds have been found in about two-thirds of the 350 wells tested so far across the eastern half of our state, many of which are far outside of the Wilmington area, and that these chemicals could be airborne--it's apparent that the funding provided to the Wilmington Air Utilities and UNC Wilmington last year to study the problem is inadequate. Our citizen's drinking water is contaminated and people are demanding more than just studies, they're demanding action. Hundreds of people have packed high school auditoriums and public hearing rooms across the State not because they are curious, but because they are concerned and they're frightened about

the very real health consequences on them, their families and their communities. So the fact that the Bill fails to adequately fund DEQ to do their job is alarming. It is my understanding, and the Department can speak for themselves, but the Department believes that any short term solution for January should include appropriations. I believe this committee wants to get this right and so I respectfully ask that the Committee act immediately to fund DEQ to do their job of protecting our air and water. Thank you for this opportunity to speak.

Emily Sutton, Haw Riverkeeper

Thank you for the opportunity to speak. My name is Emily Sutton and I'm the Haw Riverkeeper. As we learn from the research and monitoring projects surrounding GenX and the other contaminants of emerging concern, we know that this problem is much larger than the Cape Fear basin. North Carolinians have been drinking contaminated water in many basins across the State and without adequate funding this bill does nothing to address those concerns. According to a press release in August, since 2013 DEQ has seen approximately 70 positions eliminated that once supported permitting, compliance, and enforcement programs. DEQ is responsible for monitoring 38,000 miles of waterways. To add the enormous task of monitoring and regulating contaminants of emerging concern without supplying them the adequate support does not protect citizens of our state. This problem is larger than GenX. We have found perfluorooctanesulfonic acid (PFOS) and PFOA. 1,4-Dioxine, Hexavalent Chromium, and many other proflournated compounds and the list continues to grow. We need precautionary rules within industrial facilities to prevent them from putting unknown chemicals into public wastewater streams or direct discharges into our surface waters. Thank you.

Harper Peterson, Citizen

Good morning Mr. Chairman. My name is Harper Peterson and I'm from Wilmington, North Carolina and I also want to mention that many people wanted to come but were unable to because of the weather. Mr. Chairman, it's been months since this story broke and we have learned a lot and I think the most important thing we've learned is we don't know a lot. I think the Governor appropriately addressed this by calling for a state of emergency and requesting from the General Assembly emergency funding to address this environmental and health crisis. This is a crisis, this is not a process. Commenting on the draft legislation, I think it's a good start and it's long overdue. What's missing, and I think the speakers before me have stated, is investment. In your wisdom, you invested through HB 56, Amend Environmental Laws (S.L. 2017-209), your $50,000 to UNC-Wilmington and I believe another $180,000 to the CFPUA to address a crisis and that was five months ago. I haven't heard any results and I would like to hear some comment if you are in the Session today regarding what have we found out with that investment of public dollars. I too attended the SAB Committee's meeting on December 4, 2017, that you mentioned you attended. The one thing, the one take away was we don't (being the scientist) have the data to make recommendations. We need the appropriate academics, the experts, and the scientists to make those recommendations. They need data. They need to study this. And that's where I think you could appropriate some money because they're not going to be able to come back with any solid, definitive recommendations. With regard to DEQ, we have a 40 percent backlog in permitting. We need money. We need staff to do that work and I would put money there. There is an investment opportunity. At the end of the day, as a layman, people ask me constantly "is the water

safe to drink?" I can't answer that and I take a precautionary approach and I think we all should. We shouldn't be drinking the water. When someone asks my wife "is it safe to drink the water?" and she says "no, I've had three miscarriages and I'm not drinking the water and I wouldn't suggest you drink the water". I think this committee and this legislative body should make a strong recommendation not to drink the water until we have some definitive results and to do that, we need investment. The number one priority of this committee is the action we take today and with the recommendations you make on January 10, 2018. Thank you.

Jon Carr, Attorney and Lobbyist on behalf of the North Carolina Rural Water Association

Good morning Mr. Chairman and members of the Committee. Thank you all for convening and for meeting today. I'm an attorney here in Raleigh and a lobbyist standing before you on behalf of the North Carolina Rural Water Association. Rural is probably a misnomer. We represent over 95 percent of the State's water and wastewater utilities and our membership includes CFPUA. I want to indicate to you that we are supportive of the legislation before you today as an appropriate step in the process and thank you again for convening.

This concluded public comment and Representative Dixon was recognized for a motion to approve the proposed legislation for consideration to the General Assembly. Move for a favorable report on approving this proposed legislation to go before the House. The motion passed.

The Committee adjourned at 11:06.

Respectfully submitted,

Representative Ted Davis, Jr., Chair

Carla Langdon, Committee Clerk

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2017

U D

BILL DRAFT 2017-SBz-21 [v.13] (12/04)

(THIS IS A DRAFT AND IS NOT READY FOR INTRODUCTION)
01/02/2018 11:16:06 AM

Short Title: Short Term Response to Emerging Contaminants. (Public)

Sponsors:

Referred to:

A BILL TO BE ENTITLED

AN ACT TO IMPLEMENT SHORT-TERM MEASURES TO RESPOND TO EMERGING CONTAMINANTS IN THE ENVIRONMENT.

The General Assembly of North Carolina enacts:

DIRECT THE DEPARTMENT OF HEALTH AND HUMAN SERVICES TO CONSULT WITH THE SECRETARIES' SCIENCE ADVISORY BOARD IN THE DEVELOPMENT OF HEALTH GOALS FOR CONTAMINANTS

SECTION 1.(a) For purposes of this section, the Secretaries' Science Advisory Board shall mean the Science Advisory Board established by the Secretary of Environmental Quality and the Secretary of Health and Human Services on July 28, 2017.

SECTION 1.(b) The Department of Health and Human Services shall consult with the Secretaries' Science Advisory Board on the Department's process for the establishment of health goals for contaminants. The Secretaries' Science Advisory Board shall review the process by which the Department establishes health goals for contaminants and make recommendations on how to improve the process, including how to promote greater public understanding of and confidence in the health goals.

SECTION 1.(c) To the extent practicable, the Department of Health and Human Services shall notify the Chair of the Secretaries' Science Advisory Board prior to issuing a provisional health goal for a contaminant. The Department of Health and Human Services shall submit all newly issued provisional health goals to the Secretaries' Science Advisory Board at their next scheduled meeting.

STUDY NPDES PERMIT PROGRAM

SECTION 2. The Department of Environmental Quality shall study the State's National Pollutant Discharge Elimination System (NPDES) permitting program to ensure that associated requirements are sufficient to protect public health, safety, welfare, and the environment. In conducting the study, the Department shall examine the adequacy of:

(1) Requirements for persons applying for individual NPDES permits to fully disclose in applications for new permits, permit renewals, or permit modifications, all pollutants, including emerging chemicals for which an applicable discharge standard has not been established under State or federal law, included in their discharge.

DRAFT

(2) Monitoring, sampling, and laboratory analytical requirements applicable to persons holding current NPDES permits, and to persons applying for new NPDES permits. In assessing the adequacy of analytical requirements, the Department shall evaluate the consistency of analytical methods used by private labs to detect and quantify pollutants, including emerging chemicals for which an applicable discharge standard has not been established under State or federal law. And, based on information gathered in that regard, whether, to ensure the accuracy of discharge sampling results, it would be feasible and advisable for the Department to develop a certified list of laboratories through which dischargers must obtain laboratory analyses of their discharge, or whether the Department should require submission of discharge samples to the Department for laboratory analyses by the Department.

(3) Existing processes for developing standards or limitations for emerging chemicals for which an applicable discharge standard has not previously been established under State or federal law, included in a permittee's discharge.

(4) Internal permit review processes to ensure thorough and timely review of permit applications.

The Department shall submit an interim report with findings, including any recommendations for legislative action, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than April 1, 2018, and a final report with findings, including any recommendations for legislative action, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than December 1, 2018.

DIRECT THE DEPARTMENT OF ENVIRONMENTAL QUALITY TO COORDINATE AND SHARE WATER QUALITY DATA WITH STATES IN THE REGION

SECTION 3. Article 21 of Chapter 143 of the General Statutes is amended by adding a new section to read:

"**§ 143-215.1D. Coordination with neighboring states.**

The Department of Environmental Quality shall coordinate with the Georgia Department of Natural Resources, the South Carolina Department of Health and Environmental Control, the Tennessee Department of Environment and Conservation, the Virginia Department of Environmental Quality, and the West Virginia Department of Environmental Protection to improve processes for sharing information about contaminants identified in surface water or groundwater shared by or passing or flowing across the border of those states and this State. As needed, the Department shall share with those agencies water quality data for, and information about any contaminant identified in, surface water or groundwater shared by or passing or flowing across the border of those states and this State."

DEPARTMENT OF ENVIRONMENTAL QUALITY REPORTING AND NOTICE STUDY

SECTION 4. The Department of Environmental Quality shall study the statutory requirements for dischargers of untreated wastewater, untreated waste, and other substances to notify the Department and the public of discharges, including the volumetric thresholds that trigger the reporting requirements, to ensure that the requirements are sufficient to protect public health and provide adequate notice to the Department and the public. The Department shall consider whether there are any conflicts or redundancies in the statutory notice and reporting requirements. The Department shall also study its processes for notifying the General

DRAFT

Assembly and the Environmental Management Commission of the presence in the environment of emerging chemicals for which an applicable discharge standard has not been established under State or federal law. The Department shall report its findings, including any legislative recommendations, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission, no later than April 1, 2018.

WATER UTILITY CIVIL LIABILITY STUDY

SECTION 5. The School of Government at the University of North Carolina at Chapel Hill shall study the extent to which public and private water utilities may be held civilly liable for distribution of drinking water contaminated by a pollutant without applicable discharge standards established under State or federal law, and the extent to which public water utilities and private water utilities are treated differently for purposes of civil liability. The School of Government shall submit the results of the study to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission, no later than April 1, 2018.

EFFECTIVE DATE

SECTION 6. Except as otherwise provided, this act is effective when it becomes law.

DRAFT

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2017

RATIFIED BILL

RESOLUTION 2017-17
SENATE JOINT RESOLUTION 696

A JOINT RESOLUTION ADJOURNING THE SESSION RECONVENED PURSUANT TO SECTION 3.1 OF RESOLUTION 2017-12, AS AMENDED BY RESOLUTIONS 2017-14 AND 2017-15, AND FURTHER AMENDING RESOLUTION 2017-12.

Be it resolved by the Senate, the House of Representatives concurring:

SECTION 1. When the House of Representatives and the Senate adjourn on Tuesday, October 17, 2017, they stand adjourned to reconvene in regular session as provided in Resolution 2017-12, as amended by Resolutions 2017-14 and 2017-15, and as further amended by this resolution.

SECTION 2. Resolution 2017-12, as amended by Resolutions 2017-14 and 2017-15, reads as rewritten:

"...

"**SECTION 3.1B.** ~~Subject to Section 3.1A(13) of this Resolution, when~~ When the House of Representatives and the Senate ~~jointly~~ adjourn ~~the session convened on Wednesday, October 4, 2017,~~ on Tuesday, October 17, 2017, they stand adjourned to reconvene the 2017 Regular Session on ~~Wednesday, May 16, 2018,~~ Wednesday, January 10, 2018, at 12:00 noon.

"**SECTION 3.1C.** During the regular session that reconvenes on Wednesday, January 10, 2018, only the following matters may be considered:

(1) Bills:

a. Revising the judicial divisions of the State, the superior court districts, the district court districts, and the prosecutorial districts and the apportionment of judges and district attorneys among those districts and containing no other matter.

b. Revising districts for cities, counties, and other political subdivisions of the State and the apportionment of elected officials among those districts and containing no other matter.

c. Revising the Senate districts and the apportionment of Senators among those districts and containing no other matter.

d. Revising the Representative districts and the apportionment of Representatives among those districts and containing no other matter.

(2) Bills:

a. Proposing an amendment or amendments to the North Carolina Constitution and containing no other matter.

b. Proposing an amendment or amendments to the North Carolina Constitution and containing no other matter other than statutory conforming changes to implement such bills.

c. Solely making statutory and transitional changes to implement bills under sub-subdivision a. of this subdivision.

(3) Bills returned by the Governor with his objections under Section 22 of Article II of the North Carolina Constitution, but solely for the purpose of considering overriding of the veto upon reconsideration of the bill.

(4) Bills providing for selection, appointment, or confirmation as required by law, including the filling of vacancies of positions, for which appointees are elected by the General Assembly upon recommendation of the Speaker of the House of Representatives, President of the Senate, or President Pro Tempore of the Senate.

(5) Bills providing for action on gubernatorial nominations or appointments.

(6) Bills responding to actions related to litigation concerning the districts for Congressional, State House, State Senate, judicial, municipal, county, and other elected officials' actions and any other litigation challenging the legality of legislative enactments.

(7) Bills returned on or after Wednesday, June 28, 2017, to the house in which the bill originated for concurrence.

(8) Adoption of conference reports for bills which were in conference on or after Wednesday, June 28, 2017, and conferees had been appointed by both houses on or after that date.

(9) Bills relating to election laws.

(10) Bills making technical corrections to S.L. 2017-57, S.L. 2017-119, or both.

(11) Local bills having passed third reading in the house in which introduced, received in the other house in accordance with Senate Rule 41 or House Rule 31.1(h), as appropriate, and not disposed of in the other house by tabling, unfavorable committee report, indefinite postponement, or failure to pass any reading, and which do not violate the rules of the receiving house.

(12) A joint resolution further adjourning the 2017 Regular Session or amending a joint resolution adjourning the 2017 Regular Session to a date certain.

"**SECTION 3.1D.** Subject to Section 3.1C(12) of this Resolution, when the House of Representatives and the Senate jointly adjourn the regular session convened on January 10, 2018, they stand adjourned to reconvene in regular session on Wednesday, May 16, 2018, at 12:00 noon.

...."

SECTION 3. This resolution is effective upon ratification.

In the General Assembly read three times and ratified this the 9th day of October, 2017.

s/ Philip E. Berger
President Pro Tempore of the Senate

s/ Tim Moore
Speaker of the House of Representatives

Guest Speaker Signup

Committee NC RIVER QUALITY Date 1-4-2016

1. MATTHEW STAR
2. SAM PERKINS
3. Mary MacLean Asbill
4. WILL HENDRICK
5. Drew Ball
6. Emily Sutton
7. HARPER PETERSON
8. Jon Carr
9.
10.
11.
12.

VISITOR REGISTRATION SHEET

HOUSE COMM RIVER QUALITY — 01-04-18

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Lindsey Dowling	FSP
Sheila Holman	NCDEQ
LePennington	CSS
PRESTON HOWARD	NCMA
Jordan	Jordan Price
Hopper Peterson	
MATT MARTIN	WOOD
David Collins	WalkWest
Sarah Hudson	

VISITOR REGISTRATION SHEET

HOUSE COMM RIVER QUALITY — Name of Committee

01-04-18 — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Matthew Starr	Upper Neuse Riverkeeper
Sam Perkins	Catawba Riverkeeper
Mary Maclean Ashwill	Southern Environmental Law Center
HARPER PETERSON	N.C. Citizen - 212 ORANGE ST WILMINGTON NC 28401
Emily Sutton	Haw River keeper
Will Hendrick	WATERKEEPER ALLIANCE
Drew Ball	Environment NC
Greg Flory	Piedmont Triad Regional Water Authority
Susan Vick	Duke Energy
Kurtan Maynard	WWR
Andy miller	DEQ

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Ted Davis, Jr.

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.) Yes ☑ No ☐

Car Mileage
(Fill out this line if mileage is different than what is certified on file) 280

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Frank Iler

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 160
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Frank Iler
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

Holly Grange
(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Larry Yarborough

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Scott Stone

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Chuck McGrady

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Pat McElraft

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Pat McElraft
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. William Brisson

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 180
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

William Brisson
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Holly Grange

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Holly Grange
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Jimmy Dixon

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Kyle Hall

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file) file

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Elmer Floyd

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage On File
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Elmer Floyd
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, January 4, 2018

Member: Rep. Bob Muller

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Carla Langdon Ext. 11450

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Wednesday, February 21, 2018
TIME: **9:30 AM**
LOCATION: **643 LOB**
COMMENTS: An agenda will be sent prior to the meeting

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 3:29 PM on Wednesday, November 07, 2018.

___ Principal Clerk
___ Reading Clerk – House Chamber

Andrew Bowers (Committee Assistant)

DRAFT

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. ELMER FLOYD
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB MULLER
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER McGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

JUDY LOWE
COMMITTEE CLERK

AGENDA
9:30 a.m. Wednesday, February 21, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Department of Environmental Quality update on response to emerging compounds and responses to previous questions, including:
   - Spikes in GenX concentrations near the Cape Fear Public Utility Authority Plant in December, 2017
   - Potential use of private drinking water well filtration systems
   - Update on enforcement actions taken

   (1 hour 15 minutes)

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

   Mike Abraczinskas, Director, Division of Air Quality
   Department of Environmental Quality

4. Interim report on implementation of Section 20(a)(1) of S.L. 2017-209 (House Bill 56) (GenX Response Measures); report on spikes in GenX concentrations near the Cape Fear Public Utility Authority Plant in December, 2017 *(30 minutes)*
   Jim Flechtner, Executive Director
   Cape Fear Public Utility Authority

   Frank Styers, Chief Operations Officer
   Cape Fear Public Utility Authority

5. Interim report on implementation of Section 20(a)(2) of S.L. 2017-209 (House Bill 56) (GenX Response Measures) *(45 minutes)*
   Dr. Robert Keiber, Professor and Graduate Coordinator
   Department of Chemistry and Biochemistry,
   University of North Carolina Wilmington

LUNCH BREAK

6. Use and availability of high resolution mass spectrometers for detection and analysis of GenX and other emerging contaminants *(1 hour)*
   Mark Strynar, Physical Scientist
   National Exposure Research Laboratory, United States Environmental Protection Agency

   Andy Miller, Director of Legislative Affairs
   Department of Environmental Quality

7. Discussion of House Bill 189 (Water Safety Act) *(1 hour)*

8. Committee discussion and announcements

9. Adjourn

ADDITIONAL INFORMATION:

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578 or may visit the Committee's website at:
http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

House Select Committee on North Carolina River Quality
Wednesday, February 21, 2018 at 9:30 AM
Room 643 of the Legislative Office Building

MINUTES

The House Select Committee on North Carolina River Quality (Committee) met at 9:30 AM on February 21, 2018 in Room 643 of the Legislative Office Building. Representatives Brisson, Representative Davis, Representative Dixon, Representative Floyd, Representative Grange, K. Hall, Representative Harrison, Representative Iler, Representative McElraft, Representative Muller, Representative Steinburg, and Representative Yarborough attended.

Representative Ted Representative Davis, Jr., Senior Chair, presided.

The following presentations were heard:

Department of Environmental Quality (DEQ or Department) - Update on response to emerging compounds and responses to previous questions from the Committee. Sheila Holman, Assistant Secretary for DEQ; Linda Culpepper, Deputy Director of Division of Water Resources (DWR), Michael Scott, Director of Division of Waste Management (DWM); Mike Abraczinskas, Director of Division of Air Quality (DAQ); were all in attendance to answer questions in their areas of expertise.

Ms. Holman was asked by Representative Floyd if there was a legislative request the Department needed.

Ms. Holman replied that DEQ would like a concurrence on the 60 day restraining order they have issued, and would like to consult with other Directors in the Department before putting forward other requests.

See PowerPoint presentation handout: DEQ GenX Update. House Select Committee on River Water Quality.

Sheila Holman presented an update on DEQ response to GenX. Ms. Holman stated that she would get public comments for Representative Dixon.

Representative McElraft asked if the two samples above the Lifetime Health Advisory (LHA) were in private home wells?

Mr. Michael Scott, Director of DWM, responded that one of the homes is being occupied as a residence and has been provided bottled water. The other is a summer home that is not currently occupied.

Representative McElraft asked if they are closer to where the Navy was using this firefighting equipment?

Mr. Scott said that at this time, the areas where firefighting foam was used have not yet been determined. The Navy is actively looking for the source.

Representative McElraft asked if anyone is looking at the possibility that there were fires in those woods at some point?

Mr. Scott said that the Navy is looking at all aspects of that landing field. The specific use of firefighting foam that we have been looking at has been directed at aircraft fighters. We haven't heard about fighting forest fires with that kind of foam.

Representative McElraft asked if there will be a public hearing and if DEQ will be there?

Representative Brisson asked if we are using the same equipment with air quality?

Ms. Holman responded no, with stack testing the consultants use their own equipment and we will compare our data with theirs.

Representative Steinburg asked if anyone has taken a guess at what the economic impact has been to date? He believes this will affect real estate values and tourism. We should move as quickly as possible to find a solution.

Representative Iler said anecdotally he met on Monday with a representative of 200 residents in Brunswick County. He said he moved to northern Brunswick a year ago but would not now. The effect on real estate is not known at this time.

Representative Davis said he has talked with real estate agents in Wilmington and people do ask about the quality of the drinking water.

Representative Dixon said these concerns point us in the direction of how critical it is to get correct data and information to the public and to make sure that the tactic of scaring the pudding out of people is not used. Were they planning to test filters in multiple locations?

Ms. Holman said they wanted to do multiple locations. We looked at whether the testing is effective across all those.

Representative Dixon asked would you say it's encouraging that the system works?

Ms. Holman said yes.

Representative Dixon asked if there is a cost for the system?

Mr. Scott responded that Chemours will pay all the installation costs, including labor. These systems can be $5,000 to $7,000. It's a whole-house filtration system.

Representative Dixon said it seems that this is headed in a direction we can all applaud.

Representative Floyd said given the response from the CEO of Chemours last week, he doesn't believe his company is causing this problem. What is the life of the filter system?

Ms. Holman said the life of the system is 15 years but the filters need to be replaced more often.

Representative Floyd said it looks like there is a Polyvinyl chloride (PVC) storage area?

Ms. Holman said that is just one example shed.

Representative Floyd said you mentioned there are different sizes, so how big are the systems?

Mr. Scott said if an activated charcoal system was installed, the homeowner would agree to the location. It can go in the crawl space if the homeowner has one.

Representative Floyd asked how far away from the house would the shed be?

Ms. Holman said we would work with the homeowner to get those details figured out.

Representative Floyd asked about slide 11, what's the outer circle?

Ms. Holman said the outer area is in phase three, we have highlighted phase four. We will test areas two, four, and five.

Representative Floyd asked if the community was looking at 0 to 5? What distance are you using?

Ms. Holman said it is two to three miles in most areas.

Representative Grange asked if the 5 week turnaround from the United States Environmental Protection Agency (U.S. EPA) was average? I heard we were getting a 10 day turnaround time?

Ms. Holman said last year Mr. Mark Strynar was doing those tests with a turnaround time of about three weeks. The Athens Lab has a longer turnaround time because we are one of many states. If we used private sector labs, the turnaround time would be ten days to two weeks. Representative McElraft said she was confused on the LHA being 70. She thought that was why we had to set our own health goals?

Ms. Holman explained that the U.S. EPA has established a health advisory level for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA). U.S. EPA has not established any kind of health advisory for GenX.

Representative Harrison said she saw reference to your testing the Lake Jordan watershed. Did you present results on that?

Ms. Holman said we have not presented results but we have taken samples.

Representative Harrison said she was concerned about Greensboro drinking water. Are you involved with that?

Mr. Scott said yes, hazardous sites program is working with the city.

Representative Harrison asked if those areas exceed the health levels?

Mr. Scott said he couldn't speak to that but will get that to you directly. I believe some of the samples we saw were over the health levels.

Representative Muller said when he goes through the box stores and sees water jumping off the shelves, it reminds him that we need to get confidence back and fix this problem quickly.

Representative Dixon said although this committee is referred to as "River Quality," everyone needs to understand this committee is concerned with water from all sources. We should think about amending the name of the Committee.

Representative Davis said there was a Star News article about another discharge. He is repeatedly asked how much more Chemours will get away with before something is done? Is there a plan at DEQ to say enough is enough?

Ms. Holman said we discuss that on a weekly basis. We work first and foremost to protect public health.

Representative Davis asked how many Notice of Violations (NOVs) has Chemours been issued?

Ms. Holman said it's a combination of notices and the restraining order in Bladen County Superior Court, as well as notice of partial suspension of the National Pollutant Discharge Elimination System (NPDES) permit.

Representative Davis asked what reaction has Chemours given in response to those violations, and what punitive action has DEQ taken in response?

Ms. Holman said Chemours's responses are on the website. We want to recoup the investigative cost. It's a deliberative process to decide when to pull the trigger.

Representative Davis asked if there is any end in sight?

Ms. Holman said Yes. We are carefully constructing a case we can defend in court.

Representative Davis asked what legislation can this committee recommend to help regulate these compounds?

Ms. Holman said we will use every tool available to us. We would like to consult with the Agency and get back to you.

Representative Davis said there was an article in the Fayetteville Observer that quoted the head of Chemours as saying the company is cooperating and trying to find a solution and that they believe none of the discharges have affected anyone's health. What cooperation have you gotten from Chemours?

Ms. Holman said we have had cooperation in some instances, but sometimes we have had to be very specific. We asked for interim measures in December and they came back with a response that didn't suggest immediate action.

Representative Floyd asked if we can we put some dates onto recommendations to give staff time to draft?

Representative Davis said he has discussed that with staff already.

Representative McElraft asked what are we doing about Chemours questioning the health goal? Are we working with the Centers for Disease Control and Prevention (CDC)? What is the federal government doing?

Ms. Holman said the top priority of Science Advisory Board (SAB) is to take up the provisional health goal. We will be getting an update from the Department of Health and Human Services (DHHS) on March 19, 2018. DHHS continues to be in touch with the U.S. EPA and CDC about health data. Active work is ongoing.

Representative Yarborough said these things tend to be dealt with through a series of NOVs and then the problem gets fixed. Are these six notices in six months a significant outlier?

Ms. Holman said yes. We are still contemplating additional actions. This is more than we see for most situations.

Representative Iler discussed real estate values. He said a realtor told him it will affect values eventually. Also in January you stated that DEQ was on-site at Chemours to make sure they stopped putting things in the water. Has that been ongoing? Have they stopped?

Ms. Holman said they have stopped and we have staff on the site routinely. The air quality staff is taking samples.

Representative Harrison said she agrees that this is bigger than river quality, and it's bigger than PFOS and PFOA. She wants to confirm that DEQ has the statutory authority to regulate emerging compounds?

Ms. Holman said our interpretation is that we can set a standard if U.S. EPA has not set one. If U.S. EPA has set one, we cannot exceed it.

Representative Dixon said DEQ operates in the political dialogue. Warning voices fell on deaf ears at the General Assembly and at DEQ. Business and industry need certainty as we go forth. The goal line changed from 71,000 to 140. Some of this stuff appears to have some negative health impacts on animals. We are talking about stuff we don't know. I want to study this in a way that uses data and does not use scare tactics.

Representative McElraft said when we were on Regulatory Reform and we brought back something similar to the Hardison Amendments, we put an exception for public health. Also, can DEQ do something to let people know about the testing you've done with carbon filtration systems?

Representative Floyd said right now my community will experience the pipeline and GenX. There is a concern that we look at GenX it's because right next to that is the pipeline.

Cape Fear Public Utility Authority (CFPUA) – Presentation on the interim report for Amend Environmental Laws, S.L. 2017-209, Section 20(a)(1). Jim Flechter, Executive Director and Frank Mr. Styers, Chief Operations Officer presented. CFPUA has done extensive water quality sampling from the Sweeney Water Treatment Plant on a weekly basis for perfluorinated compounds including GenX. To date the levels in their treated water stay below the North Carolina DHHS health goal of 140 parts per trillion (ppt). CFPUA meets all drinking water regulations, which do not include standards for GenX.

Representative Dixon said it seems like it would be pleasing to you all to be below 140.

Mr. Flechtner said we are grateful that DEQ got the GenX levels lower, but we know there are other compounds and that is why we are trying to improve our filtration.
Representative Dixon said years ago, we took away the right of citizens to use their private wells for drinking water. Maybe we need to consider whether the government can decide where people get their water from.

Representative Davis said if a person doesn't have a CFPUA pipe running by their house, they can use their well.

Representative Dixon asked what percent of residents are not connected?

Mr. Flechtner asked if most residents of New Hanover County are customers. Carolina Beach, Kure Beach, and another are not connected?

Representative Yarborough asked if the data in CFPUA's water sampling is the same as we saw from DEQ?

Mr. Flechtner said the data we collected may be slightly different from DEQ.

Representative Yarborough asked which data points are different?

Mr. Flechtner said the top chart shows data from DEQ that they got from Chemours. The lower chart is data CFPUA collected.

Representative Iler asked have you published that data and provided it to the media?

Mr. Flechtner responded yes.

Representative Iler asked have they used this and put it out to the public?

Mr. Flechtner said it has been reported by the media and we are grateful for the coverage.

Representative McElraft asked if it would benefit the utility if you did a half page or full page ad? The media may not be taking it up enough.

Mr. Frank Styers, CFPUA Chief Operations Officer, gave additional information.

Representative Dixon asked if there has been any collaboration between CFPUA and the testing program Chemours offered to DEQ?

Mr. Styers said our testing is being done by commercial laboratories.

Representative Dixon asked if it would it be financially feasible for your system to install home systems?

Mr. Styers said we are looking at life cycle costs.

Representative Brisson said the point source discharge has stopped but the GenX levels are maintaining. Has it stopped?

Mr. Styers said even though the discharge at Chemours has stopped, there are still levels in the river. We don't know what the source of that is.

Representative Brisson asked if the numbers are fluctuating in the river?

Mr. Styers said we know it's there and we are continuing to measure it, but we don't know why it's there.

Representative Brisson asked if you let the public know its fluctuating?

Mr. Styers said we put all our data up but we can't say what we don't know.

Representative Iler asked if we have 400 ppt and it's reduced to 40 ppt, does that mean the increment is brought down to the 40 ppt level no matter what level you start at?

Mr. Styers said this is before it gets to the filtration plant so those levels can be based on dilution.

Representative Iler asked in your data, is that the level of GenX in treated water?

Mr. Styers responded yes.

Representative Iler asked are your levels flat because of the filtration or luck?

Mr. Styers said we are getting some removal at the plant.

Representative McElraft said we need to know data from right before it enters your plant. Have that delivered to us.

Mr. Flechtner said the statement that it's still in the river is drawn from the DEQ data. We found that the water in our raw water intake was similar to the treated water. We stopped testing because the outflow was about the same as the inflow.

Representative McElraft said so you're saying the outfall is so big that it's basically the same before and after treatment.

Mr. Flechtner responded yes. The fact that the point source discharge has stopped, but we are still seeing GenX in the water is concerning.

Representative McElraft asked why do we worry about the other part if we're really worried about the GenX level?

Mr. Flechtner said there's very little data on other compounds and the additive effects of these compounds. That's why we are working with the University of North Carolina at Wilmington (UNC-W) researchers. The absence of data is what is so concerning.

Representative Yarborough said we had a spill in October. There was not an increase in ppt in the water.

Representative Floyd asked what would the 140 ppt represent in a glass of water?

Mr. Flechtner said I don't have a good analogy.

Representative McElraft said if you look at Dec 5 and Dec 20, you were putting out 45 and 28. On Dec 11 there was 23,000 and you got it down to between 45 and 28. Why would you need to do anything else?

Mr. Flechtner responded that's a decision our community will have to make. It's hard to tell our customers we are doing everything we can if we aren't.

Representative McElraft said we have scared folks to death. Why?

Representative Davis said I have not done anything to scare people and this Committee is meant to tell people the truth.

Representative McElraft said here's such a huge dilution factor, are we more worried about Nafion than Genx?

Representative Harrison said a responsible party ought to be picking up the bill. There are other contaminants you are scrubbing for?

Mr. Flechtner said yes. We are working with the universities.

Representative Yarborough asked what exactly are the implementation costs going to implement?

Mr. Flechtner said the cost for the granular activated carbon, which seems like the most promising solution.

See attached PowerPoint presentation: Unregulated Contaminants Response Measures, CFPUA HB 56 Interim Report. See Board Resolution from CFPUA.

UNC-W Presentation on the interim report on implementation for Section 20(a) (2) of S.L. 2017-209 GenX Response Measures – Dr. Robert Keiber, Professor and Graduate Coordinator, Department of Chemistry and Biochemistry, UNC-W, presented. Dr. Keiber commented on natural effects of environment that contributed to GenX concentrations, such as sorption to sediments, biodegradation or transformation, and dilution during transport. UNC-W will continue ongoing studies and testing for one year.

Dr. Robert Keiber presented UNC-W study findings.

Representative Iler said most of my county borders the Cape Fear below dam 1. What are we doing below the dam?

Representative McElraft said sedimentation is a filtration system. Is it not good to have it in the sediment? Wouldn't it be hard for it to get out of the sediment into the water?

Dr. Keiber said my best guess is that it will come off because of sunlight. The high energy can make pollutants come off. We don't know.

Representative McElraft asked when would the GenX ever be exposed to light?

Dr. Keiber said look at a hurricane, boat wakes, etc. You get a large hurricane like Hurricane Floyd and things will get stirred up.

Representative Floyd stated that rain is not stationary but you said some of this is carried by rain?

Dr. Keiber said we see it in rain in Wilmington.

Representative Dixon asked if you have collected sediments starting at Chemours?

Dr. Keiber replied we started north of Chemours.

Representative Dixon asked what is sonication?

Dr. Keiber said using sound waves to help break GenX off the sediments.

Representative Dixon asked if the rainwater you sampled was rain in Wilmington?

Dr. Keiber responded yes

Representative Dixon asked did you test rain in Winston-Salem?

Dr. Keiber replied no. We tested it in Wilmington because we have a rain testing station on campus.

Representative Dixon asked what would you find if you tested in Asheville or Virginia?

Dr. Keiber said we would probably find GenX.

Representative Muller asked how many samples do you take?

Dr. Keiber said three.

Representative Muller asked if you take the average ppt of the samples?

Dr. Keiber said we will

Representative Yarborough asked can you put a timeline on the concentrations?

Dr. Keiber said we have a grad student who will be taking cores to find out how far down GenX goes.

Representative Yarborough asked will you be able to find other pollutants as well?

Dr. Keiber said yes

Representative Harrison asked are you looking at sludge at all?

Dr. Keiber said CFPUA asked us to do a biosludge analysis for them in the fall. We did that but we have not continued that.

See PowerPoint presentation handout: Sediments and GenX in the Cape Fear River. See comments from Professor Keiber. See Interim Report from UNC-W for the Environmental Review Commission.

US Environmental Protection Agency (U.S. EPA) - Mr. Mark Strynar provided an informational presentation on mass spectrometry. He defined what it is, what the different types of mass spectrometry tests are, and discussed the different types of machines that perform various types of testing.

Mr. Strynar, U.S. EPA, presented on mass spectrometers

Representative Dixon asked what stimulus brought you to the Cape Fear River?

Mr. Strynar said we did a study on perflourinated chemicals in the Cape Fear River.

Representative Dixon asked why do that study?

Mr. Strynar said we knew perfluorinated chemicals were becoming more prevalent. We picked the Cape Fear because we could see DuPont up on the hill.

Representative Dixon said my understanding is West Virginia discontinued the processing of C8 because of the situation there, and then DEQ was involved in permitting them to do the C8 here in North Carolina?

Linda Culpepper said I will have to get someone here at the time to find that out.

Representative Dixon said I believe we were aware of the situation in West Virginia, and the North Carolina General Assembly and DEQ at the time did not pay attention that when we allowed that process to be permitted here in North Carolina. I want to know what DEQ knew about the C8 process in West Virginia and what impact that had on the permitting.

Mr. Strynar said the C8 Stewardship Agreement was an agreement between U.S. EPA and eight PFOA manufacturers. There was a concerted effort at the national level to get away from PFOA.

Representative Dixon asked was the settlement in West Virginia $300 million?

Mr. Strynar said I believe it was $670 million.

Representative Dixon asked when did we start making C8 in North Carolina?

Mr. Strynar said likely it was many years before the West Virginia settlement

Representative Dixon asked what effect the Executive Order had on the settlement?

Mr. Strynar said I don't know what order you are talking about so I will not answer.

Representative Iler asked what does the U.S. EPA know about the source of our bottled water?

Mr. Strynar said good question but I really don't know. We do know that drinking water sources that supply water to 10,000 is assessed, but I don't know if it has been done for bottled water.

Representative Iler asked what source could I find out what is being done?

Mr. Strynar said someone may know that at the U.S. EPA Office of Water. We could get you a name.

Representative Davis said I know there are all different kinds of spectrometers. Andy Miller will talk about that, but am I correct that what DEQ asked for is a high resolution tandem liquid chromatography mass spectrometer?

Mr. Strynar said DEQ is asking for the Cadillac model.

Mr. Miller said we asked for $537,000 for a mass spectrometer. Calling it a tandem is the same as calling it an MS/MS but the Quadrupole-Tof (QTOF) is a mass spectrometer.

Representative Davis said I understand there is a more sophisticated model called an Orbitrap.

Mr. Strynar said that's top of the line. There are only two of those in the State.

Representative Davis asked if a QTOF would be suitable for them to do the work they need to do?

Mr. Strynar responded yes.

Mr. Miller said we didn't ask for the Chevy, we didn't ask for the Tesla, we asked for the Cadillac.

Mr. Strynar said what they asked for is exactly what they need.

Representative Davis asked can the mass specs in the university system do exactly what is needed? Are there QTOF mass specs equipped to do the analysis that DEQ wants to do?

Mr. Strynar said there are some. I don't know how many. UNC-W, University of North Carolina at Chapel Hill, and North Carolina State University have some high res mass specs.

Representative Davis said let's say UNC does not have a QTOF that's ready to roll but they have some lesser ones available. Can you up fit a lower model?

Mr. Strynar said no. If you have the Chevy, you're stuck with it. You cannot upgrade a low-resolution mass spec to do high-resolution.

Representative Davis said I understand DEQ is sending their samples to the U.S. EPA lab in Georgia. I understand your lab in Research Triangle Park is a research lab to develop test methods, and your facility is not available for long-term monitoring. Is that right?

Mr. Strynar said our regional labs are there to do long-term monitoring. We are set up to do contract research, not long-term monitoring. There are quality assurance measures that must be met, and that is what the regional labs have to do. We did our work as quickly as we could.

Representative Harrison asked if there's a difference between staffing needs for targeted and non-targeted analysis? She also discussed the precautionary principle.

Mr. Strynar said not necessarily. DEQ has staff who can do this with some instruction. And I do agree on the precautionary principle.

Representative Grange said there has been discussion of UNC's capability with respect to spectrometers. I listened to an extensive presentation in a Senate committee, and I don't think it's fair that we don't have them here.

Mr. Strynar said Dr. Ferguson may have different opinions on this.

Representative Dixon (to Representative Harrison) asked if we should we start with sugar grease and alcohol?

Representative Floyd said I hope we don't back away from recommendations.

Representative McElraft asked if U.S. EPA is doing anything on pharmaceuticals in the water?

Mr. Strynar said yes, there's a lot going on with respect to pharmaceuticals. I agree that all the products getting flushed down the toilet needs to be addressed

See PowerPoint presentation handout: Mass Spectrometry and Chromatography Explained.

NC Department of Environmental Quality, Anderson Miller, Director of Legislative Affairs - presented specifically on the mass spectrometry unit locations and purposes in North Carolina agencies.

Andy Miller spoke on mass specs in State government.

Representative Harrison said in November, we heard how many staff was diverted to work on GenX. I remember it was about 31?

Mr. Miller said it fluctuates but depends on whether there's a spike or enforcement action.

Representative Harrison – I believe HB 189, Water Safety Act, was meant to address very short term issues before short session?

Mr. Miller said yes. The U.S. EPA does a great job but it can take from a week to seven weeks in getting results back. We believe we need equipment to do the work that DEQ needs to do. We will be making a larger ask in the Short Session. Michigan asked for $23 million. We won't ask for that much.

Representative Harrison asked will that include funding for DHHS?

Mr. Miller responded probably but that is a DHHS question.

Representative Floyd said we have to have our own basketball.

Representative McElraft said I appreciate everything the Department is doing, but because the funding didn't come from the Senate, that doesn't mean DEQ is doing everything they can to keep the public safe. We will keep working on this.

See PowerPoint presentation handout: Select Committee on North Carolina River Quality.

Representative Ted Representative Davis, Chairman Representative Davis presented a commentary on the current status of House Bill 189 (Water Safety Act) and the transformation it underwent in the Senate to become the Water Safety Act, which did not pass into law.

Representative McElraft said the research done at UNC and Duke is research. You need a chain of custody for samples in a lawsuit. I truly do not believe this should be done at the university level. North Carolina Department of Agriculture and Consumer Services has eight of these. I think DEQ should have their own instrument. We need a smaller working group with the Senate and we need to try to work something out.

Representative Floyd said thank you for your response during the last session.

Representative Harrison echoes Representative Floyd's comments. She thinks this was a good job for how to do a minimum to address these issues. In the Short Session we will be looking at an even bigger ask. I don't share your optimism that we will find a solution that the Senate will accept.

Representative Davis said I hope that this conversation will lead to us being able to sit down with the Senate and work on a resolution.

Representative Brisson asked would there be an option to do this at the Joint GenX Committee?

Representative Davis said you may be thinking of Environmental Review Commission (ERC).

Representative Brisson asked if we can we take this back for discussion in ERC?

Representative Davis said we have three chairs in ERC. I was told that responsibility for dealing with GenX would shift to this committee. Sen. Wade has a committee in the Senate and it has only met once. We have had all the experts here. Representative Dixon and Representative McGrady I hope would consider it but this committee will likely be tasked with the work. If they want to do it, I would cooperate with them however I can.

Representative Brisson said the Senate always seems to have the final decision somehow. We are at a point now where we need the money appropriated because it's got us at a standstill.

Representative Dixon said my opinion originally was that ERC would have been the proper place for this discussion. I was not consulted about this committee. I have appreciated the participation in this committee. We got good news today that the CFPUA water is clean. I supported the House proposals as a beginning step to a problem that will be discussed a long time. We are getting close to getting past the sensational politics of it. We still don't have the data on GenX that we ultimately need.

Representative Steinburg said I think the position we find ourselves in now is extremely disappointing. The Senate had one meeting and ended up being the final arbiters. We worked hard to produce a good bill and then were spurned for the sake of "I'd rather do it my way." They just needed to take a look at it and trust us.

Representative Yarborough said we have a lot more to learn about the effects of GenX but we seem to have made real progress on getting Chemours to stop putting it in the river.

Representative Muller said I thought we had a good bill before, and today I'm sure we do. After hearing the U.S. EPA talk about the spectrometer, we need that machine in our house. We don't need to borrow it from the university system.

Representative Dixon said we had a good bill. We sent it to the Senate and it's their right to put their fingerprints on it, which they did. We made the decision over here not to discuss it.

Representative Davis said that's not correct. We put it in this committee so we could discuss it.

Representative Dixon said we did not put it on the floor for a vote to concur or not to concur. If we voted not to concur, it would go to conference. A decision was made to re-refer it to this committee. In this instance I don't think we can argue with the Senate for doing what they thought improved the bill. I thought it was a great decision to move it back into this committee, but we could have conferenced it and we didn't do that.

Representative Davis said that was done because nobody in the House had the opportunity to discuss it.

Representative McElraft said the Senate does have the right to do what they did and I do think conference is the right place to take this eventually. But I am glad we took the opportunity to

have the conversation we did today. I did not know the water was almost clean before it got to the CFPUA. Appropriations will ultimately have to be the ones to deal with this.

The meeting adjourned at 3:10 PM.

Representative Ted Representative Davis, Jr.,
Senior Chair Presiding

Laura Holt-Kabel, Committee Clerk



Nothing Compares
NORTH CAROLINA

DEQ GenX Update
House Select Committee on River Water Quality





Nothing Compares
NORTH CAROLINA

Division of Water Resources



Current Sampling

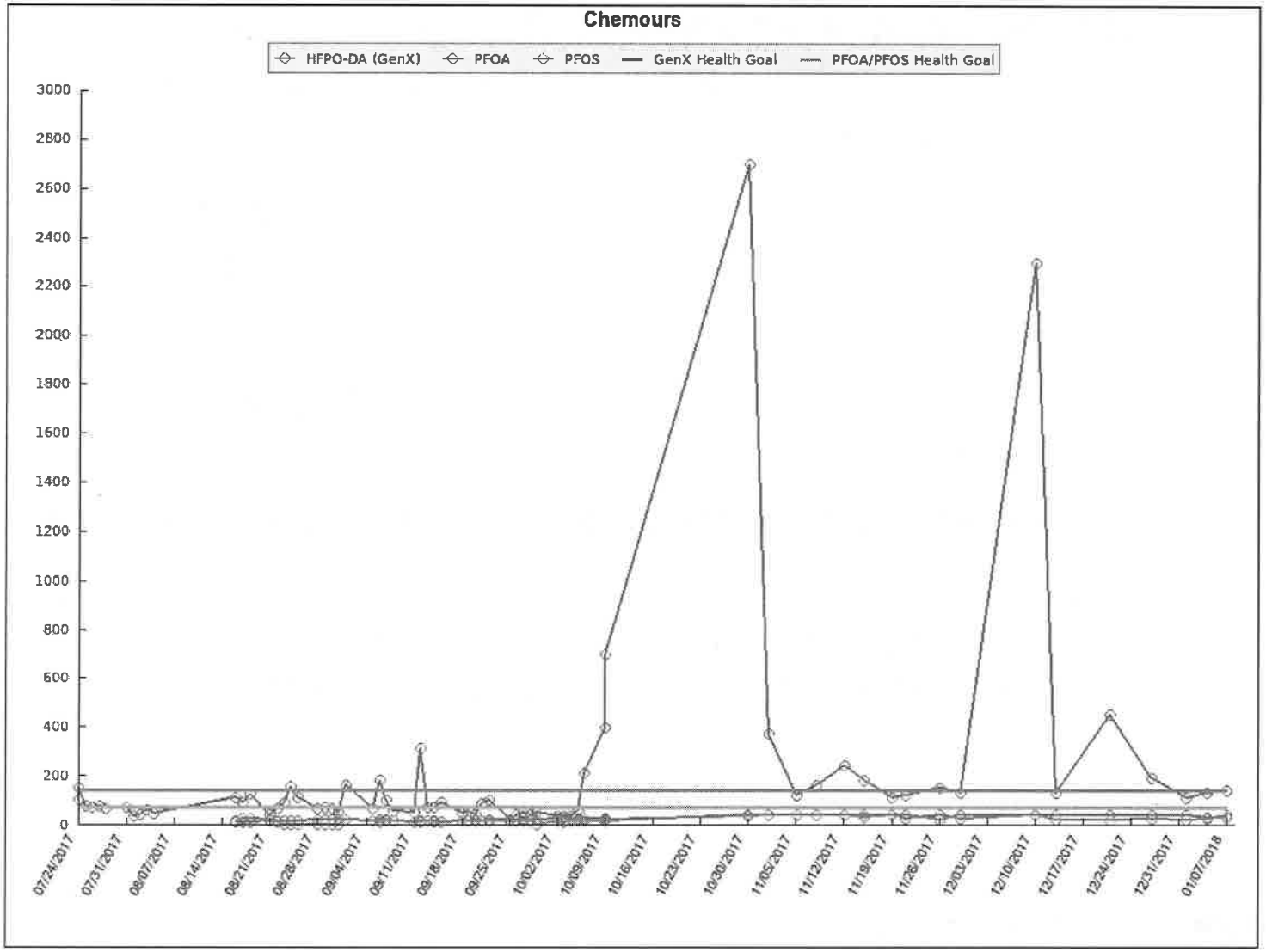
Division of Water Resources

- 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

Data at Chemours Outfall 002
GenX (parts per trillion)

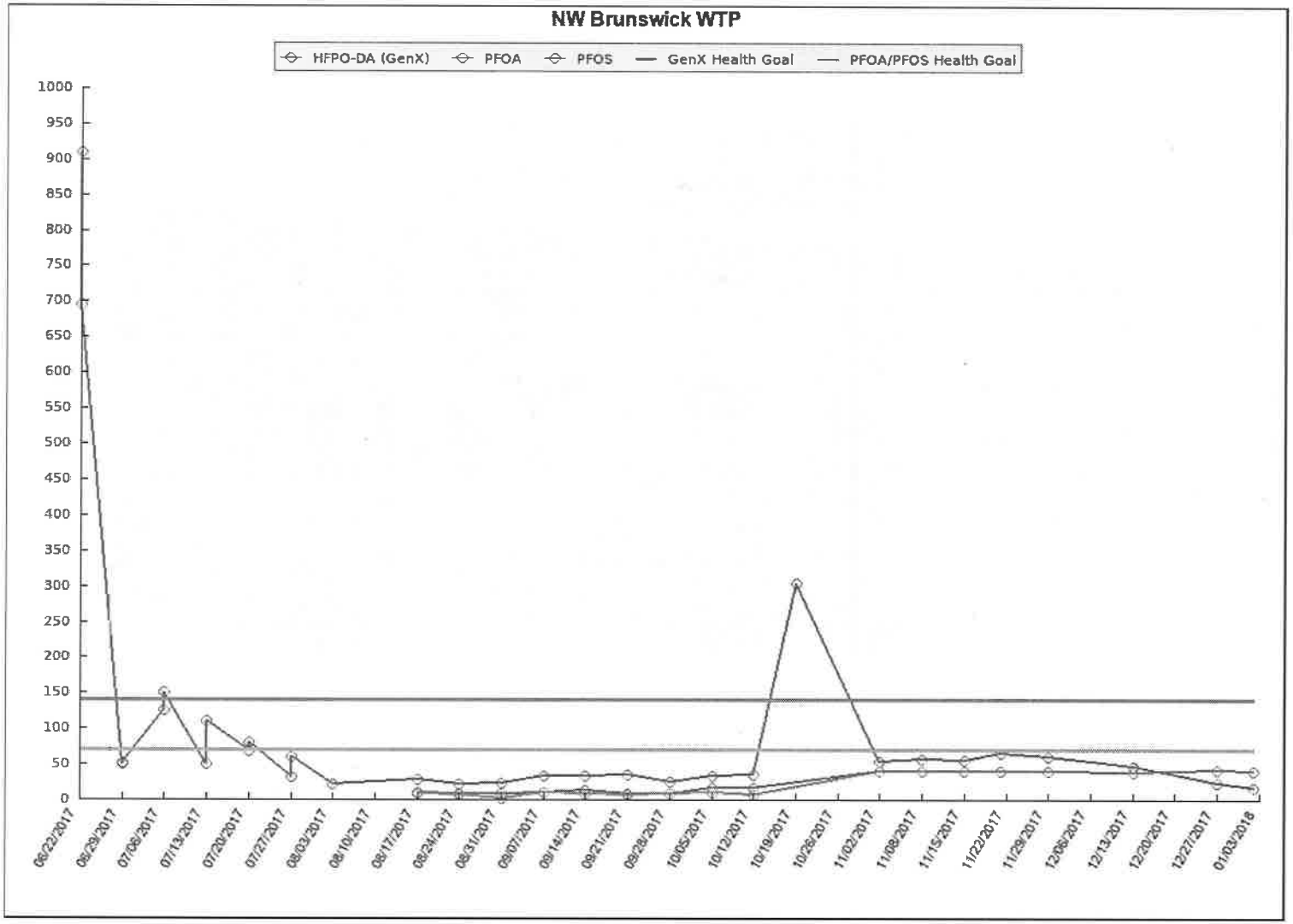


Site Inspection

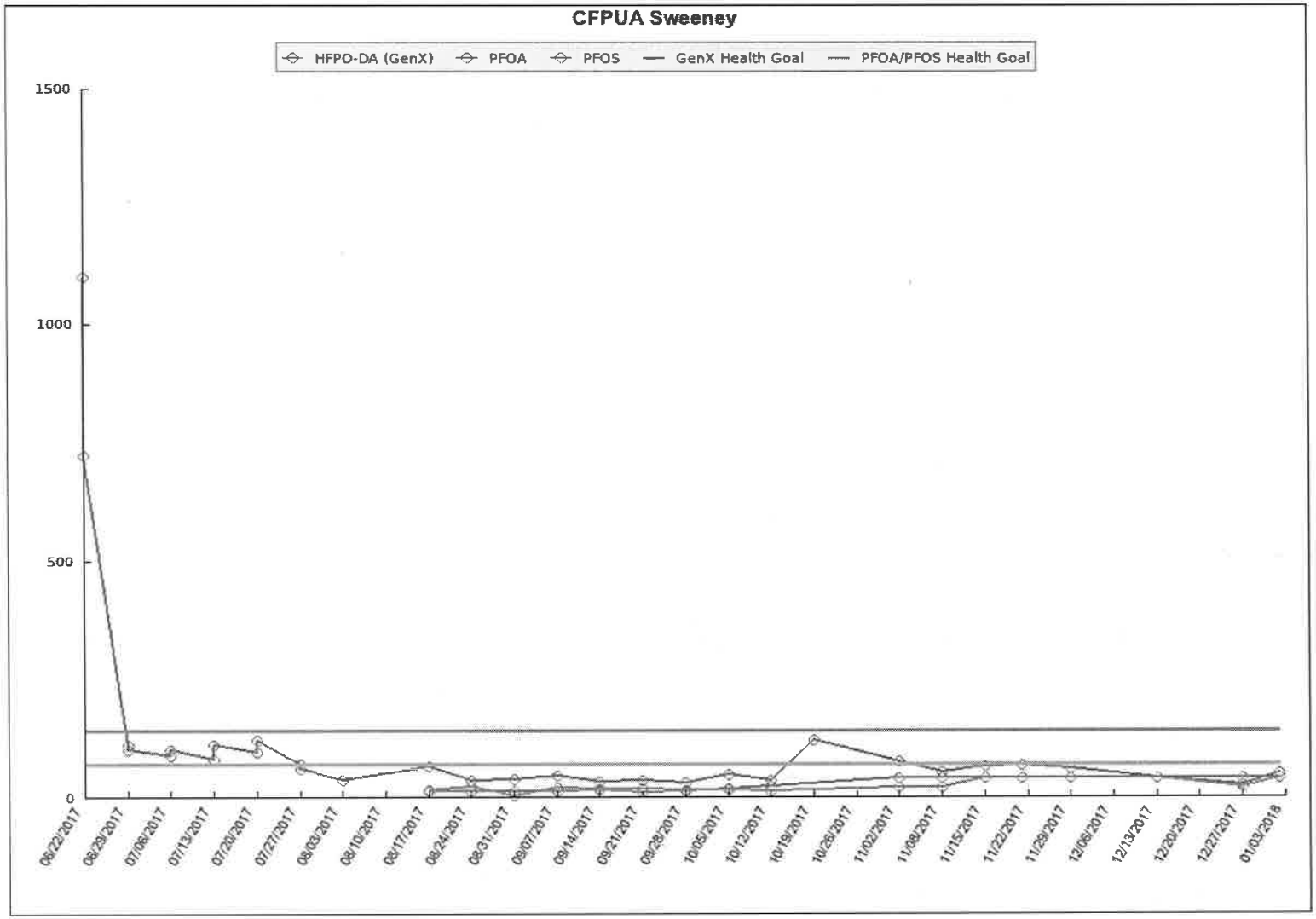


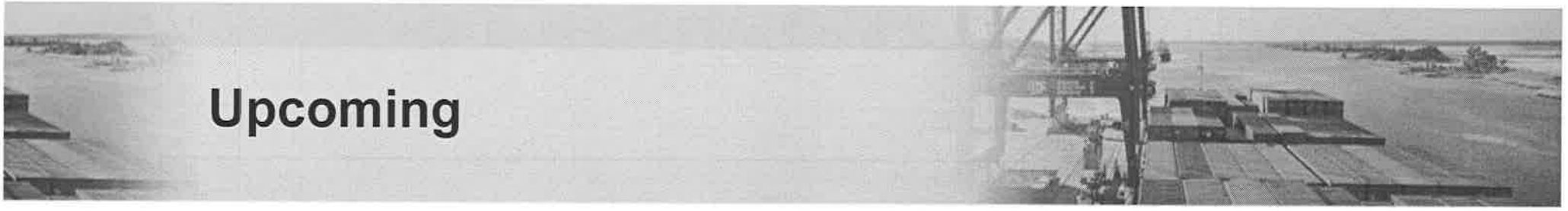
Area of Chemours plant where Oct. 6th release occurred and entered the waterway that discharges to outfall 002.

Data at Drinking Water Facilities
GenX (parts per trillion)



Data at Drinking Water Facilities
GenX (parts per trillion)





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.

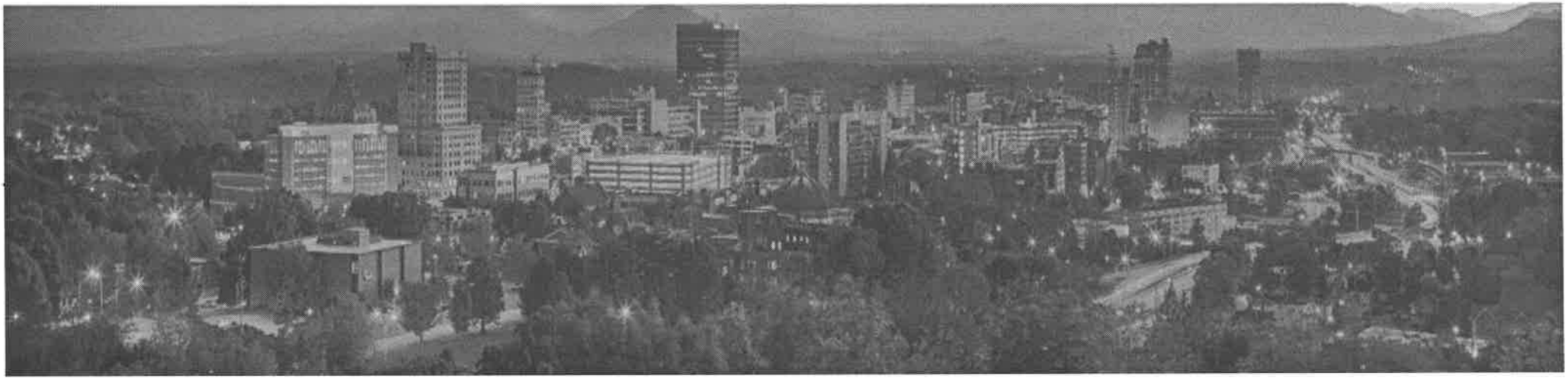
- Ambient monitoring will have to be coordinated to fit into EPA Athen's schedule, due to their support needed by other states.

- Evaluate factors for potential bioaccumulation and aquatic toxicity to develop surface water and groundwater standards, including SAB review.

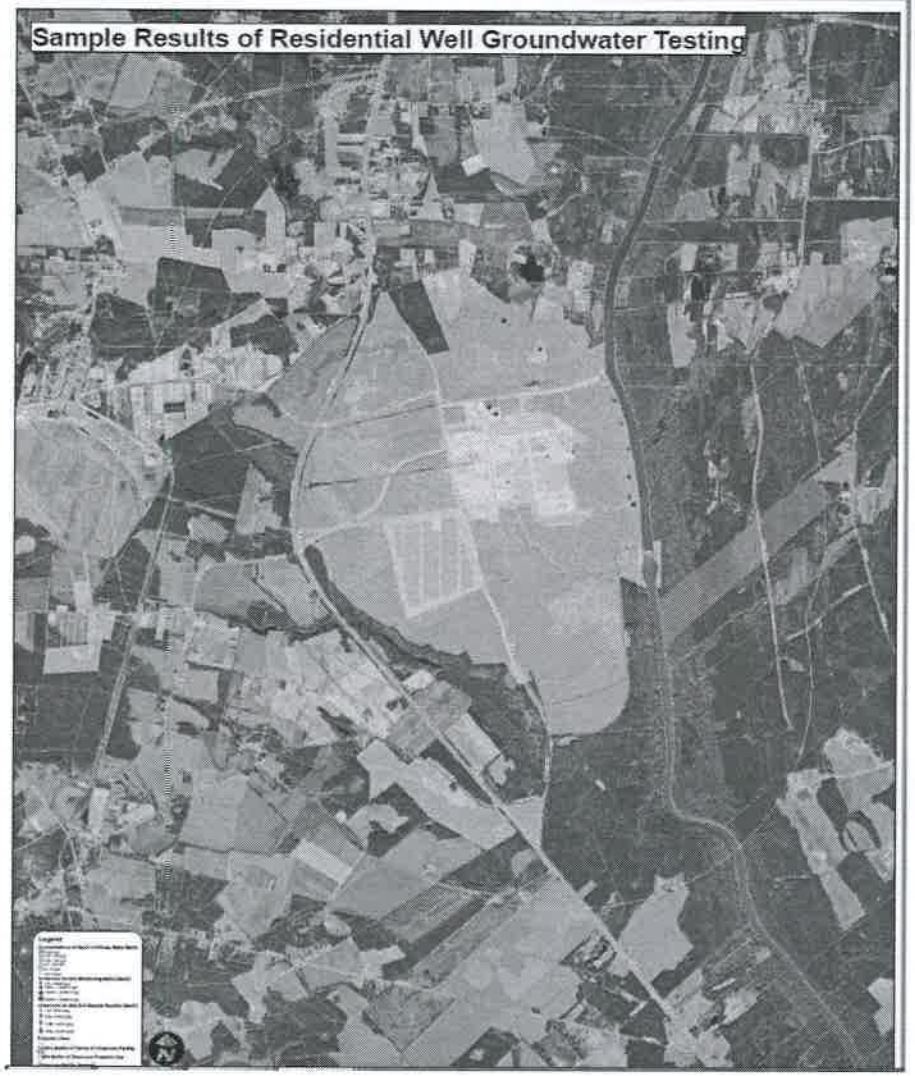


Nothing Compares
NORTH CAROLINA

Division of Waste Management



Division of Waste Management

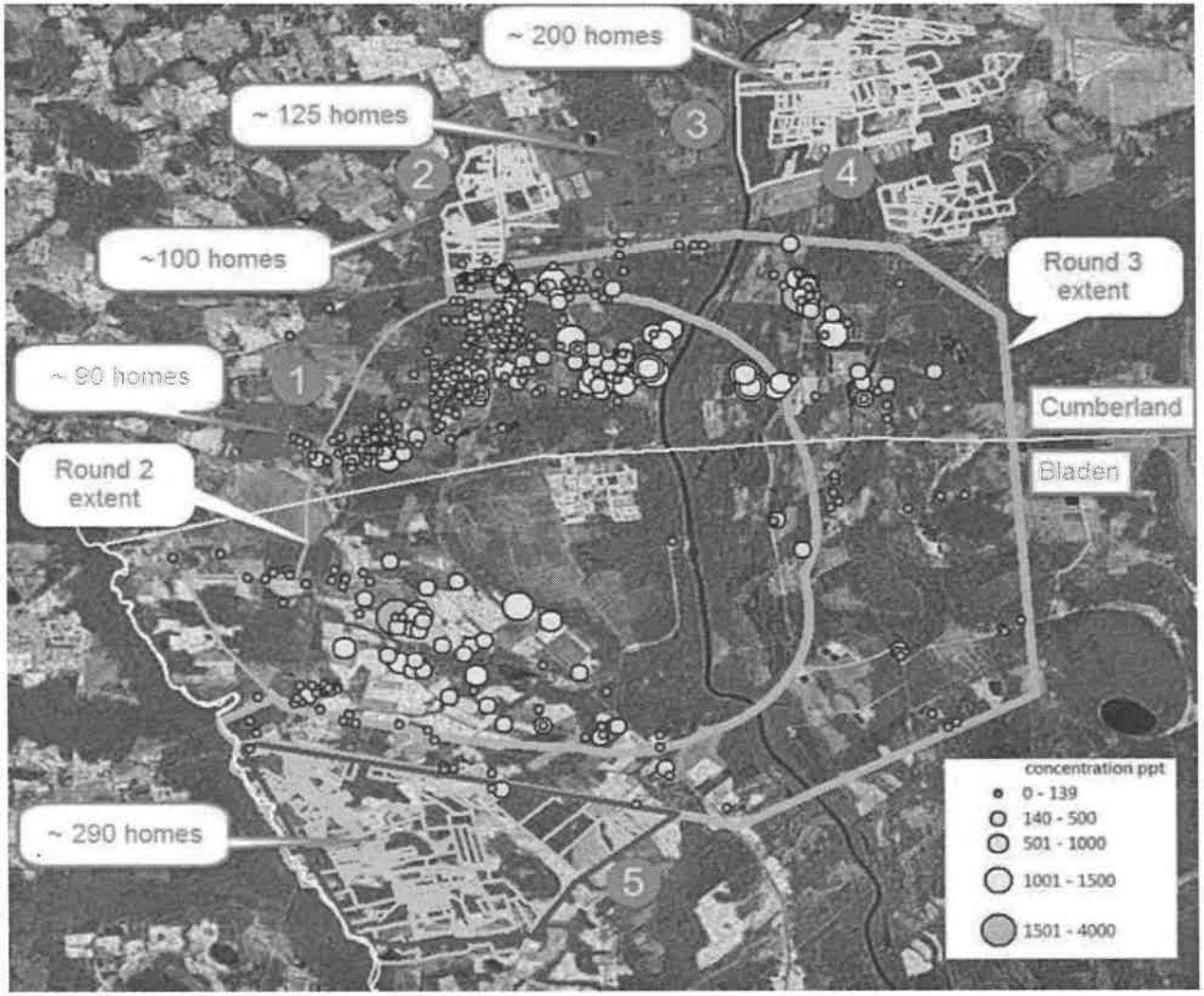


Well Sampling Results
in the Chemours area,
Phases 1-3
(up to ~1.5 mi. from facility border)

GenX: NC health goal = 140 ppt

Red = > 420 ppt
Dark Orange = 140 - 420 ppt
Orange = 100 - 140 ppt
Yellow = 10 –100 ppt
Green = 0 - 10 ppt, detected
Blue = ND (Non Detect result)
No color = not tested

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



Division of Waste Management

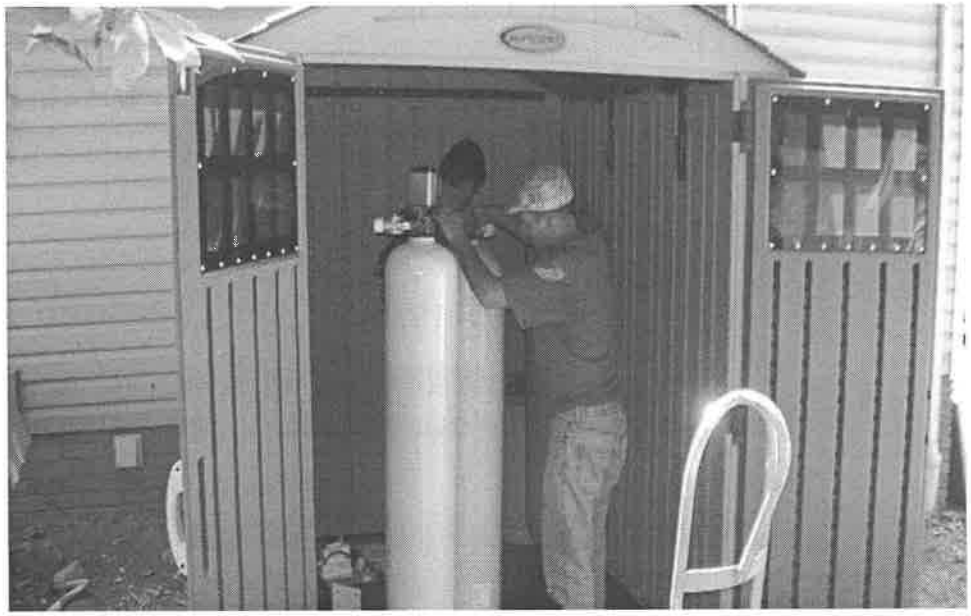
Combined Phase I, II, III Private Well PFAS Data

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 – 1/30/2018
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)

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 at or 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



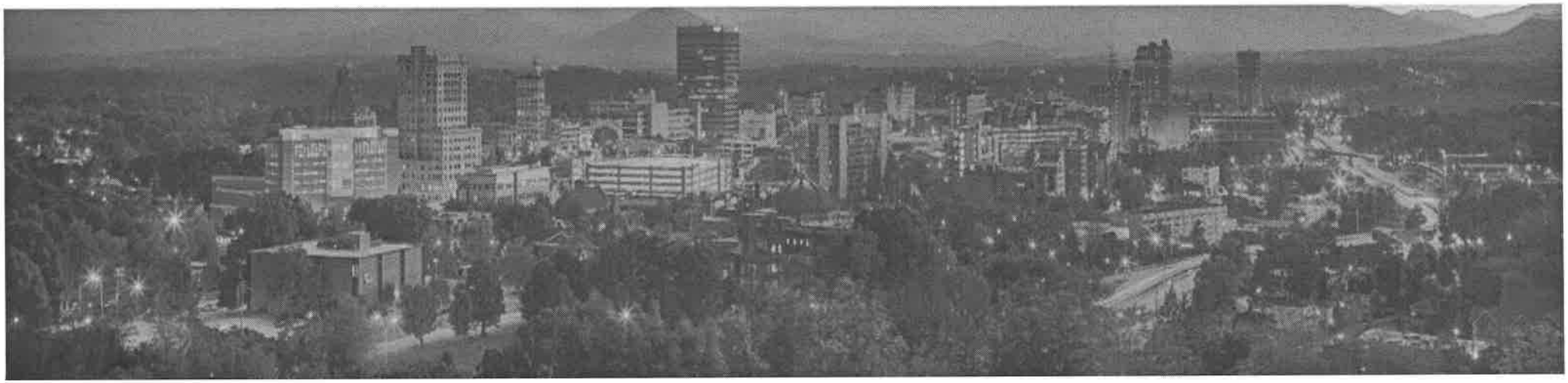
- Chemours Employee POU water treatment system
- DEQ-collected 12/20/17, analyzed for expanded PFAS suite
  - A high concentration of GenX (845 ng/L) was present in the pre-filter sample that was not detected in the carbon-treated samples
  - The "post-filter, no purge" sample simulates Chemours' sample 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 J ng/L GenX; ND (PFOS + PFOA); 1.08 ng/L Total PFAS

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



Nothing Compares
NORTH CAROLINA

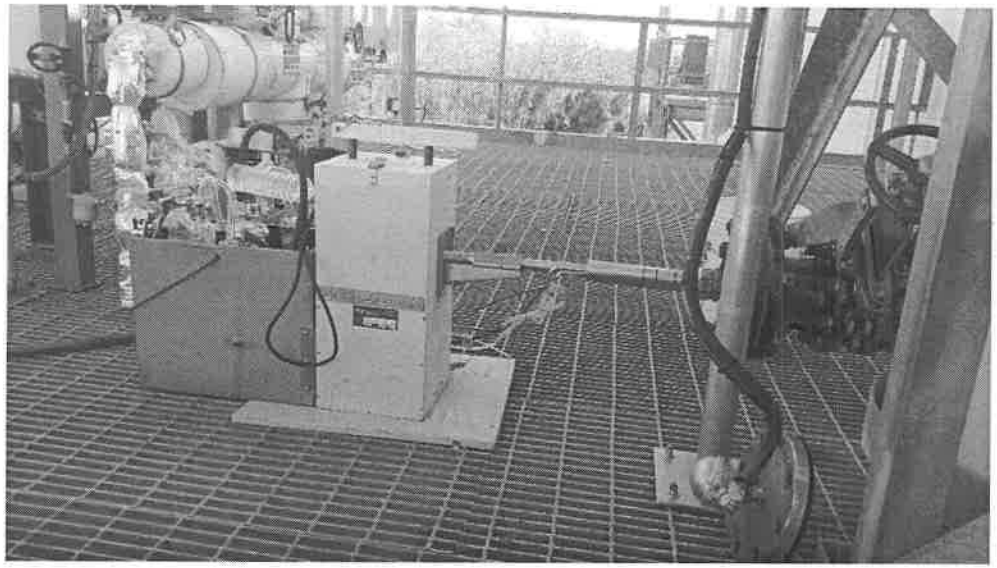
Division of Air Quality



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
  - Split samples for independent assessment by EPA lab
- Results expected early March
- Additional testing – week of February 26 & beyond



Division of Air Quality

Ambient Air Quality Monitoring

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



Division of Air Quality

Ambient Air Quality Monitoring

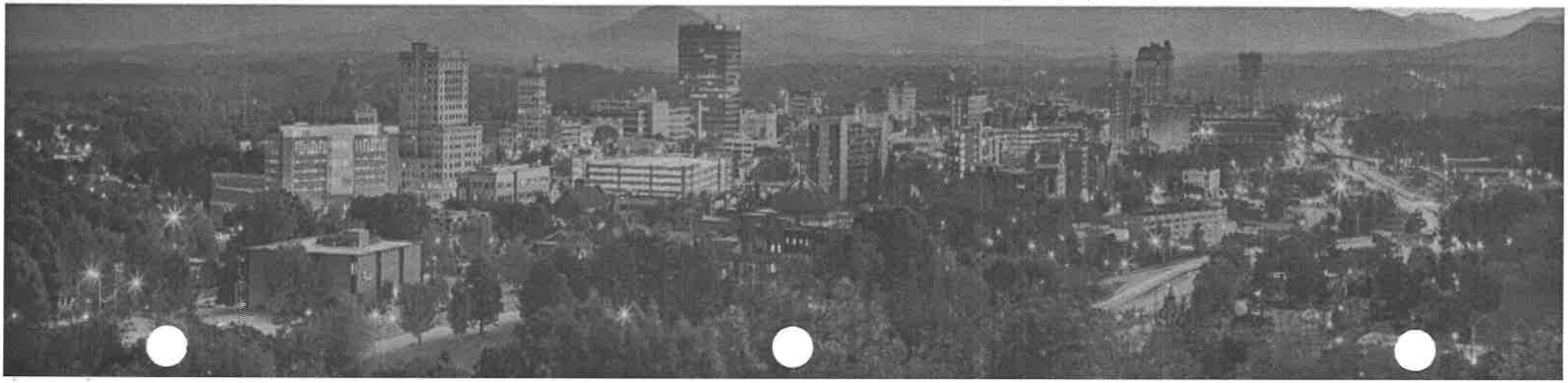
- Gather available samples from the National Atmospheric Deposition Program in NC and send to EPA lab for analysis of PFAS.
  - Clinton Crops site in Sampson County
  - Jordan Creek in Scotland County

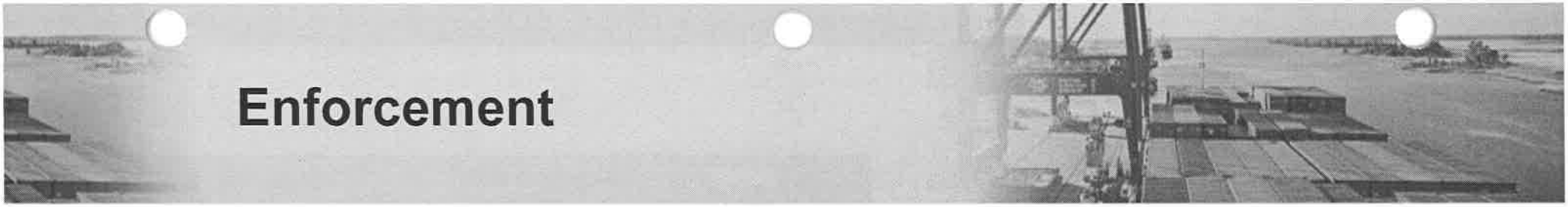
- EPA has agreed to do the lab analysis.



Nothing Compares
NORTH CAROLINA

DEQ Enforcement

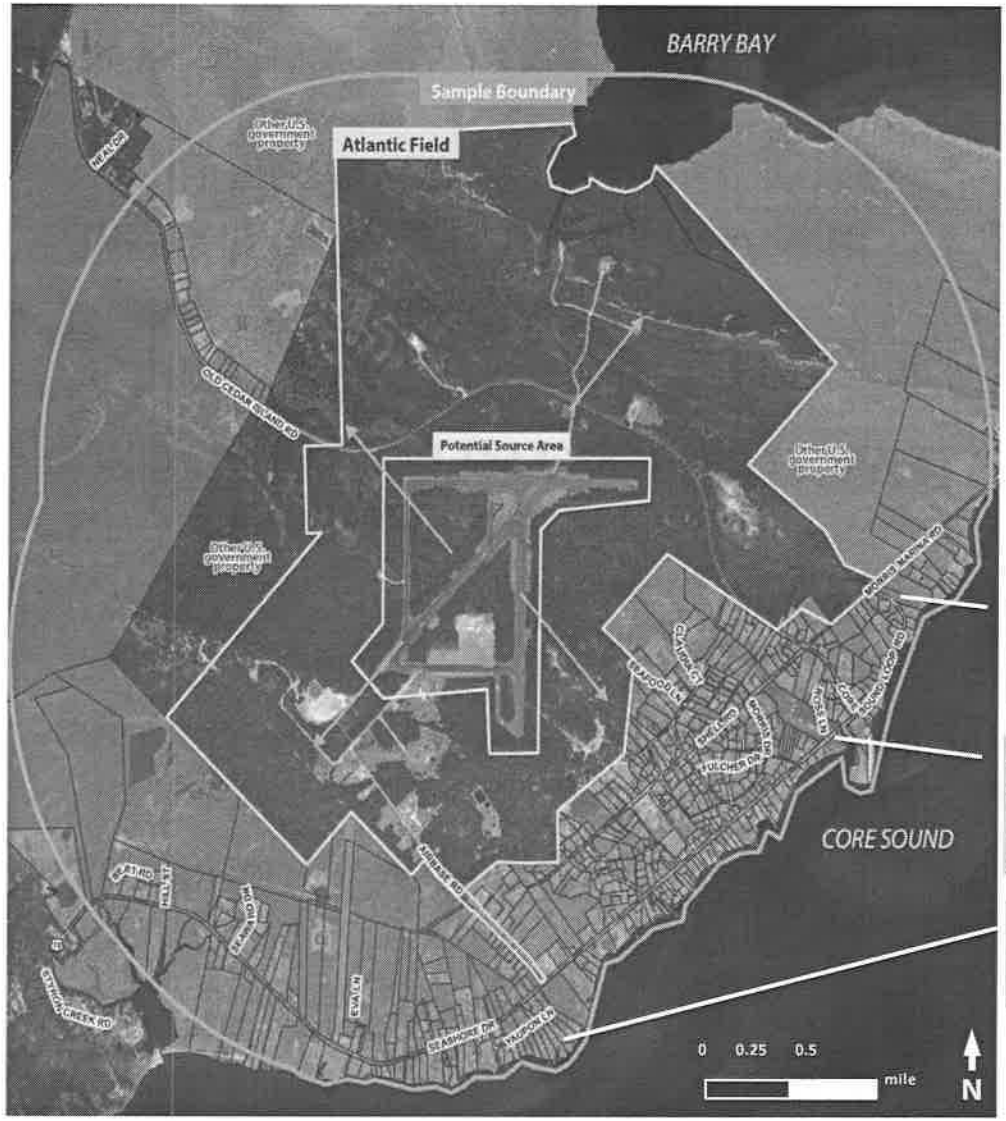




Enforcement

- 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)
- Immediate Action Notice of Violation to Address Groundwater Contamination (02/12/18)

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).*

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

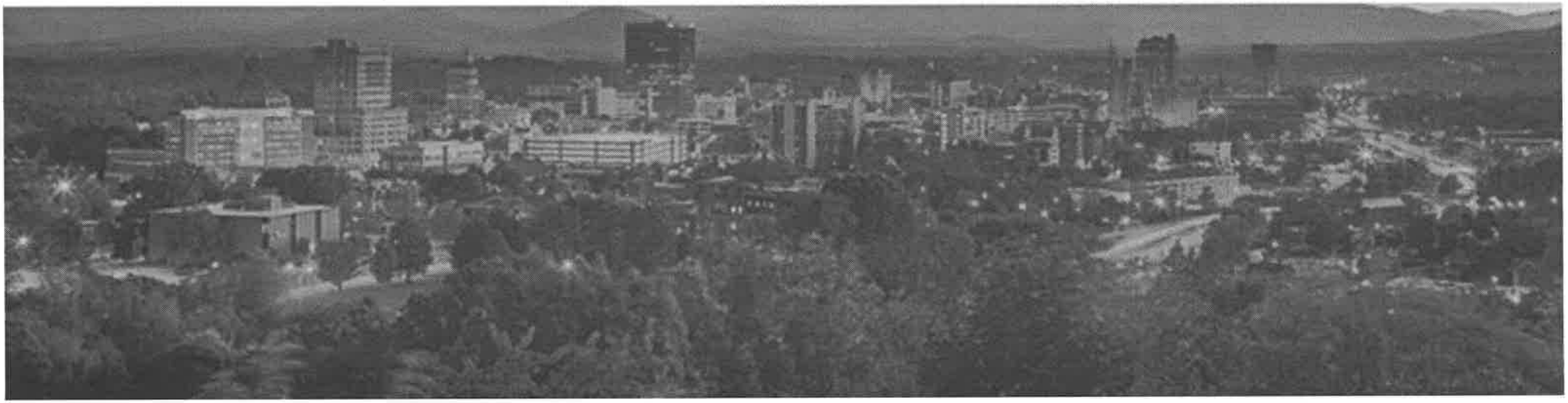
Questions ?



Nothing Compares
NORTH CAROLINA

Select Committee on North Carolina River Quality

February 21, 2018



NC DEQ



NC DEQ

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER SCIENCES SECTION			
UNIT	TYPE	PURPOSE	#
Organic Chemistry Branch	GC/MS	Base/Neutral/Acid compounds (Semivolatiles) / Waters of the State	1
Organic Chemistry Branch	GC/MS	Base/Neutral/Acid compounds (Semivolatiles) / Waters of the State	1
Organic Chemistry Branch	GC/MS	Purgeable Organics (Volatiles) / Waters of the State	1
Organic Chemistry Branch	GC/MS	Purgeable Organics (Volatiles) / Dedicated to 1,4-Dioxane testing / Waters of the State	1
		Total	4

DEPARTMENT OF ENVIRONMENTAL QUALITY - DIVISION OF AIR QUALITY-AMBIENT MONITORING SECTION			
UNIT	TYPE	PURPOSE	#
Laboratory Analysis Branch	GC/MS	Volatile organic compounds (EPA Compendium Method TO-15)	1
Laboratory Analysis Branch	HPLC/UV-Vis	Aldehyde and Ketones (EPA Compendium Method TO-11a)	1
Laboratory Analysis Branch	GC-FID	Light hydrocarbons (PAMs compounds)	1
		Total	3

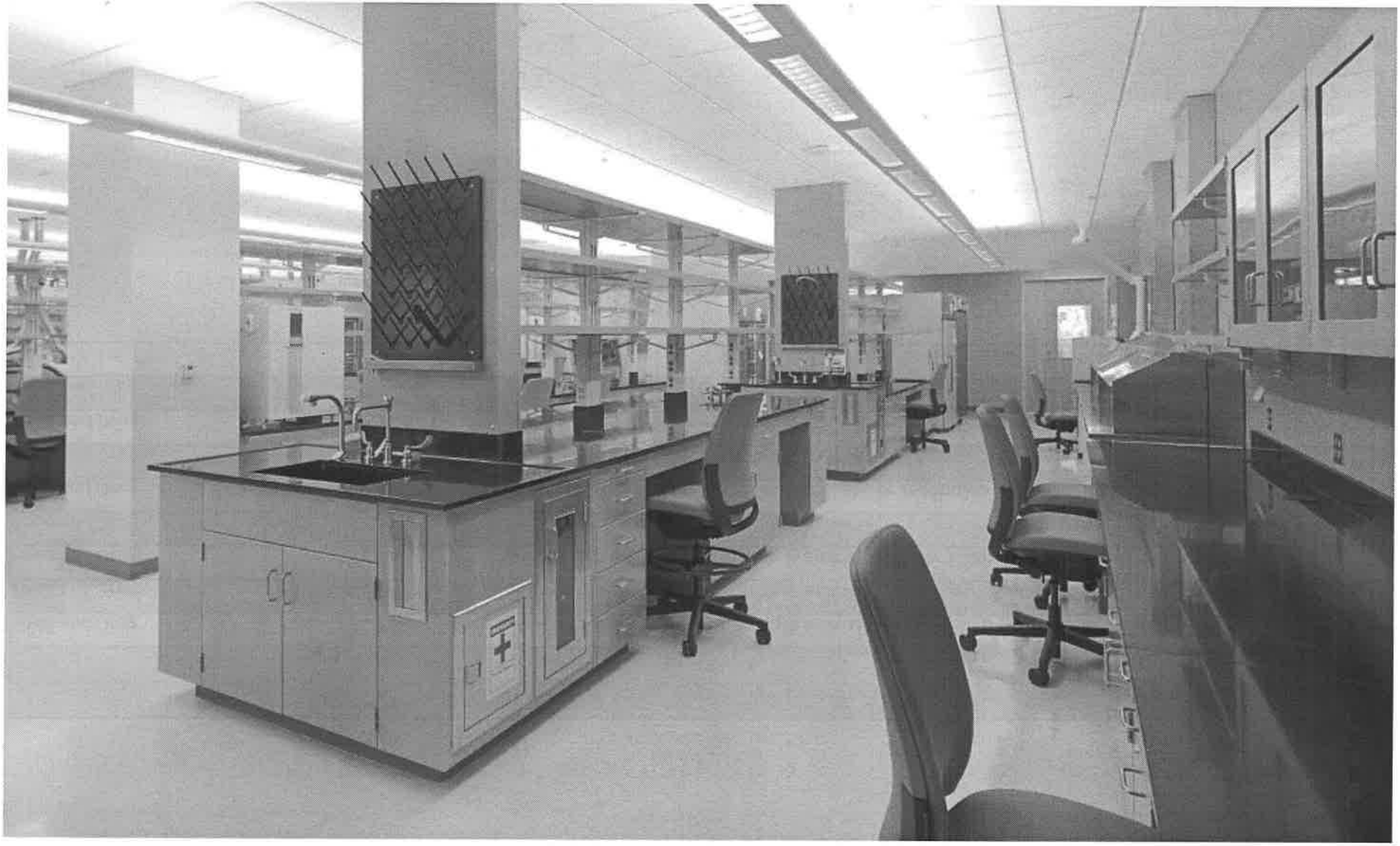
NC DEPARTMENT OF AGRICULTURE



NC DEPARTMENT OF AGRICULTURE

DEPARTMENT OF AGRICULTURE - Food and Drug Division			
UNIT	TYPE	PURPOSE	#
Food and Drug	LC/MS	Analysis of pesticides in human & animal foods for FDPD Food &Feed Programs	1
Food and Drug	LC/MS	Analysis of pesticides in human & animal foods for FDPD Food and Feed Programs	1
Food and Drug	LC/MS	Analysis of pesticides in human & animal foods for FDPD Food and Feed Programs	1
Food and Drug	GC/MS	Analysis of pesticides in human & animal foods for FDPD Food and Feed Programs	3
Food and Drug	GC/MS	Analysis of pesticides in soil, water, swabs or vegetation for SPC&PD IR Program.	2
Food and Drug	GC/MS	Analysis of pesticides in human and animal foods for FDPD Food and Feed Programs	1
Food and Drug	GC/MS	Analysis of pesticides in soil, water, swabs or vegetation for SPC&PD IR Program.	1
Food and Drug	ICP/MS	Quantification of heavy metals in human food for FDPD Food Program.	1
		Total	11

NC DHHS STATE LAB OF PUBLIC HEALTH



NC DHHS

DHHS State Lab of Public Health			
UNIT	**TYPE**	**PURPOSE**	**#**
Hemachemistry	ICP/MS	Human samples (children) to detect levels of lead in blood	2
Newborn Screening	MS/MS	Human samples (newborn screening of metabolic diseases)	6
Chemical Terrorism	ICP/MS	Human samples to detect agents of chemical terrorism	2
Environmental Sciences	ICP/MS	Environmental Testing (Trace Metals)	2
Environmental Sciences	GC/MS	Environmental Testing (semi-volatiles)	2
Environmental Sciences	GC/MS	Environmental Testing (volatiles) (2 are non-functioning)	4
Environmental Sciences	LC/MS/MS QTOF	Environmental Testing (EPA grant funded for terrorism response)	1
		Total	19

DHHS Office of the Chief Medical Examiner			
UNIT	**TYPE**	**PURPOSE**	**#**
Toxicology	GC/MS	Human toxicology samples to detect pharmaceutical and chemical agents of death	3
Toxicology	LC/MS/MS	Human toxicology samples to detect pharmaceutical and chemical agents of death	5
Toxicology	LC/Orbitrap	Human toxicology samples to detect pharmaceutical and chemical agents of death	1
		Total	9

EPA

- One existing mass spectrometer was purchased through a federal grant, which authorized a grant to NC for the purpose of identification of possible terrorist chemical threats or warfare agents

- DEQ in conversations with EPA on authority to use the mass spec for fluorinated compounds

- Once the machine is used for the purpose of fluorinated compounds, it could impede its availability for identification of a chemical threat or warfare agent

FURTHER REQUIREMENTS

- EPA Approval by the EPA Grants Management Office under 2 CFR 200.313(c)
- Qualified professionals to staff the equipment and analyze results
- Undetermined need for software updates

USE OF UNC SYSTEM EQUIPMENT

- Use of UNC system equipment and staff will include subjecting those UNC resources to ligation proceedings, and also oversight by EPA under our Quality Assurance and Quality Control requirements in using data for regulatory purposes.

- Staff would need to be available to testify in court, provide depositions and documentation for legal actions that involve data generated at each lab. Turnover in students and faculty could impede enforcement actions.

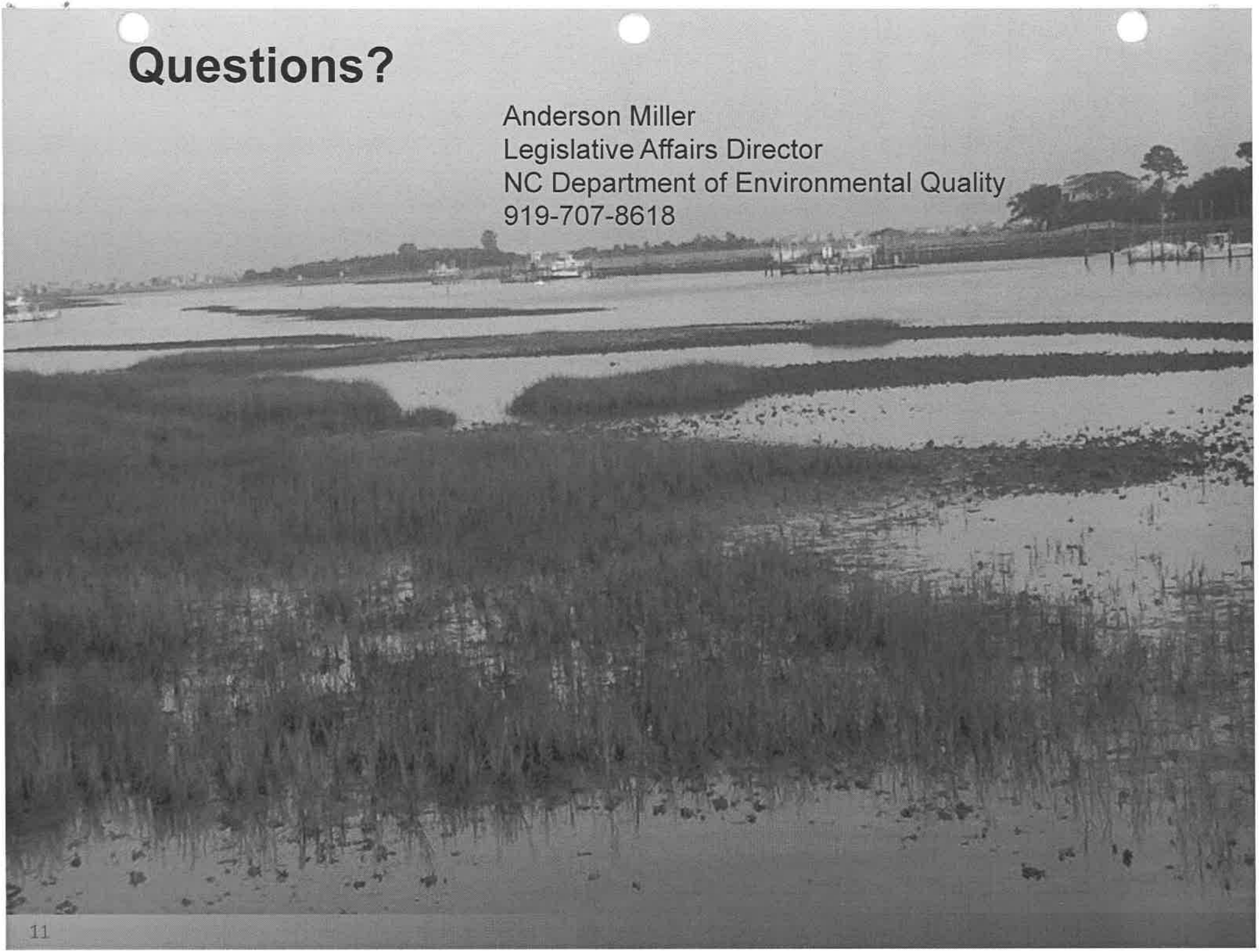
- EPA oversight includes QA/QC for lab procedures and review of data generated.

- The traceability of consumables and all maintenance activities need to be well-documented on any equipment used for litigation reporting.

- These systems will need to undergo evaluation from a method detection limit standpoint, and initial demonstrations of competency will need to be performed for all personnel. They will also have to undergo periodic proficiency testing, which is reported to EPA.

Questions?

Anderson Miller
Legislative Affairs Director
NC Department of Environmental Quality
919-707-8618



Unregulated Contaminants Response Measures

House Select Committee on North Carolina River Quality

Cape Fear Public Utility Authority HB 56 Interim Report

February 21, 2018

Cape Fear
Public Utility Authority
Stewardship. Sustainability. Service.

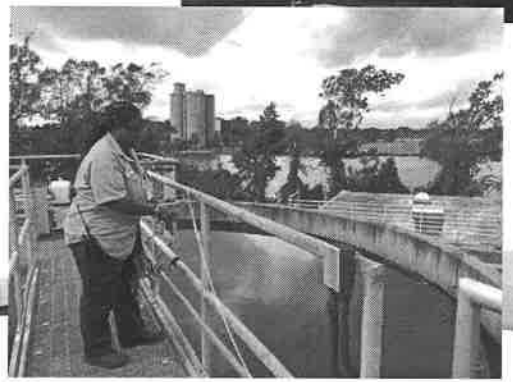
On Behalf of Our Customers

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Address the challenge presented by emerging contaminants and their effects on consumer confidence
- Action on several fronts:
  - Sampling and analysis
  - Evaluating treatment technologies
  - Identifying and quantifying other contaminants
  - Taking legal action
- Communicate with our customers
  - Offer free water station(s)
  - Provide weekly updates via the website
  - Share all drinking water test results
- CFPUA resolution asking NCDEQ for a cease in fluorochemical compound production at the Fayetteville Works site *(February 14, 2018)*







House Bill 56

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

CFPUA shares study findings from our pilot study with Brunswick and Pender counties on a monthly basis.



1. Continued work in the identification and deployment of treatment alternatives ($100,000)
2. Ongoing water supply monitoring ($85,000)
3. Information sharing
    - Interim Report (December 1, 2017)
    - Final Report (April 1, 2018)

Water Quality Sampling

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- CFPUA samples the treated water from Sweeney Water Treatment Plant on a weekly basis for perfluorinated compounds including GenX.
- NCDEQ reported that in December 2017 increased levels of GenX were measured at the Chemours Outfall 002.
- CFPUA continues to see the levels in our treated water stay below the NCDHHS health goal of 140 parts per trillion.
- CFPUA meets all drinking water regulations, which unfortunately do not include standards for GenX, other perfluorinated compounds, or other emerging contaminants.

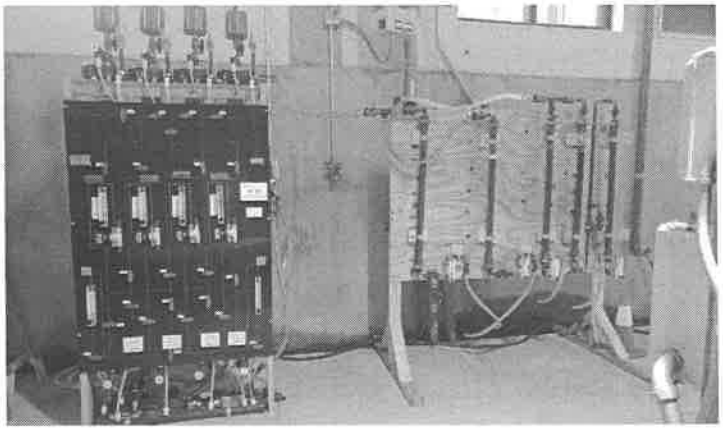
Results from Chemours Outfall 002*	
Date	**Level of GenX (ppt)**
12/11/2017	2,300
12/14/2017	120
12/18/2017	79
12/21/2017 (grab sample)	740
12/22/2017	470
12/28/2017	190

Results from Sweeney Water Treatment Plant	
Date	**Level of GenX (ppt)**
12/5/2017	45
12/20/2017	28
12/28/2017	36
1/2/2018	32
1/10/2018	35
1/16/2018	37
1/22/2018	42
1/30/2018	30

** Source: https://files.nc.gov/ncdeq/GenX/Data/Data%20spread%20sheet%20Dec-Jan.pdf*

Evaluating Treatment Technologies:
Sweeney Water Treatment Plant Pilot Study

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

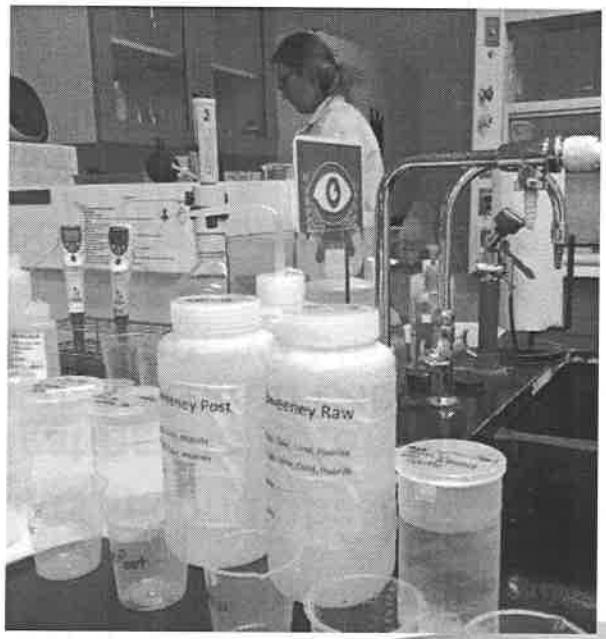


- Pilot study is in its second phase of testing.
- Study is investigating the potential of multiple types of Granular Activated Carbon and Ion Exchange media to remove emerging contaminants.
- Testing expected to be completed this spring.
- Once the study is complete, data will be used to form a recommendation on technological updates to Sweeney Water Treatment Plant.
- Effective treatment solutions rely on full understanding of what is in the water.

UNCW Research

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Since Sept 1, UNCW continues to identify other emerging contaminants in the river.
- Even though point source discharge has stopped, levels of GenX remain in the river.
  - Unknowns:
    - GenX effect on the sediments
    - Groundwater interactions with the river
    - Rainfall and stormwater runoff
- We receive monthly updates on their progress, and incorporate their findings into our work at the Sweeney Water Treatment Plant.



Future Considerations…

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Treatment Goals
  - 100% removal is unlikely.
  - Goals must be based on science and protecting public health.
  - Until there is conclusive scientific information, request State set strict discharge standards.
- Ongoing Litigation
  - Unregulated compounds should not be discharged into the river.
  - Began legal action against Chemours to protect citizens.

- Initial Implementation Costs* = $38.7 M
- Additional Annual Operating Costs = $2.9 - $3.6 million per year
- Costs to CFPUA customer:
  - $10/customer per bimonthly bill
  - Rate payers should not bear costs
  - The ultimate shared goal is to protect our customers and regional partners.
- Cost to date = $1,774,000



*Includes $1.7M for replacing the existing filter media.

Questions?

Cape Fear
Public Utility Authority
Stewardship. Sustainability. Service.



Scan to sign up for "Notify Me" & get regular CFPUA updates

Cape Fear
Public Utility Authority
Stewardship. Sustainability. Service.

James R. Flechtner, PE
Executive Director
235 Government Center Drive
Wilmington, NC 28403
910-332-6625
jim.flechtner@cfpua.org

November 16, 2017

The Honorable Trudy Wade
North Carolina General Assembly
Legislative Building
16 West Jones Street
Raleigh, North Carolina 27601

RE: HB56 GenX Response Measures
Cape Fear Public Utility Authority (CFPUA) Interim Report

Dear Senator Wade:

In accordance with House Bill 56 GenX Response Measures requirements, this interim report summarizes our coordination activities with Brunswick and Pender counties. We maintain an ongoing dialogue with their County Managers, as well as their Public Utility and Health departments.

CFPUA has provided both counties all our Cape Fear River raw and finished (treated) water laboratory sampling results for GenX at the Sweeney Treatment Plan. In addition, we have retained the engineering consultant firm, Black & Veatch, to conduct "Emerging Contaminates Treatment Strategy Piloting" tests of various types of filtration media for GenX and other perfluoroalkyl substances (PFAS). Granular Activated Carbon (GAC) and Ion Exchange Resin column tests have been conducted at the Sweeney Plant since July, and those results captured in three Technical Memorandum reports (enclosures 1, 2, 3) from Black & Veatch have been shared.

CFPUA is also conducting an accelerated column test at Calgon's facility in Pittsburgh. When the results of this study are available, this information will be provided. We anticipate entering into another agreement with Black & Veatch for additional assistance with interpreting test results, further pilot testing of other GAC's and resins, regulatory assistance and preparation of an engineering report. This testing and the final report will be crucial in deciding the future path to filter and treat emerging compounds which are being discovered.

CFPUA has formed a close partnership with University of North Carolina – Wilmington (UNCW) to identify PFAS compounds in the river. Professor Ralph Mead and his team in the Department of Chemistry and Biochemistry, have been conducting sampling testing standards work to identify

compounds and their quantity in the river. We have met with his team several times, and they've provided two monthly summaries of their work (enclosures 4, 5). These reports are also shared with both counties as they become available.

Finally, we've had many discussions with both counties related to this issue. We maintain a united sense of purpose in our mission to provide our customers drinking water of the highest quality.

Please contact me at (910) 332-6558 if you have any questions, or by email at jim.flechtner@cfpua.org.

Sincerely,

James R. Flechtner, P.E.
Executive Director

CC: Linda Miles, CFPUA Consulting Attorney
File

Enclosures (5):
(1) Technical Memorandum 1 Desktop Evaluation of Alternatives – GenX and other PFAS Treatment Options Study
(2) Technical Memorandum 2 Preliminary Report on Prescreened Alternatives – GenX and other PFAS Treatment Options Study
(3) Progress Update - Emerging Contaminants Treatment Strategy Pilot Study
(4) UNCW Study September 2017
(5) UNCW Study for October 2017

FINAL

TECHNICAL MEMORANDUM 1

Desktop Evaluation of Alternatives – GenX and Other PFAS Treatment Options Study

B&V PROJECT NO. 196369



Black & Veatch International Company
Business License F-0794
10715 David Taylor Drive, Suite 240
Charlotte, North Carolina 28269

Prepared for

Cape Fear Public Utility Authority

JULY 2017

BLACK & VEATCH

©Black & Veatch Holding Company 2017. All rights reserved.

Table of Contents

Executive Summary **3**
1.0 Purpose **1-1**
2.0 Introduction **2-1**
2.1 General Introduction 2-1
2.2 Regulatory History 2-1
2.3 Treatment Methods 2-2
2.4 Treatment at the Sweeney WTP 2-2
3.0 Analytical Measurement of PFAS and GenX **3-1**
4.0 Granular Activated Carbon Treatment Option **4-1**
4.1 Introduction 4-1
4.2 Application to PFAS 4-3
4.3 Advantages 4-4
4.4 Limitations 4-5
5.0 Ion Exchange Treatment Option **5-1**
5.1 Introduction 5-1
5.2 Application to PFAS 5-2
5.3 Advantages 5-2
5.4 Limitations 5-2
6.0 Reverse Osmosis or Nanofiltration Treatment Option **6-1**
6.1 Introduction 6-1
6.2 Application to PFAS 6-2
6.3 Advantages 6-3
6.4 Limitations 6-4
7.0 Discussion **7-1**
8.0 Summary/Recommendations **8-1**
9.0 List of Abbreviations **9-1**
10.0 References **10-1**

LIST OF TABLES

Table 2-1 Description of Existing Filters 2-3
Table 2-2 Water Quality of Combined Filter Effluent (2016-2017) 2-3
Table 3-1 Survey of Analytical Laboratories 3-1
Table 7-1 Comparison of Treatment Methods 7-3

LIST OF FIGURES

Figure 3-1 Diagram of Chromatographic Peaking 4-2
Figure 7-1 Process Schematic Showing the Potential Locations of New Options at the Existing Sweeney WTP 7-1
Figure 7-2 Schematic Diagrams of New Options 7-2

Executive Summary

Anthropogenic (human-made) organic chemicals known as perfluoroalkyl substances (PFASs) have been detected in water from the Cape Fear River, which supplies the Sweeney Water Treatment Plant (WTP). These compounds include GenX and several others recently identified by a study performed by Dr. Knappe. PFASs are used in a wide variety of manufactured products. Because of their widespread use, most people have been exposed to PFASs. PFASs have been found in many types of waters worldwide.

Neither the Environmental Protection Agency (EPA) nor the North Carolina Department of Environmental Quality (NC DEQ) has set enforceable maximum contaminant levels (MCLs) for GenX or other PFASs. Because of concern over potential health effects associated with these compounds in drinking water, Cape Fear Public Utility Authority (CFPUA) is proactively considering the feasibility and effectiveness of treatment alternatives. CFPUA is one of the first utilities within the United States to pursue enhanced treatment that targets removal of these compounds.

The following list summarizes the main findings of this technical memorandum, which presents a preliminary evaluation of the technical feasibility of water treatment methods:

- Conventional water treatment methods, such as coagulation, clarification, and granular media filtration, are not effective at removing PFASs, including GenX, as shown in a major research study of 15 full-scale WTPs.
- Various studies have shown that granular activated carbon (GAC) media, ion exchange (IX), and reverse osmosis or nanofiltration (RO/NF) are effective at removing PFASs, but the available results are limited, and almost no information specifically addresses GenX.
- For GAC, two options are available: 1A, installing new GAC media in the existing filters, and 1B, locating new GAC contactors, consisting of basins similar to the existing filter boxes, downstream from the existing filters. Both Option 2, installing new anionic IX exchangers, and Option 3, RO/NF, would also be located downstream of the existing filters.
- Option 1A, installing new GAC in the existing filters, would be the lowest initial cost option with the shortest implementation time, however, operating costs would be directly influenced by replacement frequency, which is currently unknown. New GAC media would cost $1 million to $2 million per replacement event.
- To provide an improved basis for decision-making, site-specific testing of these processes (GAC, IX, and RO/NF) is recommended to refine the understanding of design and operational parameters that would affect feasibility and cost.
- Since the lowest initial cost option would be Option 1A, one logical approach would be to conduct GAC media testing on water with Sweeney WTP concentrations to consider the viability of this option before a larger testing program is started.
- As a parallel path activity while testing proceeds, it is recommended that planning-level cost opinions be developed for the lowest and highest cost options, Option 1A and Option 3. The development of the cost opinions would be based on preliminary assumptions that could subsequently be revised when site-specific test results are available.

1.0 Purpose

This document presents a preliminary evaluation of the technical feasibility of several water treatment methods that have been proposed for removal of the anthropogenic (human-made) organic chemical known as GenX and other compounds recently identified. This contaminant, GenX, has only recently been identified as a concern within the field of drinking water treatment, and limited treatment information is available. This evaluation is based on engineering assumptions and extrapolations that could be confirmed by subsequent bench-scale and/or pilot-scale testing before full-scale implementation.

2.0 Introduction

2.1 GENERAL INTRODUCTION

There is a group of organic chemical compounds, collectively referred to as perfluoroalkyl substances (PFASs), also sometimes called perfluorinated compounds (PFCs). The term PFAS is used in this memorandum. Various PFASs have been used in a wide variety of manufactured products, such as firefighting foams, carpets, clothing, cosmetics, food packaging, and cookware. Because of their widespread use, most people have been exposed to PFASs. PFASs have been found in many types of waters worldwide. As shown in the recent literature review by Dickenson and Higgins (2016), this includes the United States, Germany, Canada, South Korea, China, Brazil, United Kingdom, France, Italy, and Spain. As an indication of how widespread these compounds are, a study by Houde et al. (2006) observed the presence of PFASs in the blood of animals in remote areas in the arctic.

Lists of compounds that make up PFASs, as well as information on molecular weight and chemical formula, can be found in various references (including Dickenson and Higgins 2016; Sun et al. 2016; and Water Research Foundation 2016). One specific type of PFAS of special interest to CFPUA, which is known by the trade name GenX, was detected by Sun et al. (2016) in the Cape Fear River at an average concentration of 631 nanogram per liter (ng/L).

GenX is used as a processing aid for the production of fluoropolymer materials. It is the ammonium salt of perfluoro-2-propoxypropanoic acid (PFPrOPrA), according to Heydebreck et al. (2015). PFPrOPrA has the chemical formula $C_6HF_{11}O_3$, a molecular weight of 330 Dalton, and Chemical Abstracts Service (CAS) Registry No. 13252-13-6. According to *The News Journal*, June 27, 2017 (Mordock 2017), Chemours, a company that had been discharging wastewater containing GenX from its Fayetteville, North Carolina, facility to the Cape Fear River about 100 miles upstream from Wilmington, North Carolina, announced that it had temporarily stopped discharging wastewater containing GenX while determining how to address the issue. On June 27, 2017, the North Carolina Department of Environmental Quality (NC DEQ) confirmed that Chemours had stopped discharging GenX wastewater to the Cape Fear River (https://deq.nc.gov/deq-verifies-chemours-has-stopped-discharging-genx-wastewater). Even if the GenX discharge is not restarted, it is anticipated that concentrations of a stable chemical such as GenX may remain in the river for a period of time. It appears that Chemours may be continuing to discharge wastewaters containing other PFAS compounds; information to revise that possibility has not been found.

2.2 REGULATORY HISTORY

Allowable concentrations of PFASs in drinking water is a relatively new topic being considered by the United States Environmental Protection Agency (EPA). The EPA has not issued any regulations regarding PFASs in drinking water, and there are therefore no enforceable maximum contaminant levels (MCLs) for PFASs. However, in 2009, on the basis of the limited health effects information available at that time, the EPA published provisional health advisories for two PFAS compounds: perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). For reference, the formula for PFOA is $C_7F_{15}COOH$, and it has a molecular weight of 414 Daltons, and PFOS is $C_8F_{17}SO_3H$, and it has a molecular weight of 500 Daltons. In May 2016, the EPA issued revised health advisories for PFOA and PFOS of 70 ng/L, measured either individually or in combination (EPA 2016). The EPA develops health advisories to provide information on contaminants that it believes may cause human health effects and are known or anticipated to occur in drinking water. These health advisories are "non-enforceable and non-regulatory and provide technical information to states

agencies and other public health officials" (EPA 2016). There are currently no EPA regulations or health advisories regarding GenX. Although there are no enforceable MCLs for GenX or other PFASs, the Cape Fear Public Utility Authority (CFPUA) is proactively considering the feasibility and effectiveness of treatment alternatives because of concern over potential adverse health effects associated with the presence of these compounds in drinking water.

2.3 TREATMENT METHODS

A major goal of Water Research Foundation Project 4322 (Dickenson and Higgins 2016) was to evaluate removal of PFASs at 15 full-scale water treatment systems throughout the United States, including two potable reuse treatment systems. This study found that conventional water treatment methods, including aeration, chlorination, chloramination, chlorine dioxide, coagulation, flocculation, anthracite media filtration, microfiltration or ultrafiltration, ozonation, permanganate addition, sedimentation, softening (caustic softening followed by solids contact clarification), and ultraviolet (UV) light, were not effective at removing PFASs. In addition, the literature review showed that other researchers have confirmed that these treatment processes provide essentially no removal of PFASs.

Dickenson and Higgins (2016) conducted bench-scale testing of granular activated carbon (GAC) and nanofiltration (NF), as well as observation of a certain type of ion exchange (IX) resin and full-scale reverse osmosis (RO), noting that each of these methods provided varying levels of removal of PFASs. Therefore, these treatment methods (GAC, IX, and RO/NF) are considered in this memorandum.

2.4 TREATMENT AT THE SWEENEY WTP

The existing Sweeney Water Treatment Plant (WTP), which has a rated capacity of 35 million gallons per day (mgd), applies the following processes: ozonation (pre and intermediate), coagulation, flocculation, clarification, biological filtration using GAC media, disinfection including UV, and chlorination. The granular media filtration consists of (from bottom to top) underdrains and gravel, sand, and GAC. The sand layer is 12 inches deep with an effective size of 0.4 to 0.5 millimeters (mm) and a uniformity coefficient of 1.4. The GAC layer is 48 inches deep. The four older filters (1 through 4) initially used Calgon Filtrasorb 300 (coal-based carbon). The GAC in filters 3 and 4 has been in service since 1997; in 2005 the media was replaced in filters 1 and 2 during maintenance work on the underdrains. The other filters use a similar type of coal-based carbon called VGAC 8x30 SNC that has been in service since 2010 (filters 5 to 9) and 2011 (filters 10 to 15). There are 14 filters, as summarized in Table 2-1. On the basis of current demands, typical operating conditions are 25 mgd on higher flow days and 12 mgd on lower flow days (which equate to loading rates of 2.8 gallons per minute per square foot (gpm/ft^2) and 1.4 gpm/ft^2, respectively). These figures indicate a typical loading rate of 2.5 gpm/ft^2 and an empty bed contact time (EBCT) of approximately 12 minutes in the GAC portion of the filter. Water quality of the combined filter effluent is listed in Table 2-2.

Table 2-1 Description of Existing Filters

PARAMETER	UNIT	VALUE
Number of Filters	Number	14
Cells per Filter	Number	1
Area per Filter	ft^2	435
Dimensions, L x W x D	ft	15 x 29 x 15.58
Hydraulic Loading	gpm/ft^2	4
Capacity Rating, each filter	mgd	2.5

Table 2-2 Water Quality of Combined Filter Effluent (2016-2017)

PARAMETER	UNIT	TYPICAL	MINIMUM	MAXIMUM
Temperature	°C	20.9	10.0	31.0
pH	Standard unit	5.7	4.8	6.4
Turbidity	NTU	0.032	0.01	0.68
Alkalinity	mg/L as $CaCO_3$	8	5	14
TOC	mg/L	2.1	1.7	3.1
UV 254	1/cm	0.019	0.008	0.036
Conductivity	µS/cm	176	162	193

NTU = nephelometric turbidity unit
cm = centimeter
µS/cm = micro-Siemens per centimeter

3.0 Analytical Measurement of PFAS and GenX

It has been determined that here are two commercial analytical laboratories that offer measurement of PFASs, Eurofins and Test America, based on discussions with researchers in the field, however, only Eurofins is currently providing GenX measurements. Information provided by these laboratories on reporting limits, costs, and sample turn-around time is presented in Table 3-1. Regarding PFASs other than GenX, Eurofins provides measurement for 14 compounds and Test America 17. There are also some non-commercial laboratories that measure PFAS concentrations, including Dr. Knappe's laboratory at North Carolina State University (NCSU), EPA, Colorado School of Mines, and the State of Minnesota. Dr. Knappe has said (personal communication) that NCSU and EPA Region 4 can measure GenX as well as other similar perfluorinated ethers.

Table 3-1 Survey of Analytical Laboratories

PARAMETER	EUROFINS	TEST AMERICA
Provides GenX Measurement?	Yes	No
GenX Method	SPE extraction/preconcentration LC Liquid Chromatography, MS Mass Spect	NA
GenX Reporting Limit, ng/L	10	NA
Price per Sample	$350	NA
Turn-around Time, at cited price	10 Business Days	NA
Sample Holding Time	14 Calendar Days or possibly longer since GenX is quite stable	NA
Provides Measurement of Other PFAS?	Yes	Yes
Number of PFASs in Lab's Standard Package	14	17
Other PFAS Method	Method 537	Method 537
Other PFAS Reporting Limit, ng/L	2.0	2.0
Price per Sample	$325	$250 to $300
Turn-around Time, at cited price	10 Business Days	10 Business Days
Sample Holding Time	14 Calendar Days	14 Calendar Days

4.0 Granular Activated Carbon Treatment Option

4.1 INTRODUCTION

Granular activated carbon (GAC) adsorption is a water treatment process that uses a granular media produced from carbon-based materials such as coal, coconut shells, peat, or wood that have been "activated" by heat and sometimes other manufacturing steps to yield the desired properties. There are many types of GAC media, and selection of an effective carbon for a given situation is frequently based on site-specific testing. Water treatment applications include use as a granular media for filtration to remove particulates and turbidity as well as to remove certain dissolved materials, such as organic constituents that can result in color or the formation of disinfection byproducts (DBPs), taste and odor (T&O) causing compounds, or industrial solvents if present in the water. GAC is also sometimes used to dechlorinate water.

GAC is implemented in water treatment in one of two roles: one, as a filter-adsorber, providing both filtration and adsorption functions or, two, as a post-filter contactor in which adsorption is the primary treatment objective. As the adsorptive capacity of the GAC becomes exhausted, microbial growth on the GAC can be used to convert some of the chemicals in the water to cell mass. This is referred to as biofiltration. The GAC filters at the Sweeney plant operate as biofilters.

When applied as a biologically active filter, microbial activity on the GAC causes the removal of some organics. Adsorption of organic materials on the carbon can also occur. Both of these mechanisms can occur simultaneously when the GAC media is new or recently regenerated. In a typical scenario with new GAC media almost all of the organic material that is chemically attracted to the GAC would be removed. As the adsorption "sites" on the GAC are filled, the adsorptive ability of the carbon becomes exhausted, resulting in a "breakthrough" in which the concentration of organic chemicals being removed increases in the effluent from the GAC filter.

Total Organic Carbon (TOC) is a complex mixture of many organic compounds. Some are adsorbed better by GAC than others, and there is often a small fraction, 5 to 10 percent, that is not adsorbed at all. The nonadsorbable fraction passes to the effluent. Some TOC is removed by biodegradation in the GAC bed after the bed's adsorption capacity has been exhausted. Consequently, a typical TOC breakthrough curve comprises three stages:

1. Immediate breakthrough of the nonadsorbable component of TOC (typically 5 to 10 percent of influent TOC).
2. Removal of TOC by adsorption (decreases with time as the adsorption capacity of the GAC is consumed) and varies by chemical.
3. Continued biological removal of a portion of the TOC.

Each type of GAC exhibits a selectivity or preference for some organic species over others. In addition, when breakthrough occurs, a phenomenon called "chromatographic peaking" may take place. When this happens, the GAC releases some types of organic material that were adsorbed previously while removing other types instead (in a sense trading one that it "prefers" for the other). From a practical standpoint, the outcome of that event is that there can be higher concentrations of some organic chemicals in the effluent than in the influent. A simplified diagram to help explain chromatographic peaking is presented on Figure 3-1. The drawing on the left side of the figure shows new GAC media (or new IX resin which also exhibits chromatographic peaking) that is removing all of the "A" and "B" molecules that are present in the influent water. The drawing on the right shows exhausted GAC media (or IX resin), treating the same influent concentrations of

"A" and "B" while the sites attracted to "A" and "B" are full. On the right side the exhausted media/resin is releasing "A" molecules that have already been captured because there is a preference to attract "B" molecules. On the right side the concentration of "A" in the effluent is greater than in the influent because "A" molecules are being released.

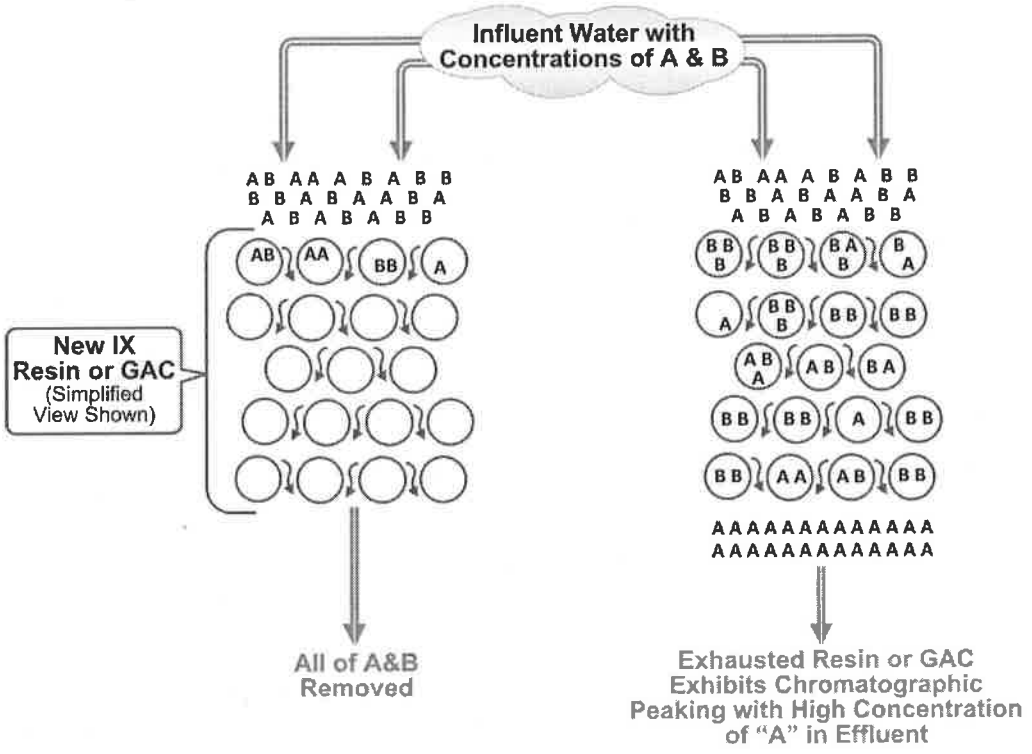


Figure 3-1 Diagram of Chromatographic Peaking

Because of the biological removal mechanism, even after the adsorptive capacity of the GAC is exhausted, a portion of the TOC concentration in the water is removed, essentially consumed, by microbes. In many surface water supplies, typically about 10 to 20 percent of the TOC is biodegradable and removed in this way. When the adsorption ability of a GAC bed is exhausted the media needs to be regenerated or replaced to continue to remove organics by adsorption. Preliminary discussions with GAC providers, in regard to the GenX application being considered in this document, indicate that the spent GAC would be shipped off-site for regeneration and replaced with new or regenerated carbon.

Key parameters that affect the design, operation, and costs of applying GAC include loading rate (LR), EBCT, and number of bed volumes (BVs) to breakthrough.

LR is the flow rate per cross-sectional area and, in the United States, that value is typically presented in gpm/ft^2. Even with clean filters, as LR increases, the pressure drop across the filter also increases. When applied to filter/adsorbers, LR is an additionally important variable. In that service, the filter media removes particles from the water. As the filter gets fouled (or plugged) with accumulated particles, the filters are periodically backwashed by the plant staff to remove the captured particles and maintain the pressure drop within a desired range.

EBCT is the amount of time, typically measured in minutes, that the water is in contact with the media with the assumption of an empty bed to facilitate comparison of different media on a common basis. Sufficient EBCT is needed to allow enough time for the chemicals being removed to transfer to the GAC. If EBCT is too short, removal will be inadequate. After LR and EBCT are established, bed height can easily be calculated.

BV is the number of volumes of water that can flow through the GAC before breakthrough occurs. In comparing two different types of GAC, the product that treats the higher number of BVs before breakthrough of the target compound would require less frequent replacement or regeneration. If the number of BVs treated is low, and hence the replacement frequency is high, other treatment methods may be more cost-effective. Each new set of GAC installed in the existing filters would cost $1 million to $2 million, according to discussions with carbon suppliers.

4.2 APPLICATION TO PFAS

Experience with removing PFASs with GAC is summarized in this section.

A key study that included application of GAC to remove PFASs was conducted by Dickenson and Higgins (2016). Their literature review concluded that few studies have been published on the effectiveness of PFAS removal methods, citing Quinones and Snyder (2009); Post et al. (2009); Takagi et al. (2008); Eschauzier et al. (2012). Some batch test studies on PFAS removal by GAC have been published by Deng et al. (2010); Yu et al. (2009); Senevirathan et al. (2010); Lampert et al. (2007) on removal of PFOS and PFOA as well as by Carter et al. (2010) on removal of perfluorobutane sulfonate (PFBS). These studies showed the effectiveness of GAC at removing certain types of PFAS compounds but did not include GenX.

Dickenson and Higgins (2016) evaluated GAC performance for removing PFAS at four full-scale facilities (Utilities 7, 8, 18, and 20). The PFAS concentrations at Utility 8 were too low, so that part of the study was discontinued. Utility 20 applied Calgon F600 (coal-based carbon) in a lead-lag arrangement with about 13 minutes of EBCT in each contactor, which equates to about 10,000 BV every 3 months. The authors reported that Utility 20 operated its lead contactors for approximately 10 months before initial breakthrough of evaluated PFAS. With effluent from the lead contactor feeding the lag contactor, concentrations in the lag effluent for all except one type of PFAS in the study were maintained below detection limits for the 1 year period studied. Utility 18 applied Calgon F300 (coal-based carbon) for surface water treatment. The carbon had already been in service for more than 6 years at the time of the study, and it was observed that effluent concentrations for some PFASs were higher than influent concentrations, so it is possible that leaching and/or chromatographic peaking occurred. Another study (Takagi 2011) was cited as observing a similar case where fresh carbon was initially effective at PFAS removal but was not effective 1 year later. Utility 7 applied Norit GAC300 (coal-based carbon) with EBCT of about 10 minutes and observed removal of many types of PFASs to below detection limits, while three shorter chain PFASs (which were described as perfluorobutanoic acid [PFBA], perfluoropentanoic acid [PFPeA], and perfluorohexanoic acid [PFHxA]) exhibited partial removal at 33 percent, 74 percent, and 91 percent, respectively.

Dickenson and Higgins (2016) conducted a type of bench-scale testing known as rapid small-scale column tests (RSSCTs) on three types of GAC: Calgon F300 (coal-based with Iodine No. 900 I2/g), Calgon F600 (Iodine No. 850 I2/g), and Siemens (now Evoqua) 1240C (coconut-based). RSSCT results for F300 while treating spiked deionized water, exhibited initial breakthrough of some PFASs at about 30,000 BV, while other effluent concentrations did not exceed 2 percent of the influent values after 98,000 to 125,000 BV. There was some indication that smaller chain PFASs had

earlier breakthroughs, and a "general chain length dependent pattern was observed, but it did not hold true for all of the PFCAs (PFAS compounds studied)"; therefore, it is difficult to extrapolate the anticipated level of GenX removal at this time. Additional RSSCT results from tests of GAC treating a spiked creek water with a background dissolved organic carbon concentration of 1.7 mg/L yielded lower numbers of BVs to breakthrough. When applied to the creek water, all three GACs had a breakthrough of greater than 20 percent for all PFASs studied within about 11,000 BV, indicating that the presence of the background natural organic matter (NOM) competed for sites on the carbon and shortened the number of BVs. Higher concentrations in the effluent than in the influent were also observed for some of the compounds. In general, F300 provided more BVs, with about 26,000 BVs for PFOA compared to 11,000 BVs for F600 and 1240C.

Dr. Higgins, a professor at the Colorado School of Mines, and a colleague, C. Bellona, are conducting ongoing related work on removal of PFASs by GAC (personal communication). Comparing F400 and F600 from Calgon, N400 from Cabot/Norit, and a coconut-based GAC from Cabot/Norit (GCN 1240) at an LR of 2.5 gpm/ft^2 and an EBCT of approximately 11 minutes, F400 and N400 had the best performance over a 5 month pilot period. Additional testing of F400 and N400 is being planned. In their trials, F400 and N400 have so far provided in excess of 17,000 BVs without breakthrough of the PFASs of interest while treating a groundwater that included about 1.5 mg/L of background TOC. While it would be difficult to directly extrapolate the number of BVs for a surface water case such as Sweeney's, these results indicate that these types of GAC show promise in this application.

Redding (2017) showed about 30,000 and 60,000 BVs to breakthrough for PFOA and PFOS, when treating a groundwater at about 10 minutes of EBCT with influent concentrations of 67 and 49 ng/L, respectively, and 0.3 mg/L of background TOC; better performance (about 40 percent more BVs) was observed with an enhanced coconut-based carbon (1230 CX) than with a coal-based carbon (12 x 40 reagglomerated bituminous).

While none of these studies specifically focused on GenX, they show that GAC is effective at removing PFAS compounds. Studies could be conducted to quantify BV to breakthrough for the more promising GACs, including the effects of having other organics present to compete for adsorption sites, and possibly result in chromatographic peaking, at Sweeney plant conditions.

The literature review of Sun et al. (2016) discusses other studies that have shown that powdered activated carbon (PAC), a more finely powdered version of GAC, is effective at removing various PFASs, but the effectiveness decreases with chain length. However, Sun et al. (2016) indicate, "It is unclear, however, how the presence of ether group(s) [such as occurs in GenX] impacts adsorbability." The comparative testing indicated a lower removal percentage for GenX than for PFOA. For reference, GenX has a molecular weight of 330 Daltons, comprising $C_6HF_{11}O_3$, including one ether group and five perfluorinated carbons. PFOA has a molecular weight of 414 Daltons, comprising $C_8HF_{15}O_2$, including no ether groups and seven perfluorinated carbons. In the authors' view, this is the only published paper to consider removal of GenX or similar PFASs that includes an ether-based backbone by water treatment processes. The authors conclude that carbon provides some removal of GenX and similar PFASs, but that these compounds are difficult to remove. The paper suggests a need for "broader discharge control and contaminant monitoring."

4.3 ADVANTAGES

Advantages of the GAC option are as follows:

1. Essentially no capital costs or additional land (space) would be required if the option proves to be sufficiently effective when installed in existing filter boxes. Pilot-scale testing is being considered to verify that hypothesis.
2. The Sweeney WTP staff is experienced with and understands operation of the GAC filters.
3. This option has the shortest implementation time since new facilities would not be needed.
4. This option has the lowest requirements for additional labor or maintenance.
5. The option would be less energy intensive than RO/NF and would require roughly the same energy usage as for IX.
6. The option does not generate a liquid waste stream on-site. (RO/NF has that as a limitation. GAC and IX do not.)
7. The effectiveness of different types of GAC can be compared on site-specific feedwater in accelerated bench testing, which is being considered. (Accelerated testing is not practical for IX or RO/NF except for measuring RO/NF rejection.)
8. For GAC, there would be no need to increase the capacity rating (i.e., loading rate) of the existing filters or add more filters. (RO/NF has that as a limitation.)
9. All of these options have the advantage of having been applied in a wide range of WTPs, albeit for different applications than GenX removal.

4.4 LIMITATIONS

Limitations of the GAC option are as follows:

1. Performance characteristics on removing GenX and other PFASs at site-specific conditions are unknown. Testing/piloting is advised. (All of the options have this limitation.)
2. The media would require periodic replacement when exhausted. Testing/piloting is being considered to quantify the frequency of media replacement, which could be multiple times a year. (The GAC and IX options have this limitation. RO/NF membrane elements are generally replaced about every 7 years.)
3. This option is potentially susceptible to chromatographic peaking. Testing/piloting is advised to refine understanding. (The GAC and IX options have this limitation.)
4. Selectivity could limit removal of other PFASs even if the option is effective on GenX. (The GAC and IX options have this limitation. RO/NF could also exhibit selectivity but is anticipated to be less selective than GAC or IX [subject to confirmation]).

5.0 Ion Exchange Treatment Option

5.1 INTRODUCTION

Ion exchange (IX) is a water treatment process that applies the use of spherical polymeric particles that are sometimes called ion exchange resin or, less formally, "beads." IX resins are manufactured for a variety of applications. One of the most widely known examples of IX is in home water softeners. In that application, as water flows through a softener tank containing IX beads, calcium and magnesium ions, which are the source of hardness in the water, are attracted to the resin and exchanged for sodium ions. The resulting effluent has a lower hardness and an increased concentration of sodium. When most of the exchange sites are filled with calcium and magnesium, the water softening resin becomes less effective at removing them, the concentration in the effluent for those ions increases and, similar to the GAC process previously discussed, breakthrough occurs.

In a home water softener, a salt solution, generally a sodium chloride solution, is applied to regenerate the resin by converting the calcium and magnesium-filled sites back to sodium-filled sites, and after regeneration, it is placed back into softening mode. Because the calcium and sodium ions that are exchanged in this process are positively charged ions, which are also called cations, this type of IX is sometimes called cationic IX. There are other types that remove certain negatively charged species, which are called anions, so that type of IX is sometimes called anionic IX (sometimes abbreviated AIX).

Various types of IX are used in water treatment. Some full-scale WTPs use the same type of resin as home water softeners to soften water on a larger scale. Some WTPs employ other types of IX such as for nitrate or arsenic removal. Resin manufacturers offer types of anionic IX to remove certain organic materials, such as PFASs.

It should be noted that the type of resin used in a home water softener is not expected to remove GenX. The types of resins used in softeners are very different from the AIX resins that have been developed to remove PFASs. A basic chemical difference between them is that IX softeners remove certain cations from water, while the resins for PFAS treatment remove certain anions. Another difference between the IX resins used for water softening and the types developed for PFAS removal is regeneration. While softening resin is generally regenerated on-site, for PFASs removal, the resin would be returned to the manufacturer for disposal, probably by thermal destruction according to discussions with the manufacturers.

There are similarities between GAC and IX. Both processes apply media in vessels or tanks to remove certain dissolved materials from water. As previously discussed, GAC is sometimes also used to filter particulates and turbidity from water, but IX is essentially only applied to removing dissolved material. Another difference is that one of the removal mechanisms for GAC is to function as a biologically active filter that removes a portion of the TOC biologically, but IX is not applied with that mechanism. Another similarity is that, for both processes, the adsorption or exchange sites are periodically filled, resulting in breakthrough and requiring replacement or regeneration. In addition, as with GAC, IX does not remove all dissolved material equally, and the phenomenon of chromatographic peaking can result in higher effluent than influent concentrations as breakthrough occurs. For some extensively studied applications such as water softening, an IX system can be designed according to water analysis data without site-specific testing, but less is known about PFAS applications, so testing may be advised.

Another way that IX is similar to GAC is that the major parameters that impact the design, operations, and costs are the same: LR, EBCT, and number of BVs to breakthrough. The values would be different, but the concepts would be similar. A reason to consider IX as an option to GAC in this study is that a preliminary survey of the options indicates that there are IX resins that may remove PFASs to low concentrations with a higher LR and lower EBCT than GAC, which could make the process more compact and possibly more cost-effective.

5.2 APPLICATION TO PFAS

While anionic IX shows promise for removal of PFASs, the available information is quite limited. In their literature review Dickenson and Higgins (2016) summarize five studies that indicate successful removal with various resins in fairly limited testing. It would be difficult and theoretical to extrapolate from these studies to the Cape Fear River water quality. Two manufacturers of IX systems (Calgon and Evoqua applying Dow PSR2 resin) have indicated that, in their experience, the resins remove PFASs with less EBCT than GAC (for example about 2 minutes versus about 10 minutes). If a cost comparison were made between a new GAC system located downstream from the existing filtration versus a new IX system located downstream from the existing filtration, the shorter EBCT for IX would significantly reduce the size and the land area used; in that case, IX would likely result in lower cost. However, it is less clear that the costs for IX would be lower than GAC if it can be shown that installing new GAC media into the existing filter boxes would address the treatment goals. Therefore, it may be advisable to conduct some initial testing of at least one IX resin selected from the more promising types to develop operating parameters (EBCT, BV, etc.) for a comparison of IX and GAC. Unlike for GAC, there is no accepted rapid or accelerated test method for IX. Testing/piloting would be conducted in real time.

5.3 ADVANTAGES

Advantages of the IX option are as follows:

1. IX probably has a higher LR and shorter EBCT than GAC (subject to confirmation). If so, IX may be less costly than GAC if both options were to be located downstream from existing filters.
2. The option is less energy intensive than RO/NF and roughly the same energy usage as GAC.
3. The option does not generate a liquid waste stream on-site. (RO/NF has that as a limitation. GAC and IX do not.)
4. For IX, there would be no need to increase the capacity rating (i.e., loading rate) of the existing filters or add more filters. (RO/NF has that as a limitation.)
5. All of these options have the advantage of having been applied in a wide range of WTPs, albeit for different applications than this.

5.4 LIMITATIONS

Limitations of the IX option are as follows:

1. IX would have higher capital costs and land (space) requirements than installing GAC in existing filter boxes.
2. Accelerated testing is not practical for IX or RO/NF except for measuring RO/NF rejection. (GAC does not have that limitation.)

3. Performance characteristics on removing GenX and other PFASs at site-specific conditions are unknown. Testing/piloting is advised. (All of the options have this limitation.)
4. The media would require periodic replacement when exhausted. Testing/piloting is being considered to quantify the frequency of media replacement, which could be multiple times a year. (The GAC and IX options have this limitation. RO/NF membrane elements are generally replaced about every 7 years.)
5. The option is potentially susceptible to chromatographic peaking. Testing/piloting is advised to refine understanding. (The GAC and IX options have this limitation.)
6. Selectivity could limit removal of other PFASs even if the option is effective on GenX. (The GAC and IX options have this limitation. RO/NF could also exhibit selectivity but is anticipated to be less selective than GAC or IX.)

6.0 Reverse Osmosis or Nanofiltration Treatment Option

6.1 INTRODUCTION

Reverse osmosis (RO) and the associated nanofiltration (NF) process are membrane-based water treatment processes in which a relatively thin (1,000 Angstrom, which is equal to 0.0001 mm) and semi-permeable manufactured barrier removes dissolved materials from water. While the RO/NF process also removes particulate materials from water, it is a misapplication to use it for this purpose because particulates foul the membrane in ways that cause damage, increasing costs and shortening service life, and can result in significant reduction in plant capacity. Therefore, feedwater to RO/NF is pre-filtered including protective cartridge filtration, typically down to about the 5 micron (0.005 mm) level.

RO/NF processes are commonly applied in WTPs with applications ranging from desalination; removal of Total Dissolved Solids (TDS), sodium, chloride, etc.; softening; color removal; organics removal; and specialized applications such as removing nitrate or arsenic. For instance, CFPUA's WTP in New Hanover County applies NF to treat groundwater to remove organic materials that form DBPs when the water is chlorinated as well as softening the water at the same time.

There are some small differences between RO and NF. RO exhibits higher rejection of dissolved materials with less selectivity than NF. For example, RO might tend to provide 98 percent (nominal) rejection of both divalent and monovalent ions (such as sulfate and chloride, respectively), while NF might yield 95 percent rejection of sulfate and only 60 percent rejection of chloride. Since RO provides very high rejections for both types, it is said to exhibit little selectivity. On the other hand, for NF there is sufficient selectivity that it is difficult to generalize regarding the rejection percentages. NF rejection of inorganic solutes varies with ionic strength of the feed solution, the relative concentrations of individual ions, and sometimes as a function of pH.

For this study, the focus is on the removal of PFASs and, more specifically, on GenX. More detailed discussion on experience with RO/NF rejection of PFASs is presented in the following section. Another difference between RO and NF is that NF membrane tends to be productive at lower pressure than RO; however, in the past decade, the difference between operating pressures has been greatly reduced as newer membrane products have become available.

RO/NF membranes, as currently applied in municipal-scale water treatment projects, are manufactured in a flat sheet form that looks like a large roll of shiny white paper but is actually composed of thin layers of specially engineered plastics. The flat sheet membrane is packaged into cylindrically shaped spiral-wound filter elements that for full-scale projects are typically about 8 inches in diameter by 40 inches long. There are also smaller home-sized RO/NF elements that are about 2 inches in diameter by 12 inches long.

Home RO units generally have one element mounted in a single pressure vessel, installed under a sink, and are operated on the available pressure from the community's distribution system. On full-scale systems, multiple elements are mounted inside each pressure vessel, and many pressure vessels are included in each train. Unlike home systems, pumping is used in full-scale facilities to provide the driving pressure, and antiscalant chemicals are added to the feedwater to allow as much water recovery as possible (to minimize the waste discharge flow) without allowing precipitation to occur that could damage the membrane. Periodically, the operators conduct cleaning cycles to maintain capacity at as low an energy consumption as possible.

While many water treatment processes have an influent and an effluent, RO and NF have three process streams flowing while in operation: the influent (which is called the feed) and two effluent streams, the permeate (which is the purified water) and the concentrate (which is the concentrated wastewater). RO/NF are so effective at removing dissolved materials that frequently only a portion of the finished water is made up of permeate, and the rest is bypassed around the RO/NF. However, a preliminary evaluation of the GenX application indicates that 100 percent of the finished water would likely have to be permeate.

Depending on the concentrations and treatment goals, it is even possible that a second pass of RO would be needed to sufficiently remove GenX. In that case, this application of RO/NF would be more like seawater desalination facilities, where at least one 100 percent first pass is applied, and in some cases, a second pass or a partial second pass is also applied. In addition, many seawater RO facilities need and practice post-treatment to add some hardness, alkalinity, and sometimes other constituents back into the permeate water before distribution to make the water noncorrosive; it is highly likely that would also be needed in this case.

Major variables to consider with RO/NF are parameters called rejection, recovery, operating pressure, and flux. Rejection describes the percent of a given component in the feed that is not passed to the permeate. For example, if there is 97 percent rejection of sodium and a concentration of 100 mg/L in the feed, the permeate concentration would be 3 mg/L. Recovery is the percent of feedwater that becomes permeate. The goal is to maximize the recovery to minimize the flow rate of concentrate to waste, but a high value cannot be arbitrarily selected. Recovery is determined after careful calculations considering the site-specific maximum concentration that can be achieved without precipitation occurring inside the RO/NF system. Operating pressure is generally calculated according to the water chemistry and temperature as well as certain aspects of the selected membrane and the system design.

Flux is an important parameter that is determined by past experience with RO/NF, frequently augmented by some site-specific testing, especially for surface water applications such as this one. Flux is the RO/NF equivalent of hydraulic loading rate. With GAC and conventional granular media filters, the loading rate is typically the filtered water flow rate in gpm divided by the cross-sectional area of the filter in ft^2. For RO/NF, the flux is the permeate flow rate in gpd divided by the membrane area in ft^2. The unit of measurement for flux, gpd/ft^2, is typically abbreviated as gfd. As with recovery, the value for flux cannot be arbitrarily selected. If the flux is set too high for a given application, excessive and costly fouling and operational problems will occur at the facility. In the more extreme cases of high flux, the capacity of the facility has to be lowered to yield stable performance.

6.2 APPLICATION TO PFAS

Experience with removing PFASs with RO/NF is summarized in this section.

Steinle-Darling and Reinhard (2008) measured rejection of various PFASs, but not GenX, by four different NF membranes in a small flat sheet test device. Testing was primarily conducted with Dow/FilmTec NF270 with some experiments also performed with Dow/FilmTec 200 or the GE/Osmonics DK or DL membranes. It should be noted that these are piperazine-based polyamide membranes, which are somewhat different from the polyamide type chemistry used in the more widely applied RO and NF membranes. In addition, these tests were conducted on a small flat sheet device, which tends to yield higher rejection values than full-scale two- or three-stage systems with spiral-wound elements that are operated at higher recovery, so the concentration on the feed-concentrate side is higher. Summarizing the results, many PFASs with a molecular weight above

300 Daltons had at least 95 percent rejection. Charge on the solutes and operating pH had an impact for some compounds. For example, one solute with a molecular weight of 499 Daltons that was uncharged at the operating pH, exhibited lower rejection, as low as 42 percent with one of the tested membranes. Sorption of some compounds was also observed on the membrane, and, because this could lead to misleading results, future testing should address that issue. Ionic strength had little impact on rejection of PFASs, which was shown by adding 2,500 mg/L of sodium chloride to the feed solution, and, which resulted in less than a 1 percent change in rejection. Fouling impacted rejection; average rejections for clean membrane were 99 percent but were only 95 percent for fouled membrane.

The literature review by Dickenson and Higgins (2016) described the work by Steinle-Darling and Reinhard (2008), which is discussed above, and Tang et al. (2006) who observed greater than 99 percent removal of PFASs (in that case PFOS) with four different types of RO membrane.

Dickenson and Higgins (2016) also conducted trials with Dow/FilmTec NF270 membrane. They used flat sheet test cells, such as those used by Steinle-Darling and Reinhard (2008), but with modifications to address certain issues. For example, they used a larger feed volume with once-through flow, rather than recycle, and two test cells in series to provide experimental duplication. For all of the PFASs included in this study, rejection exceeded 93 percent and mostly exceeded 95 percent. Dickenson and Higgins compared clean to fouled membrane and did not observe lower rejection with fouled membrane; in some sampling events, the rejection increased with fouling.

Dickenson and Higgins (2016) also evaluated performance at two full-scale potable reuse facilities using RO, one with Hydranautics ESPA2 spiral-wound elements arranged in a three-stage array operated at a flux of 12 gfd and 85 percent recovery and the other with Toray and Hydranautics spiral-wound elements at a flux of 11.6 to 11.9 gfd and 80 percent recovery. All PFASs were below detection in the RO permeate samples. Concentrations in the influent of some PFASs as high as 370 ng/L and RO permeate concentrations of less than 0.5 ng/L were reported in the appendix indicating better than 99 percent rejection.

One of the largest RO/NF membrane manufacturers, Toray (personal communication) reported that testing with a PFAS that is similar to GenX (which they described as being PFHxA with the following formula, $C_6HF_{11}O_2$) resulted in RO rejection normally higher than 94 percent but lower at lower pH values (which were not quantified), and NF with a rejection of about 70 percent.

6.3 ADVANTAGES

Advantages of the RO/NF option are as follows:

1. RO/NF probably (subject to confirmation) removes the widest range of PFAS chemicals with the least selectivity and without chromatographic peaking.
2. CFPUA has experience operating NF at another facility.
3. All of these options have the advantage of having been applied in a wide range of WTPs, albeit for different applications than this.

6.4 LIMITATIONS

Limitations of the RO/NF option are as follows:

1. RO/NF may have (subject to confirmation) the highest capital costs and greatest land (space) requirements of these options.
2. To maintain the existing WTP's rated capacity, using the RO/NF option would require an increase to the regulator-approved loading rate of the existing filters or the addition of more filters.
3. Additional treatment might be needed to sufficiently treat the water to avoid RO/NF fouling; however, the existing WTP's relatively low filtered water turbidity indicates this may not be needed (subject to confirmation).
4. Performance characteristics on removing GenX and other PFASs at site-specific conditions are unknown. Testing/piloting is advised. (All of the options have this limitation.)
5. RO/NF continually generates a liquid waste stream requiring disposal. This could be a major and potentially costly issue if direct discharge is not allowed.
6. RO/NF is energy intensive (would have the highest energy consumption).
7. RO/NF removes such a wide range of solutes from the water that post-treatment of the finished water would be needed to add certain minerals back into the water to prevent corrosion in the distribution system and customers' homes. This step would be necessary to prevent problems such as "red" water or elevated levels of lead and/or copper.
8. Depending on the influent concentrations, effluent goals, and rejection performance, RO/NF may need a second pass or a partial second pass, which would further increase costs.
9. During testing/piloting of RO/NF, it is recommended that measurements include concentrations of targeted organic chemicals (e.g., GenX and other PFASs) in feed and concentrate as well as permeate to allow mass balance calculations to verify that rejection is providing all of the observed removal, not a shorter term adsorption mechanism. Without that information, the projection of long-term performance could be misleading.

7.0 Discussion

The location for each of the options within the Sweeney WTP's process schematic is shown on Figure 7-1. Two locations for suboptions are shown for GAC: (1A) with new GAC media installed in the existing filter-adsorber boxes and (1B) with the GAC installed in new contactors that would treat effluent from the existing filter boxes. Both of the other options (Option 2, IX, and Option 3, RO/NF) would treat effluent from the existing filter boxes. The location shown on the figure (for Options 1B, 2, and 3) is immediately following the existing filters, but the treatment would be just as effective if it were located downstream from the existing UV units. Selection of the location could be made during a subsequent design phase according to plant hydraulic and space issues. The post-filtration options include the assumption that the filters provide sufficient pretreatment, which can be confirmed in site-specific testing.

Schematic diagrams of the options are shown on Figure 7-2.

Of the two GAC options, 1A would be the lower cost option if suitable operating conditions and performance with a sufficient number of BV before change-out can be determined for GAC installed in the existing filters. In some cases, GAC media is more effective when applied to filtered water only as an adsorber. It is possible when used as both a filter and an adsorber that the service life of the media can be shortened by backwashing cycles. The filter-adsorber needs fairly frequent backwashing to remove accumulated solids material; when the GAC is applied as an adsorber only, backwashing is infrequent. Pilot testing could be conducted to determine the difference in performance (BV to breakthrough) in this case.

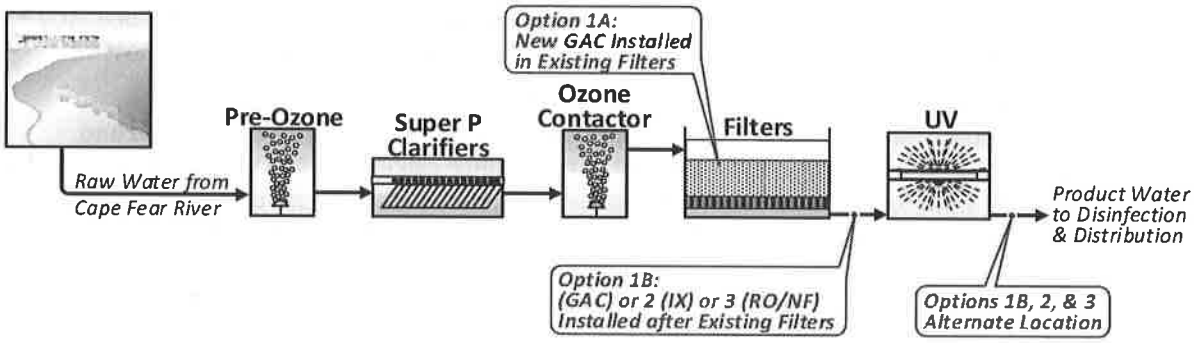


Figure 7-1 **Process Schematic Showing the Potential Locations of New Options at the Existing Sweeney WTP**

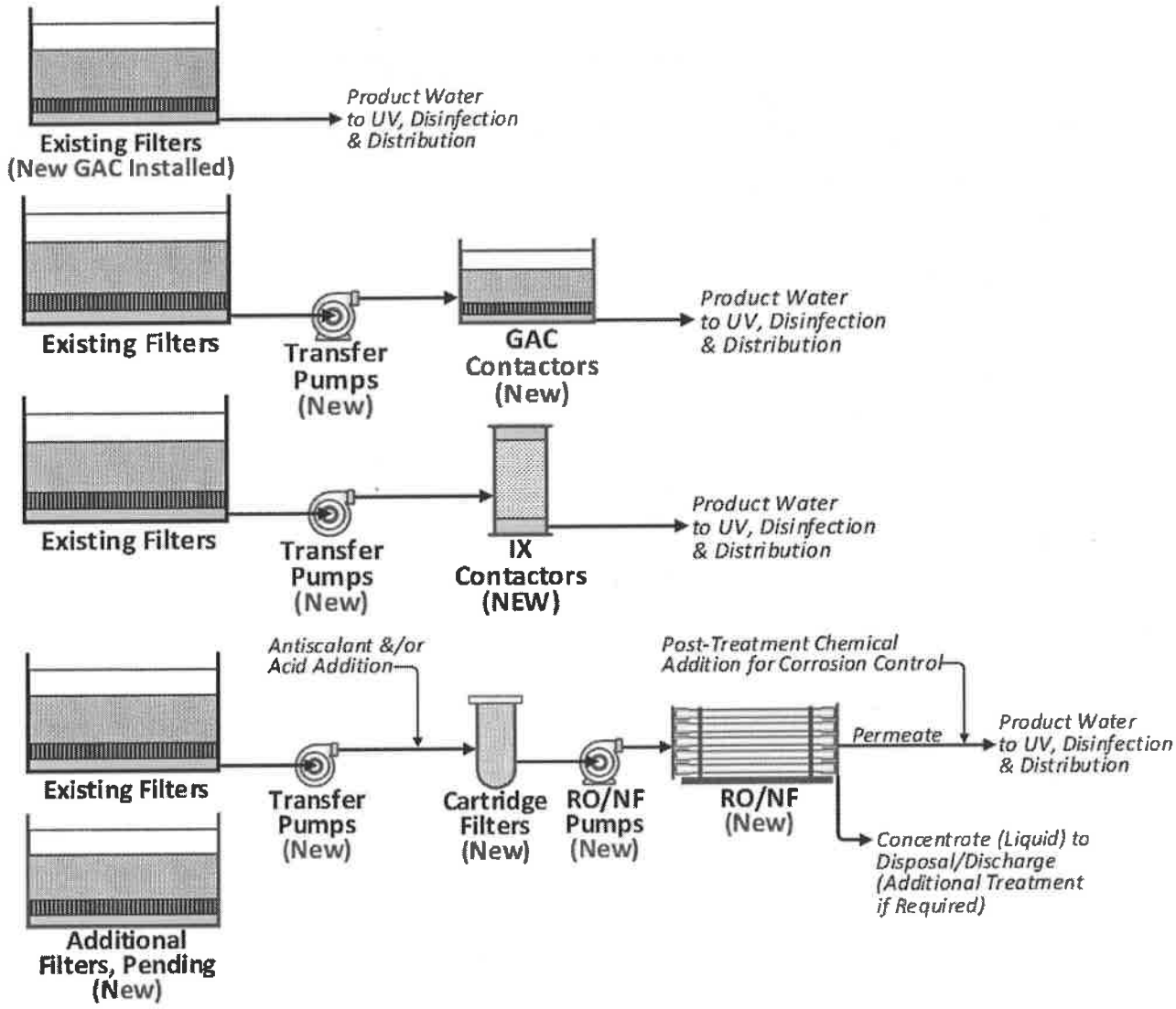


Figure 7-2 Schematic Diagrams of New Options

A comparison of the main features of the treatment methods is summarized in Table 7-1. These rankings incorporate engineering assumptions that are based on the currently available information. It is anticipated that additional information would be collected as the project moves forward.

Table 7-1 Comparison of Treatment Methods (5 is Best)

PARAMETER	GAC IN FILTERS	GAC ADSORBER	IX	RO/NF
OPTION NUMBER	1A	1B	2	3
Known Performance on GenX and other PFAS	0	0	0	0
Potential on GenX and other PFAS	5	5	5	5
Commonly Used for Water Treatment	5	5	5	5
Capital Cost	5	3	3	1
Implementation Time	5	2	2	1
Liquid Waste	5	5	5	1
Energy Use	5	4	4	1
Labor	5	3	3	1
Rerating Existing Filters	5	5	5	1
Selectivity	1	1	1	5
Chromatographic Peaking	1	1	1	5
Operational Understanding	5	5	2	4
Rapid Test Option	5	5	1	1

Notes related to the table are as follows:

- RATINGS – The ratings are comparative and are expressed on a 0 to 5 scale with 5 being the highest, best rating in each category.
- KNOWN PERFORMANCE ON GENX AND OTHER PFAS– All options were rated the same, a low rating, because there is little information available on water treatment methods to remove GenX.
- POTENTIAL ON GENX AND OTHER PFAS – All options were rated the same, a high rating, because the available information available indicates that any of these methods would be effective at removing GenX.
- COMMONLY USED - All options were rated the same, a high rating, because all of these treatment methods are commonly used in drinking water treatment facilities.
- CAPITAL COST – Option 1A is the best in this category because there would be no new capital cost for installing new GAC in the existing filters. However the life cycle costs could be high if the GAC would require frequent replacement. Regarding the other options, adding GAC adsorbers or IX beds (1B and 2) would qualitatively have lower capital costs than RO/NF (3).

- IMPLEMENTATION TIME – Option 1A (replacing the GAC in the existing filters) could be implemented in the shortest amount of time. Regarding the other options, adding GAC adsorbers or IX beds (1B and 2) would take somewhat less time to build and install than RO/NF (3).
- LIQUID WASTE - Neither GAC nor IX would generate significant additional liquid waste and the spent material would be shipped off-site for regeneration or disposal. RO/NF continuously yields a liquid waste stream, the concentrate. Handling and disposal of this stream can be problematic and sometimes costly.
- ENERGY USE - New GAC in the existing filters (1A) would not increase the WTPs energy usage. New post-filtration GAC or IX systems (1B or 2) would require some additional pressure drop. RO/NF is the highest energy user of these options.
- LABOR - Applying GAC in the existing filter boxes would have minimal impact. New facilities for post-filtration GAC or IX systems (1B or 2) would likely require some additional staff. Experience with RO/NF that option would require more additional staff.
- RERATING EXISTING FILTERS – The RO/NF option would require a higher filtered water flow rate and so would need either an increased loading rate on the existing filters or additional (new) filters. Neither GAC or IX options would require an increase in filtered water capacity.
- SELECTIVITY - While site-specific testing would be needed to fully show this, in general RO/NF removes a wider range of compounds. GAC and IX are more selective.
- CHROMATOGRAPHIC PEAKING - Chromatographic peaking can occur with GAC and IX and that has been indicated in similar applications. If it occurs, then during breakthrough some concentrations are higher in the effluent (the treated water) than in the influent. Since the removal mechanism of RO/NF is rejection, not adsorption, then it would not occur with RO/NF. RO/NF can experience increased passage due to leaks in seals but that is repairable.
- OPERATIONAL UNDERSTANDING - GAC scores best in this category because the existing Sweeney WTP uses GAC. The utility has NF at another location and so their operators also have an understanding of that treatment process, but the Sweeney operators do not have day-to-day experience.
- RAPID TEST OPTION - GAC is the only option with an accepted rapid/accelerated testing method, which is called RSSCT.

8.0 Summary/Recommendations

1. A number of perfluorinated compounds have been observed in the Cape Fear River upstream from the intake of the Sweeney WTP. Researchers measured average GenX concentrations of 631 ng/L. GenX is one of a group of organic chemicals that are referred to as PFASs, which are used in a wide variety of manufactured products.

2. Neither the EPA nor NC DEQ have set enforceable MCLs for GenX or other PFASs. Because of concern over potential adverse health effects associated with the presence of these compounds in drinking water, CFPUA is proactively considering the feasibility and effectiveness of treatment alternatives.

3. Chemours, a company that had been discharging wastewater containing GenX and PFAS into the Cape Fear River announced in late June 2017 that it had stopped discharging wastewater containing GenX while determining how to address the issue. Even if GenX discharge is not restarted, it is anticipated that concentrations of a stable chemical such as GenX may remain in the river for a period of time. It appears that Chemours may be continuing to discharge wastewaters containing PFAS compounds; information to revise that possibility has not been found.

4. A study of full-scale water treatment systems has shown that conventional water treatment methods, including aeration, chlorination, chloramination, chlorine dioxide, coagulation, flocculation, anthracite media filtration, microfiltration or ultrafiltration, ozonation, permanganate addition, sedimentation, softening (caustic softening followed by solids contact clarification), and UV light, were not effective at removing PFASs.

5. Various researchers have found that GAC, IX, and RO/NF are treatment options that have been successful at removing PFASs but that information is limited; almost no information is available on applying water treatment processes specifically to GenX removal.

6. Site-specific testing of these processes is recommended to refine the understanding of design and operational parameters for GAC, IX, and RO/NF.

7. Since the lowest initial cost option would be Option 1A, installing new GAC media into the existing filters, one logical approach would be to conduct testing to verify the viability of that option before staring a larger testing program. A key parameter for Option 1A is replacement frequency, which is directly related to the number of BV that can be achieved by the GAC before breakthrough. For example, even though Option 1A would have no capital cost, it would be too expensive and impractical if the GAC had to be replaced weekly or daily. Another important parameter is the range of PFASs that are removed by each option. For example, the data available from other sites indicate that the highest capital cost option, RO/NF, may provide removal of a longer list of PFAS compounds than GAC or IX. Testing would quantify these and other parameters and provide a basis for decision-making.

8. As a parallel path activity while testing proceeds, it is recommended that preliminary, planning-level, cost opinions be developed for the likely lowest cost and highest cost options to assist the utility with planning. Initially, before testing has been conducted, the development of the cost opinions would be based on preliminary assumptions that could subsequently be revised when test results are available. The low and high cost options would be, respectively, Option 1A (new GAC media installed in the existing filters) and Option 3 (RO/NF).

9.0 List of Abbreviations

AIX	Anionic Ion Exchange
BV	Bed Volume
CAS	Chemical Abstracts Service
CFPUA	Cape Fear Public Utility Authority
cm	Centimeter
DBP	Disinfection Byproducts
EBCT	Empty Bed Contact Time
EPA	United States Environmental Protection Agency
ft^2	Square Foot
GAC	Granular Activated Carbon
gfd	Gal per ft^2 per day = gpd/ft^2
gpm	Gallon per Minute
IX	Ion Exchange
LR	Loading Rate
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
NC DEQ	North Carolina Department of Environmental Quality
NF	Nanofiltration
ng/L	Nanogram per Liter
NTU	Nephelometric Turbidity Unit
PAC	Powdered Activated Carbon
PFAS	Perfluoroalkyl Substance
PFBA	Perfluorobutanoic Acid
PFBS	Perfluorobutane Sulfonate
PFC	Perfluorinated Compound
PFHxA	Perfluorohexanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PFPeA	Perfluoropentanoic Acid
PFPrOPrA	Perfluoro-2-Propoxypropanoic Acid
RO	Reverse Osmosis

RSSCT	Rapid Small-Scale Column Test
TOC	Total Organic Carbon
µS/cm	Micro-Siemens per Centimeter
UV	Ultraviolet
WTP	Water Treatment Plant

10.0 References

Black & Veatch Project 145726, Process Design Memorandum for Sweeney WTP Expansion, February 16, 2007.

Black & Veatch Project 145726, Civil Design Memorandum for Sweeney WTP Expansion, May 22, 2007.

Carter, K. E., and Farrell, J. (2010). Removal of Perfluorooctane and Perfluorobutane Sulfonate from Water via Carbon Adsorption and Ion Exchange, Separation Science and Technology 45(6): 762-767.

Deng, S., Yu, Q., Huang, J., and Yu, G. (2010). Removal of Perfluorooctane Sulfonate from Wastewater by Anion Exchange Resins: Effects of Resin Properties and Solution Chemistry, Water Research 44(18): 5188-5195.

Dickenson, Eric R. V., and Christopher Higgins (2016). Treatment Mitigation Strategies for Poly- and Perfluoroalkyl Substances, WEF Proj 4322, ISBN 978-1-60573-234-3, Water Research Foundation, Denver, Colorado.

EPA (2016). Fact Sheet PFOA and PFOS Drinking Water Health Advisories, EPA 800-F-16-003, November 2016.

Eschauzier C., Beerendonk E., Scholte-Veenendaal P., and De Voogt P. (2012). Impact of Treatment Processes on the Removal of Perfluoroalkyl Acids from the Drinking Water Production Chain, Environmental Science & Technology 46(3): 1708-15.

GenX Wastewater, DEQ, June 27, 2017.

Heydebreck, F., Tang, J., Xie, Z., and Ebinghaus, R. (2015). Alternative and Legacy Perfluoroalkyl Substances: Differences Between European and Chinese River/Estuary Systems, Environmental Science & Technology 49(14): 8386-8395.

Houde, M., Martin, J. W., Letcher, R. J., Solomon, K. R., and Muir, D. C. (2006). Biological Monitoring of Polyfluoroakyl Substances: A Review, Environmental Science & Technology 40(11): 3463-3473.

Lampert, D., Frisch, M., and Speitel, G. (2007). Removal of Perfluorooctanoic Acid and Perfluorooctane Sulfonate from Wastewater by Ion Exchange, Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management. January 11(1) 60-68.

Mordock, Jeff (2017). "Chemours says it has stopped GenX discharge at North Carolina plant," The News Journal, June 27, 2017. http://www.delawareonline.com/story/money/2017/06/27/chemours-says-has-stopped-genx-leak-north-carolina-plant/431499001/

North Carolina Department of Environmental Quality, "DEQ Verifies Chemours Has Stopped Discharging." https://deq.nc.gov/deq-verifies-chemours-has-stopped-discharging-genx-wastewater

Post, G., Louis, J., Cooper, K., Boros-Russo, B., and Lippincott, R. (2009). Occurrence and Potential Significance of Perfluorooctanoic Acid (PFOA) Detected in New Jersey Public Drinking Water Systems, Environmental Science & Technology 43(12): 4547-4554.

Quiñones, O., and Snyder, S. (2009). Occurrence of Perfluoroalkyl Carboxylates and Sulfonates in Drinking Water Utilities and Related Waters from the United States, Environmental Science & Technology 43(24): 9089-9095.

Redding, Adam (2017). Selection of activated carbon for PFOA/PFOS removal, NEWWA Spring Conference, April 5, 2017.

Senevirathna, S. T. M. L. D., Tanaka, S., Fujii, S., Kunacheva, C., Harada, H., Shivatoki, B. R., and Okamoto, R. (2010). A Comparative Study of Adsorption of Perfluorooctane Sulfonate (PFOS) onto Granular Activated Carbon, Ion-Exchange Polymers and Non-Ion-Exchange Polymers, Chemosphere 80(6): 647-651.

Sun, M., Arevalo, E., Strynar, M., Lindstrom, A., Richardson, M., Kearns, B., Pickett, A., Smith, C., and Knappe, Detlef R. U. (2016). Legacy and Emerging Perfluoroalkyl Substances are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina, Environmental Science & Technology Letters 3(12): 415-419, American Chemical Society.

Takagi, S., Adachi, F., Miyano, K., Koizuma, Y., Tanaka, H., Mimura, M., Watanabe, I., Tanabe, S., and Kannan, K. (2008). Perfluorooctanesulfonate and Perfluorooctanoate in Raw and Treated Tap Water from Osaka, Japan, Chemosphere 72: 1409-1412.

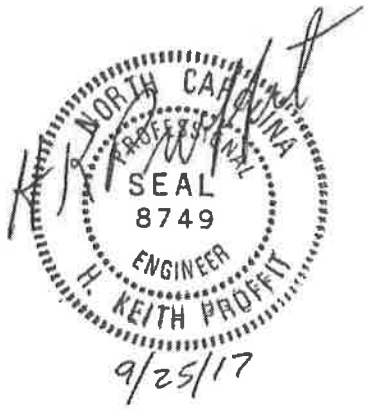
Water Research Foundation, WRF (2016). Poly- and perfluoroalkyl substances: background technical information, 5 pp., Water Research Foundation, Denver, Colorado.

Yu, Q., Zhang, R., Deng, S., Huang, J., and Gang, Y. (2009). Sorption of Perfluorooctane Sulfonate and Perfluorooctanoate on Activated Carbons and Resin: Kinetic and Isotherm Study, Water Research 43: 1150-1158.

TECHNICAL MEMORANDUM 2

Preliminary Report on Prescreened Alternatives – GenX and Other PFAS Treatment Options Study

B&V PROJECT NO. 196369



PREPARED FOR

Cape Fear Public Utility Authority

SEPTEMBER 2017

BLACK & VEATCH

©Black & Veatch Holding Company 2017. All rights reserved

Table of Contents

Executive Summary **1**
1.0 Purpose **1-1**
2.0 Introduction **2-1**
2.1 General Introduction 2-1
2.2 Regulatory History 2-1
2.3 Treatment Methods 2-2
3.0 Summary of Initial Process Evaluation from TM1 ..... **3-1**
4.0 Calculation Basis **4-1**
5.0 Option 1A (New GAC Installed in the Existing Filters) **5-1**
6.0 Options 1B (GAC Contactors Located Downstream from Existing Filters) & 1C (Deep Bed Version of 1B) **6-1**
7.0 Option 3 (RO/NF Located Downstream from Existing Filters) **7-1**
8.0 Discussion **8-1**
9.0 Summary/Recommendations **9-1**
10.0 List of Abbreviations **10-1**
11.0 References **11-1**

LIST OF TABLES

Table ES-1 Summary of Planning Level Cost Opinions 1
Table 4-1 Overall Calculation Basis 4-1
Table 5-1 Option 1A (GAC in Existing Filters) Calculation Basis 5-1
Table 5-2 Option 1A (GAC in Existing Filters) Planning Level Cost Opinion 5-2
Table 6-1 Option 1B (GAC Contactors Post-Filtration) and Option 1C (Deep Bed Version of 1B) Calculation Basis 6-1
Table 6-2 Option 1B (GAC Contactors Post-Filtration) and Option 1C (Deep Bed Version of 1B) Planning Level Cost Opinions 6-2
Table 7-1 Option 3 (RO/NF Post-Filtration) Calculation Basis 7-1
Table 7-2 Option 3 (RO/NF Post-Filtration) Planning Level Cost Opinion 7-4
Table 8-1 Summary of Planning Level Cost Opinions 8-1

LIST OF FIGURES

Figure 3-1 Process Schematic Showing Potential Locations of TM1 Options at the Existing Sweeney WTP 3-1
Figure 3-2 Schematic Diagrams of Options Evaluated in TM1 3-2
Figure 6-1 Options 1B and 1C - GAC Contractors Site Plan 6-3
Figure 7-1 Option 3 Site Plan 7-5

Executive Summary

Organic chemicals known as perfluoroalkyl substances (PFASs) have been detected in Cape Fear River water, which supplies the Sweeney Water Treatment Plant (WTP), as discussed in Technical Memorandum 1 (TM1), Black & Veatch (2017). PFAS compounds, including one called GenX, were identified in research by Dr. Knappe, a professor at North Carolina State University and coauthors (Sun et al. 2016). These compounds have also been detected by the North Carolina Department of Environmental Quality (NCDEQ); recent sampling indicates the concentrations have declined. Because of widespread use, most people have been exposed to PFASs, which have been found in waters worldwide. Neither the Environmental Protection Agency (EPA) nor the NCDEQ have set enforceable maximum contaminant levels (MCLs) for GenX or other PFASs. Because of concern over potential health effects, Cape Fear Public Utility Authority (CFPUA) is proactively considering the feasibility and effectiveness of treatment alternatives. CFPUA is one of the first utilities within the United States to pursue enhanced treatment to target removal of these compounds.

This TM presents planning level opinions of probable cost for treatment options previously selected in TM1. These are summarized in Table ES-1.

Table ES-1 Summary of Planning Level Cost Opinions

PARAMETER	OPTION 1A	OPTION 1B	OPTION 1C	OPTION 3
Description	GAC in Existing Filters	GAC Contactors Post-Filtration	Deep Bed Version of 1B	RO/NF Post-Filtration
Initial Cost, $ in millions	$1.7 million	$28 million	$32 million	$113 million
Annual Operating Costs, $ in millions/yr	$3.0 million to $6.0 million	$3.3 million to $6.3 million	$3.4 million to $6.4 million	$3.3 million
Present Worth (PW) of Annual Costs, $ in millions	$42 million to $82 million	$45 million to $86 million	$46 million to $86 million	$45 million
Total Present Worth (TPW), $ in millions	$44 million to $84 million	$73 million to $114 million	$78 million to $118 million	$158 million

Notes: GAC = Granular Activated Carbon; RO/NF = Reverse Osmosis/Nanofiltration

Option 1C was added after TM1 was written. Option 1C is a deeper bed version of Option 1B.

Option 1A's initial cost includes an initial load of GAC media and one-time replacement of sand and gravel. The GAC options (1A, 1B, 1C) would have higher initial costs if standby filters/contactors were added to provide full capacity when units are off-line during GAC replacement events.

Annual costs for the GAC options (1A, 1B, 1C) are a function of media life. The cost ranges in the table are based on 6,000 and 12,000 bed volumes (BV). A 6,000 BV case would need to change GAC twice as often as a 12,000 BV case. CFPUA is conducting testing to determine BV at Cape Fear River concentrations.

In accordance with recommendations in TM1, a detailed cost opinion was not prepared for Option 2, Ion Exchange (IX); however, it is the engineer's opinion that TPW for Option 2 would be roughly in line with Option 1B. IX is less widely practiced for organic contaminant removal than GAC or RO/NF. However, recent pilot testing elsewhere of IX resins has shown promise as a treatment technology for removal of perfluorinated compounds from drinking water. Therefore, as a contingency CFPUA is conducting IX testing.

Summarizing key issues related to each option:

- Option 1A (New GAC in Existing Filters). This is the lowest cost option due to the comparatively low initial cost. Currently the GAC media in the existing filters provides filtration, while if new GAC were installed it would provide both filtration and adsorption to remove dissolved organic materials. A key issue with all of the GAC options (1A, 1B, and 1C), is the change-out frequency. Testing is being conducted to verify preliminary assumptions. At the 6,000 BV to 12,000 BV cases considered herein, change-out would be every 78 days to 156 days for each unit. Such frequent servicing would reduce plant capacity, unless standby filters are added and could be an impediment to operations. Other aspects of GAC options (1A, 1B, and 1C) that can also be tested include a risk of chromatographic peaking (which could result in higher concentrations in the effluent than in the influent) and a benefit of removing other compounds such as Contaminants of Emerging Concern (CEC) or Pharmaceuticals and Personal Care Products (PPCP).

- Option 1B (GAC Contactors Post-Filtration). This option is similar to Option 1A, since both apply GAC; however, 1B has the added feature of locating the new process downstream from the filters. Therefore, while the frequency of GAC change-outs could be an impediment to the operations staff for 1A, 1B or 1C, GAC replacement events would not directly impact filtration activities with 1B or 1C. The GAC in Option 1B/C would remove organic materials via adsorption, but it would not also provide filtration; that would continue to be accomplished by the existing filters. As with Option 1A, 1B/C would provide the benefit of removing other CEC and PPCP compounds. If adsorption were not needed in the future, the change-out frequency of 1A could be essentially eliminated while with Options 1B/C the contactors could subsequently be converted to use as filters, such as for a plant expansion.

- Option 1C (Deep Bed Version of 1B). Option 1C, a deep bed version of Option 1B, was included to consider the cost impact of contactors with a longer time period between breakthrough and therefore a longer time between GAC replacement events. Due to increased construction costs and a greater amount of GAC media initially installed, the capital costs of 1C would be higher than with 1B; however, the operating costs would be essentially the same, since the consumption of GAC would be constant. Having longer time periods between GAC replacement events would be less disruptive to plant operations.

- Option 2 (IX Post-Filtration). There are similarities between Option 2 (IX) and the post-filtration GAC options (1B and 1C), including operating costs affected by the number of BV and the associated frequency of media replacement. Testing is being conducted to allow comparison of the number of BV for GAC and IX media and better quantification of costs.

- Option 3 (RO/NF Post-Filtration). Option 3 has the highest costs, both initial and total present worth, as well as requiring the greatest amount of land. The evaluation indicates that the main RO/NF building would not fit on the existing Sweeney WTP site. An alternative location to consider would be the park area to the south adding to the complexity of the project. It is unknown if that land would be available for this purpose. In addition, Option 3 includes the drawbacks of consuming the greatest amount of raw water, disposal of the concentrate stream and post-treatment to control corrosion. The additional raw water consumption could limit future plant expansion options and the concentrate disposal could increase the projected cost opinion, depending on the requirements of the regulatory agency. The costs for a concentrate disposal method have been included in the evaluation, but it is unknown at this time if the regulatory agency will accept this method.

1.0 Purpose

This document presents opinions of probable cost for water treatment methods that were previously identified in Technical Memorandum 1 (TM1), Black & Veatch (2017), for the removal of the anthropogenic (human-made) organic chemicals known as perfluoroalkyl substances (PFASs), including a type called GenX. It is important to note that GenX has only recently been identified as a concern within the field of drinking water treatment. Only limited information is available on treatment methods to remove GenX and other PFASs. The evaluation presented in this memorandum is based on engineering assumptions and extrapolations that could be confirmed by subsequent bench-scale and/or pilot-scale testing before full-scale implementation. Given the preliminary nature of these treatment concepts, the type of cost opinion presented herein is referred to as Class 5 by the Association for the Advancement of Cost Engineering (AACE), which can be applied to a planning level comparison of options.

2.0 Introduction

2.1 GENERAL INTRODUCTION

There is a group of anthropogenic (human-made) organic chemical compounds, collectively referred to as perfluoroalkyl substances (PFASs); also sometimes called perfluorinated compounds (PFCs). The term PFAS is used in this memorandum. As discussed in TM1, Black & Veatch (2017), and various additional references (including Dickenson and Higgins 2016, Sun et al. 2016, and Water Research Foundation 2016), PFASs have been used in a variety of manufactured products such as firefighting foams, carpets, clothing, cosmetics, food packaging, and cookware. Because of their widespread use, most people have been exposed to PFASs. PFASs have been found in many types of waters worldwide, including the United States, Germany, Canada, South Korea, China, Brazil, United Kingdom, France, Italy, and Spain.

One specific type of PFAS of special interest to Cape Fear Public Utility Authority (CFPUA), which is known by the trade name GenX, was detected by Sun et al. (2016) in the Cape Fear River at an average concentration of 631 nanograms per liter (ng/L). Chemically GenX is known as Perfluoro-2-Propoxypropanoic Acid (PFPrOPrA). More recently, the North Carolina Department of Environmental Quality (NCDEQ) reported that river water samples from the July 17 to 20, 2017 time period had GenX concentrations below 140 ng/L (https://deq.nc.gov/news/hot-topics/genx-investigation/genx-sampling-sites). On Sept 13, 2017 CFPUA reported results (http://www.cfpua.org/CivicAlerts.aspx?AID=741) from 17 sample days between Aug 7 and 28, 2017 of raw and finished water at the Sweeney WTP with GenX concentrations in the 32 ng/L to 54 ng/L range. Previously, on June 27, 2017, NCDEQ confirmed that Chemours had stopped discharging GenX wastewater to the Cape Fear River (https://deq.nc.gov/deq-verifies-chemours-has-stopped-discharging-genx-wastewater). The results indicate that without continued discharge of GenX the concentration in the river is declining.

2.2 REGULATORY HISTORY

Allowable concentration of PFAS in drinking water is a relatively new topic being considered by the United States Environmental Protection Agency (EPA). The EPA has not issued any regulations regarding PFASs in drinking water; therefore, there are no enforceable maximum contaminant levels (MCLs) for PFASs. However, in 2009, on the basis of the limited health effects information available at that time, the EPA published provisional health advisories for two PFAS compounds: perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). In May 2016, the EPA issued revised health advisories for PFOA and PFOS of 70 ng/L, measured either individually or in combination (EPA 2016). The EPA develops health advisories to provide information on contaminants that it believes may cause human health effects and are known or anticipated to occur in drinking water. These health advisories are "non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials" (EPA 2016). There are currently no EPA regulations or health advisories regarding GenX. Although there are no enforceable MCLs for GenX or other PFASs, the CFPUA is proactively considering the feasibility and effectiveness of treatment alternatives because of concern over potential adverse health effects associated with the presence of these compounds in drinking water. CFPUA is one of the first utilities within the United States to pursue enhanced treatment that targets removal of these compounds.

2.3 TREATMENT METHODS

TM1, Black & Veatch (2017), presented additional information on PFASs including a preliminary evaluation of treatment methods. A summary of TM1 is presented in the next section of this memorandum.

3.0 Summary of Initial Process Evaluation from TM1

The following is a summary of the recommendation in TM1, Black & Veatch (2017) that provides a preliminary evaluation of treatment methods:

1. Perfluorinated compounds, including one called GenX, have been observed in the Cape Fear River upstream from the intake of the Sweeney Water Treatment Plant (WTP).
2. Neither the EPA nor NCDEQ have set MCLs for GenX or other PFASs. Because of concern over potential adverse health effects associated with the presence of these compounds in drinking water, CFPUA is proactively considering treatment alternatives.
3. Chemours, a company that had been discharging wastewater containing GenX and PFAS into the Cape Fear River, announced in late June 2017 that it had stopped discharging wastewater containing GenX while determining how to address the issue.
4. A study of full-scale water treatment systems has shown that conventional water treatment methods, including aeration, chlorination, chloramination, chlorine dioxide, coagulation, flocculation, anthracite media filtration, microfiltration or ultrafiltration, ozonation, permanganate addition, sedimentation, softening (caustic softening followed by solids contact clarification), and ultraviolet (UV) light, were not effective at removing PFASs.
5. Various researchers have found that granular activated carbon (GAC), ion exchange (IX), and reverse osmosis or nanofiltration (RO/NF) are treatment options that have been successful at removing PFASs, but performance information is limited. Site-specific testing of selected processes is recommended before developing a detailed design.
6. Process schematics of the evaluated options are shown on Figures 3-1 and 3-2.
7. TM1 recommended that planning-level cost opinions be developed for the likely lowest and highest cost options to assist the utility with planning. Since site-specific testing has not been completed, these cost opinions would be based on preliminary assumptions and past research. The low and high cost options would be Option 1A (new GAC media installed in the existing filters) and Option 3 (RO/NF located downstream from the existing filters).

Therefore, this memorandum, TM2, presents cost opinions for Options 1A and 3. In addition, Option 1B (GAC contactors located downstream from the existing filters) and a deeper bed version of 1B, referred to as Option 1C, are also considered in TM2.

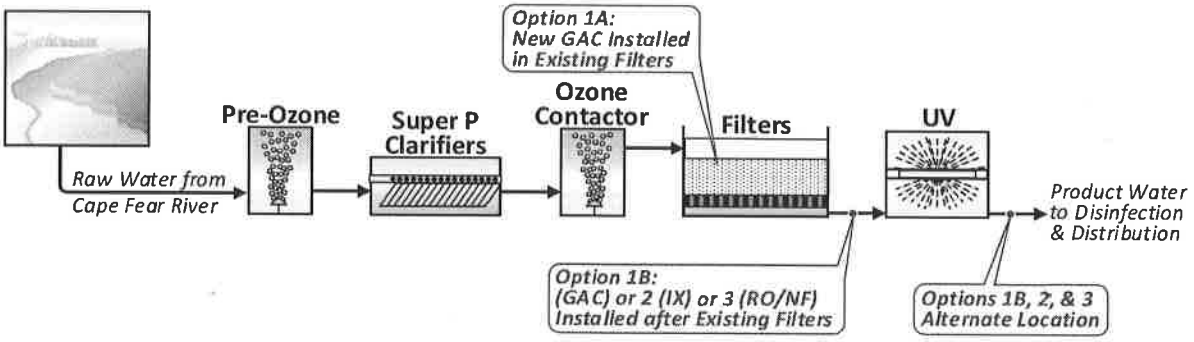


Figure 3-1 **Process Schematic Showing Potential Locations of TM1 Options at the Existing Sweeney WTP**

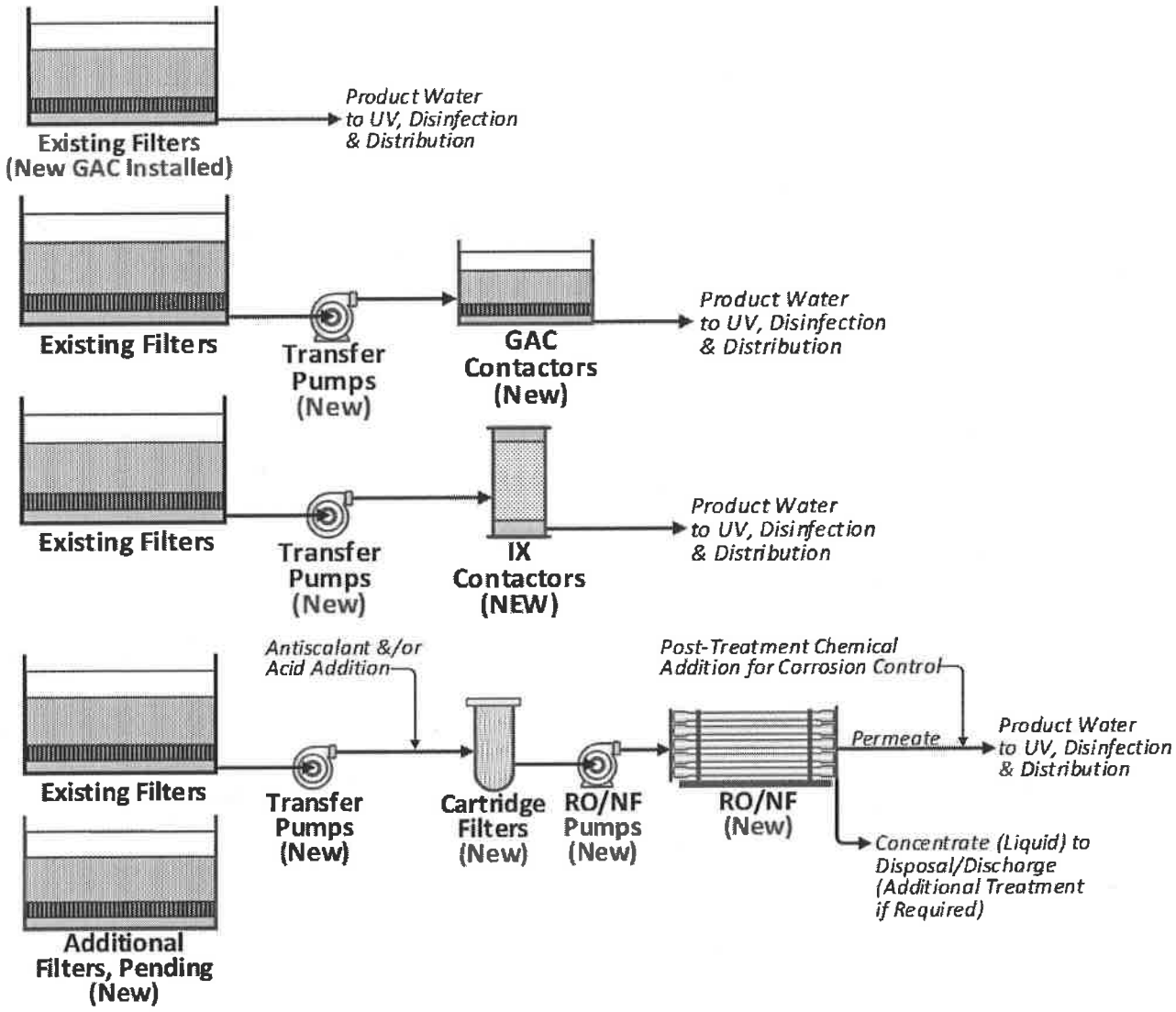


Figure 3-2 Schematic Diagrams of Options Evaluated in TM1

Options shown on Figure 3-2 (from top to bottom) are as follows:

- Option 1A (New GAC media installed in the existing filters).
- Option 1B (GAC contactors located downstream from the existing filters).
- Option 2 (IX located downstream from the existing filters).
- Option 3 (RO/NF located downstream from the existing filters).

An option that was not considered in TM1 is a deeper bed version of Option 1B, which is referred to in TM2 as Option 1C. Diagrams showing process location and a schematic for the 1C option would be the same those shown for Option 1B.

4.0 Calculation Basis

The overall calculation basis applied in this memorandum is presented in Table 4-1. Items specifically related to individual options are presented in the section on each option.

Table 4-1 Overall Calculation Basis

PARAMETER	UNITS	VALUE
Design Capacity (Basis for capital costs)	mgd	35
Average Day Capacity (Basis for operating costs)	mgd	14 (Average day flow for 2014 to 2016)
Peak Flow Day in 2016	mgd	26
Operating Period	years	20
Interest Rate (Basis for converting annual costs to present worth)	percent	4
New Process Area Costs, Outside/Covered	$/ft^2	50
New Building Costs (Taller Option 1C Building)	$/ft^2	200 (220)
Cost of Electricity	$/kWh	0.055 (Based on April 2017 electrical bill)
Additional Staff	$/yr	$50,000 x 1.4 factor to include benefits = $70,000
Contingency (Included in opinions of capital costs)	percent	30

The capital cost opinions presented in this TM are based on Black & Veatch experience and its proprietary cost development tool. After determining an installed equipment cost, additional project costs are added on the basis of an additional 29.5 percent factor to include sitework, yard piping, and on-site infrastructure for electrical and instrumentation/controls; an additional 26 percent factor to include contractor/subcontractor markups (e.g., overhead, profit, mobilization, bonds, and insurance); and non-construction costs are included on the basis of an additional 49.5 percent factor to provide budgets for permitting, engineering/design, legal and administrative, construction services, commissioning and start-up, and contingency.

5.0 Option 1A (New GAC Installed in the Existing Filters)

The calculation basis for Option 1A (New GAC Installed in the Existing Filters) is presented in Table 5-1. The existing filters currently include GAC media, but the adsorptive capacity of that media has been exhausted over time. The currently installed media provides filtration. If new GAC media were installed, the filters would provide both filtration (e.g., removing particles and turbidity) and adsorption (e.g., removing certain dissolved materials). The design and operating parameters for 1A (capacity, loading rate, and pressure drop) were assumed to be the same as currently practiced at the existing Sweeney WTP. The number of bed volumes (BV) until breakthrough occurs directly impacts replacement frequency. Assumptions based on experience with GAC at other locations have been included in Table 5-1 and in the evaluation. Testing is being conducted to verify the BV value for this specific source water with different types of GAC. Site-specific verification is needed because the types and concentrations of chemicals in the water affect GAC performance. Different organic chemicals in the feedwater can compete for GAC adsorption "sites," which affects the number of BV between media replacements.

Table 5-1 Option 1A (GAC in Existing Filters) Calculation Basis

PARAMETER	UNITS	VALUE
Number of Existing Filters	Number	14
Area per Filter	ft^2	435
Dimensions, L x W x D (Depth of GAC media)	ft	15 x 29 x 15.58 (4)
Capacity Rating, each filter	mgd	2.5
Loading Rate, Capacity (Average Day) with All Filters	gpm/ft^2	4 (1.6)
Empty Bed Contact Time (EBCT), Capacity (Average Day) with All Filters	minutes	7.5 (18.7)
Number of New Staff	Number	1
Bed Volume (BV), assumed	Number	6,000 and 12,000
GAC Price	$/lb	1.25
One-Time Replacement of Non-GAC Media (sand and gravel)	$ (Lump Sum)	$660,000

An additional staff member has been included for Option 1A. While it is likely that additional operators would not be needed because the existing filters would be operated as they currently are, it is anticipated that additional staff time would be needed for maintaining the equipment since the frequency of change-outs could yield additional wear as well as a need for additional instrument calibration and staff time to coordinate GAC replacement activities.

The GAC price applied in these calculations is based on Black & Veatch experience and discussions with potential bidders. The price includes removal and replacement of the media with virgin GAC, disposal or regeneration of the spent media by the supplier, freight to and from the site, and field

service personnel provided by the media supplier to remove the old media and install the new media. Therefore, for the development of the planning level scenario presented in this TM the price is based on essentially a turn-key arrangement with the GAC supplier providing a full range of services. If the project is subsequently implemented the GAC procurement method and supplier's scope could be optimized, such as to include more utility-provided labor component, regeneration and/or return of media, if that would yield a more cost-effective solution for CFPUA.

There would be no new facilities with this option, so there would be no new buildings and no construction costs. The initial cost incorporates the initial GAC media replacement as well as a budget for a one-time replacement of the sand and gravel in the existing filters. The reason for including an initial replacement of the sand and gravel would be to eliminate the possibility that PFAS compounds could have accumulated in that part of the media that could subsequently be released into the filtrate. Subsequent GAC replacement costs are included in the annual costs presented herein.

The annual operating costs and present worth of Option 1A is dependent on the replacement frequency of the GAC media. CFPUA is conducting testing to better quantify the replacement frequency given their water quality. On another project Black & Veatch has observed about 12,000 BV between GAC replacement events when applied to removing similar PFAS compounds, but not GenX, and at a TOC concentration that is lower than at the Sweeney WTP. The higher TOC concentration in the Cape Fear River could reduce the number of BV to less than 12,000 BV. To provide a sensitivity analysis both 6,000 BV and 12,000 BV scenarios are considered in this evaluation. At 12,000 BV with average flow conditions the GAC media would be replaced about every 5.2 months (156 days). At 6,000 BV the replacement would be twice as often, about every 78 days. At 12,000 BV and assuming 2 of 14 filters out of service for one week for each change-out, then filtration capacity would be reduced about one-third of the time (32 percent). At 6,000 BV it would be about two-thirds of the time. A capacity of up to 30 mgd could be provided with 12 of 14 filters in service based on the current design rate of 4 gpm/ft^2. If that limitation in available filtration area is unacceptable then standby filters could be added, which would add to the project's initial cost.

The planning level cost opinion for Option 1A is presented in Table 5-2.

Table 5-2 Option 1A (GAC in Existing Filters) Planning Level Cost Opinion

PARAMETER	OPTION 1A
Description	GAC in Existing Filters
Initial Cost, $ in millions	$1.7 million
Annual Operating Costs, $ in millions/yr	$3.0 million to $6.0 million
Present Worth (PW) of Annual Costs, $ in millions	$42 million to $82 million
Total Present Worth (TPW), $ in millions	$44 million to $84 million

6.0 Options 1B (GAC Contactors Located Downstream from Existing Filters) & 1C (Deep Bed Version of 1B)

The calculation basis for Options 1B (GAC Post-Filtration: Located Downstream from the Existing Filters) and 1C (Deep Bed Version of 1B) are presented in Table 6-1. Option 1C, a deeper bed version of 1B, was not considered in TM1, but has been incorporated into this memorandum (TM2). Having a deeper bed would add some cost but would also allow a longer time period between GAC replacement events, thereby causing less disruption to plant operations.

For this study, the same number of BV was applied to Options 1B and 1C as for 1A to facilitate comparison. Testing is being conducted to better quantify the BV values for the specific source water.

The main difference between Option 1A and Options 1B/1C is the location of the new GAC media. For Option 1A, the GAC media would be installed in the existing filter boxes. For Options 1B/1C, the new GAC media would be installed in new contactors that would be located downstream from the existing filters. In Option 1A, the new GAC would provide both filtration of the water (e.g., removing particles and turbidity) as well as to adsorb GenX and other organic materials from the water, while with Options 1B/1C, the GAC would be treating already filtered water and would only provide the adsorption mechanism. One aspect of the testing that is being conducted is to compare GAC adsorption when applied to settled water (like 1A) or filtered water (like 1B/1C).

The main design parameters were assumed to be the same for Options 1A, 1B, and 1C to facilitate comparison, although 1C has a longer EBCT. A difference between 1A and 1B/1C is that a transfer pump station is provided with Options 1B and 1C to transport the water from the existing header to the new treatment area and to provide the pressure needed to drive the water through the contactors, while 1A does not need a new pump station. In addition a new backwash pump has been included for Options 1B and 1C. During more detailed design tasks an optimization to consider would be dividing the 1B/1C contactors into cells to possibly allow use of the existing backwash pumping equipment.

Table 6-1 Option 1B (GAC Contactors Post-Filtration) and Option 1C (Deep Bed Version of 1B) Calculation Basis

PARAMETER	UNITS	OPTION 1B	OPTION 1C
Loading Rate, Capacity (Average Day) with All Filters	gpm/ft²	4 (1.6)	4 (1.6)
Empty Bed Contact Time (EBCT), Capacity (Average Day) with All Filters	Minutes	7.5 (18.7)	20 (50)
Number of New Staff	Number	2	2
Bed Volume (BV), assumed	Number	6,000 and 12,000	6,000 and 12,000
GAC Price	$/lb	1.25	1.25

Two additional staff members have been included in the annual costs for Options 1B and 1C to account for an addition to the WTP that would require more labor support than Option 1A.

The planning level cost opinion for Options 1B and 1C are presented in Table 6-2.

Table 6-2 Option 1B (GAC Contactors Post-Filtration) and Option 1C (Deep Bed Version of 1B) Planning Level Cost Opinions

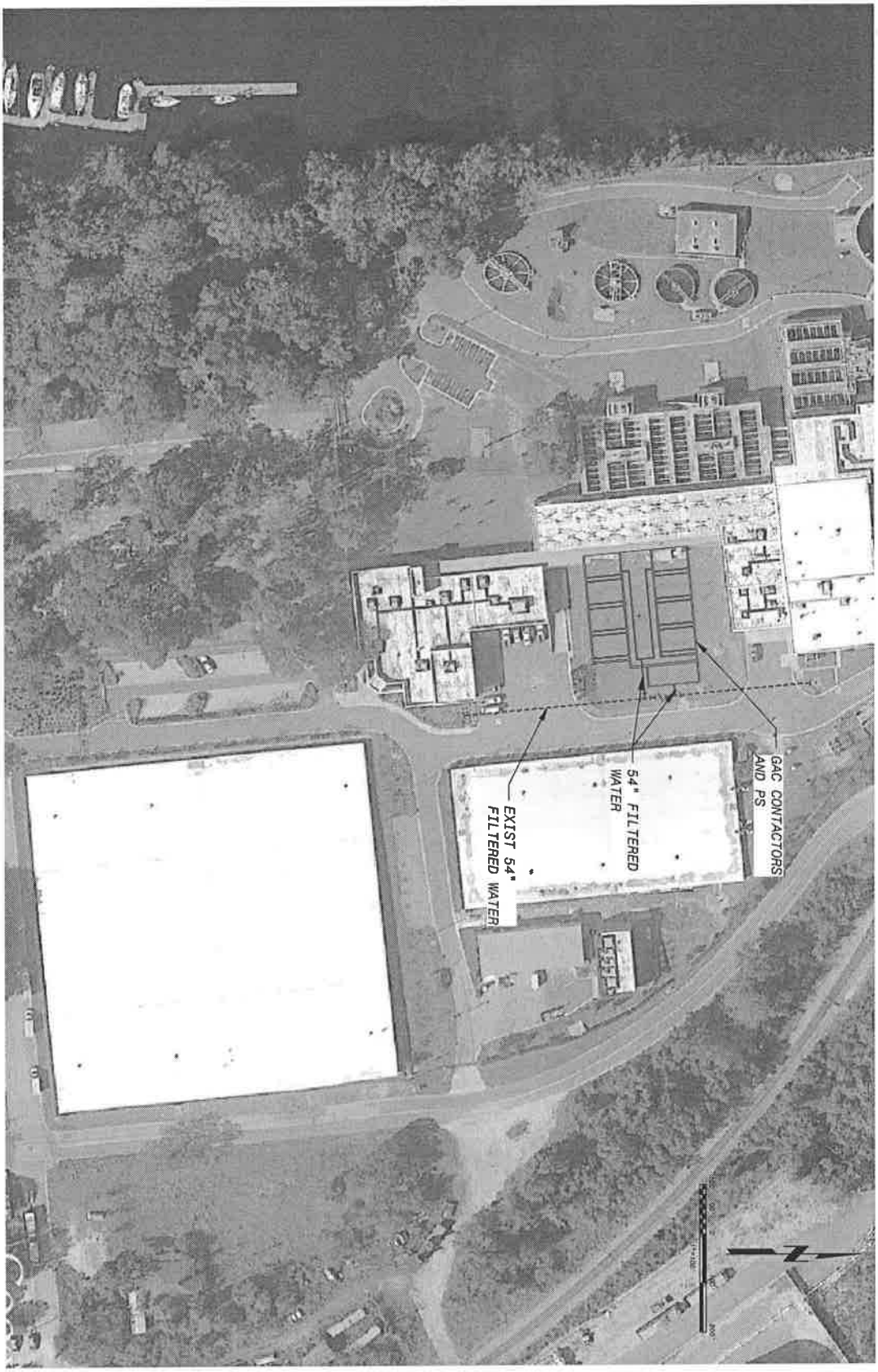
PARAMETER	OPTION 1B	OPTION 1C
Description	GAC Contactors Post-Filtration	Deep Bed Version of 1B
Initial Cost, $ in millions	$28 million	$32 million
Annual Operating Costs, $ in millions/yr	$3.3 million to $6.3 million	$3.4 million to $6.4 million
Present Worth (PW) of Annual Costs, $ in millions	$45 million to $86 million	$46 million to $86 million
Total Present Worth (TPW), $ in millions	$73 million to $114 million	$78 million to $118 million

As with Option 1A, the operating costs and present worth values for Options 1B and 1C are also dependent on the replacement frequency of the GAC media. Therefore, as with Option 1A both 6,000 BV and 12,000 BV scenarios are considered in this evaluation. The GAC replacement frequency would be as discussed in the previous section, about every 78 days or 156 days, respectively.

Options 1B and 1C would require space for a new transfer pump station as well as a new GAC contactor building. The transfer pump station area would be about 500 ft^2 and the GAC contactor building would be about 11,000 ft^2. The cost for buildings has been included in the cost opinion presented in this memorandum. A concept of the location of Options 1B or 1C is presented on Figure 6-1.

As indicated in the figure, the new contactors would likely infringe on the stormwater detention pond that captures runoff and allows a degree of settlement before discharging off site. This issue would need to be addressed with regulators. Any costs associated with alternative or additional treatment of stormwater have not been included.

FD7000
DT000



SITE PLAN

1" = 100'-0"

CAPE FEAR PUBLIC UTILITY AUTHORITY

SWEENEY WATER TREATMENT PLAN

OPTION 1B - GAC CONTRACTORS
SITE PLAN

BLACK & VEATCH
Building a world of difference
Black & Veatch Corporation
Kansas City, Missouri

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK	APP

FIGURE 6-1
SHEET OF

7.0 Option 3 (RO/NF Located Downstream from Existing Filters)

The calculation basis for Option 3 (RO/NF Post-Filtration: Located Downstream from the Existing Filters) is presented in Table 7-1.

Table 7-1 Option 3 (RO/NF Post-Filtration) Calculation Basis

PARAMETER	UNITS	VALUE
Design Flows: RO/NF Feed Permeate Concentrate	mgd (gpm)	 41.2 (28,600) 35 (24,300) 6.2 (4,300)
Average Flows: RO/NF Feed Permeate Concentrate	mgd (gpm)	 16.5 (11,400) 14 (9,700) 2.5 (1,700)
Recovery	percent	85
Flux	gfd	10.4
Cartridge Filter Element Replacement Rate	per year	6
RO/NF Element Replacement Rate	per year	1/7 = 14.3 percent (i.e., 7 year service life)
Value of Additional Prefiltered Water	$/1000 gal	0.5
Allocation for Land Acquisition (Only used for Option 3)	$	$400,000
Number of New Staff	Number	5

To provide a basis for determining a planning level cost opinion, the flows listed in Table 7-1 were assumed, which incorporated the assumption that all of the finished water would be comprised of RO/NF permeate. A review of the scientific literature (refer to TM1, Black & Veatch, 2017) indicates that RO/NF has generally provided about 95 percent rejection of similar PFAS compounds, although in some studies rejections of about 70 percent to 99 percent have been observed. In some cases rejection was influenced by pH, which indicates the mechanism may be more complex than just size exclusion. As an example, if a source water concentration would be 631 ng/L (which is the average concentration of GenX observed by Sun et al. 2016), 95 percent rejection would result in a concentration of 31 ng/L in the permeate. While the concentrations in the Cape Fear River are not well understood, and even thought the July 2017 measurements by NCDEQ resulted in all GenX concentrations being below 140 ng/L, it appears logical at this point to plan to treat 100 percent of the finished water flow for the RO/NF option. To further illustrate this, even if the feedwater concentration would be 140 ng/L at 95 percent rejection the concentration in the permeate would be 7 ng/L. If instead of 100 percent treatment a small (5 percent) bypass flow were allowed with a

feed concentration of 140 ng/L and 95 percent rejection, the finished water concentration would roughly double to 14 ng/L. Therefore, for this level of study it appears reasonable to assume full RO/NF treatment to account for unknowns, including the concentration in the river, the actual rejection, and the finished water goals. If NF/RO is selected for full-scale implementation, a further study to determine the impact of a by-pass stream on cost, water quality, and operations would be warranted.

As discussed in the previous paragraph, a review of the scientific literature indicated that RO/NF has generally provided about 95 percent rejection of similar PFAS compounds, although in some studies rejections of about 70 percent to 99 percent have been observed. Some of the studies indicated that NF provided rejection values as high as RO while others indicated that rejection by the NF membrane considered in those studies was lower than for RO. In general, NF and RO systems are very similar and have the same types of components and ancillary support equipment. In the past, RO operated at higher pressures than NF and, therefore, exhibited higher energy use, but advancements in membrane technology have significantly reduced the operating pressure difference. Membrane selection could be determined during a more detailed design phase and could be based on site-specific testing. At the current level of planning and development of a cost opinion, this evaluation is based on the use of either NF or low pressure RO.

Unlike the GAC options (1A, 1B, and 1C), Option 3 (RO/NF) would require an increase in feedwater flow rate (thereby consuming more raw water) and would also yield an increase in wastewater flow rate (because of the concentrate stream). A related RO/NF parameter is recovery, the ratio of permeate flow to feed flow. Generally recovery is set as high as possible to minimize flow rates of the feed and concentrate streams. During detailed design recovery would be determined on the basis of concentrations in the feedwater of what are called sparingly soluble salts. The goal is to have as high a recovery as possible without causing sparingly soluble salts to precipitate in the membrane system, resulting in more frequent chemical cleanings, higher operating costs, shorter membrane service life, and capacity shortfalls. The conductivity of the Cape Fear River water (less than 200 µS/cm) indicates that this is relatively low concentration water. Many RO/NF facilities achieve 85 percent recovery, so it appears reasonable to base the current level of planning and development of a cost opinion on that value (while also including antiscalant chemical addition to the feedwater). The recovery value and other design conditions would be evaluated in more detail during a detailed design phase.

Related to the concept of recovery, the RO/NF option would result in increases in both raw water consumption and wastewater flow rate. Design and average flow rates are listed in Table 7-1. In some situations, especially for inland RO/NF facilities, disposal of the concentrate can be a major cost item. For this evaluation it was assumed that the concentrate could be disposed of via a nearby existing river outfall. It was also assumed that the portion of the capital cost that was calculated by the cost model to cover yard piping expenses (which was more than $4 million in capital expenses plus the added factors for contractor/ subcontractor mark-ups and non-construction costs, including contingency) would provide sufficient budget to include the relatively short discharge line. However, there is risk associated with this assumption. The regulatory agency might not approve of the concentrate discharge, and other methods of handling and disposal could add significant cost to the RO/NF option. If the RO/NF option receives additional consideration, it is recommended that discussions be held with the regulator early-on in project development.

In addition to generating a concentrate flow, the RO/NF option consumes more feed flow than the GAC options. The capital cost opinion for the RO/NF option accounts for this by including additional filters. The operating cost opinion accounts for this by including a value for the incremental

processing costs for additional filtered water at average flows, applying the basis listed in Table 7-1; however, no value is assigned to the raw water itself.

Another difference between RO/NF and the other options is that RO/NF would require additional post-treatment of the finished water before sending it to the distribution system. Costs for this have been included in this study. The reason for the additional post-treatment is that RO/NF product water is somewhat corrosive due to the lower pH, alkalinity, and hardness as well as other factors such as differences in the sulfate/chloride concentration ratio. The RO/NF product water needs some post-treatment to make it compatible with the existing distribution system. If the RO/NF option is selected, it is recommended that additional development of the post-treated water conditions be conducted.

A key parameter for RO/NF design and operations is flux, which is the RO/NF equivalent to hydraulic loading rate. With GAC filters (and other granular media filters) hydraulic loading rate is the filtered water flow rate per unit of cross-sectional flow area and is generally expressed in gpm/ft^2. Flux is the flow rate of permeate per unit of membrane area and is generally expressed in gallons per ft^2 per day (gfd). The higher the flux, the lower the capital cost because higher flux means fewer membrane elements and pressure vessels are purchased. Flux is selected on the basis of past experience treating similar water and, if possible, verified by site-specific testing. If the flux is set too high, the membrane system will have problems with "fouling," resulting in more frequent chemical cleanings, higher operating costs, shorter membrane service life, and capacity shortfalls. For this evaluation a conservative flux was selected because the feed water is from a surface source, which tends to yield more fouling than treating groundwater. It is generally easier to control fouling to manageable levels at the flux selected for this evaluation.

RO/NF is typically described as being an energy intensive process because it consumes more electrical energy than many other water treatment processes. However, modern RO/NF facilities consume less electricity than in the past. Cost of the average energy consumption was included in the annual costs that were determined for this evaluation. Regarding capital costs, preliminary calculations indicate that the RO/NF option could add about 4.5 MW in connected electrical power at the WTP. Preliminary discussions with the energy provider, Duke Energy, indicate that some new infrastructure would be needed to provide that additional amount of electricity. Duke Energy indicated that they would provide some portion of the new infrastructure since this development would provide them with a new major consumer of electricity. For this evaluation it was assumed that the portion of the capital cost that was calculated by the cost model to cover on-site electrical infrastructure (which was more than $4 million plus added costs because of factors for contractor/subcontractor mark-ups and non-construction costs, including contingency) would provide sufficient capital cost budget for this service.

The evaluation indicates that the main RO/NF building would not fit on the existing site of the Sweeney WTP. An allocation has been included in Table 7-1 and in the calculation of the cost opinion to allow for the possible purchase of additional land area. This is essentially a placeholder value and the actual cost of land acquisition is unknown. If the RO/NF option is to receive additional consideration, more detail is recommended to better understand the land costs.

Five new staff members were included for Option 3 (RO/NF) to account for this addition to the WTP, since RO/NF would require more labor support than Options 1A (GAC in Existing Filters) and 1B (GAC Post-Filtration).

Option 3 would require space for an addition to the existing filtration area, a new transfer pump station, and a new building for the RO/NF and related ancillary equipment. The new filter area

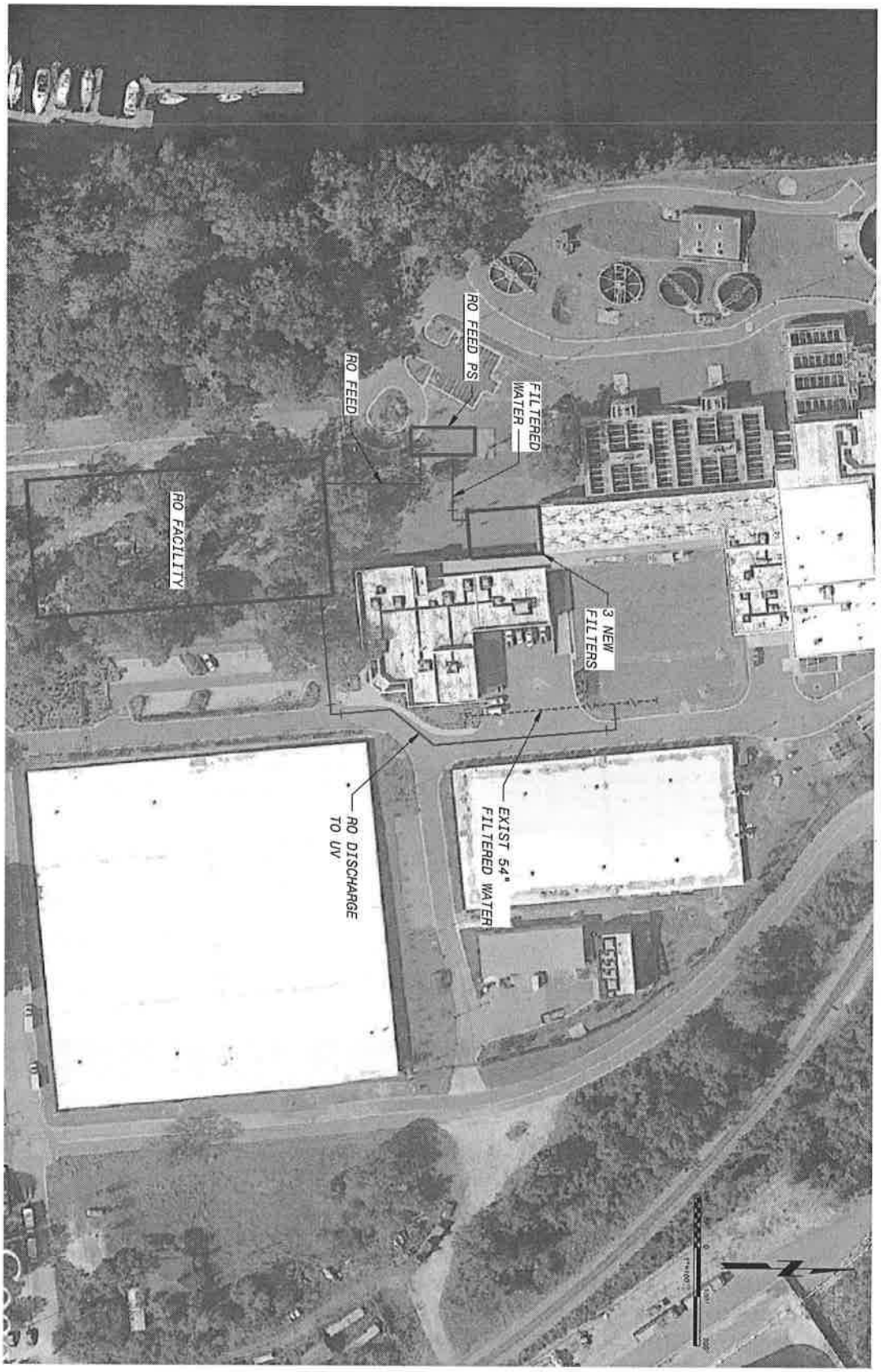
could be located outside with sunshades, like the existing filters. The additional area for the filtration step would be about 2,300 ft², the pump station would be about 500 ft², and the RO/NF building would be about 40,000 ft². Part of the RO/NF building area could be located with the transfer pump station building as needed to fit on the site. The costs for the shade-covered area and building(s) have been included in the cost opinion presented in this memorandum. A concept of Option 3 is shown in Figure 7-1. The area identified for the RO/NF Facility is in the park to the south of the existing Sweeney WTP site.

The planning level cost opinion for Option 3 (RO/NF) is presented in Table 7-2.

Table 7-2 Option 3 (RO/NF Post-Filtration) Planning Level Cost Opinion

PARAMETER	OPTION 3
Description	RO/NF Post-Filtration
Initial Cost, $ in millions	$113 million
Annual Operating Costs, $ in millions/yr	$3.3 million
Present Worth (PW) of Annual Costs, $ in millions	$45 million
Total Present Worth (TPW), $ in millions	$158 million

FD7000
D7000



SITE PLAN
1" = 100'-0"

CAPE FEAR PUBLIC UTILITY AUTHORITY
SWEENEY WATER TREATMENT PLAN

OPTION 3
SITE PLAN

BLACK & VEATCH
Building a world of difference
Black & Veatch Corporation
Kansas City, Missouri

DESIGNED:	
DRAWN:	
CHECKED:	
APPROVED:	
DATE:	

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.

FIGURE 7-1
SHEET OF

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK	APP
PM:					
FM FILE:	SHEET:				
SAVED: 8/23/2017 8:53:12 AM	SHEET:				
PLOTTED: 8/23/2017 10:14:52 AM	SHEET:				
USER: STOKESD	DRG VER:	SHEET:			

8.0 Discussion

The planning level cost opinions for the options evaluated in this memorandum are summarized in Table 8-1.

Table 8-1 Summary of Planning Level Cost Opinions

PARAMETER	OPTION 1A	OPTION 1B	OPTION 1C	OPTION 3
Description	GAC in Existing Filters	GAC Contactors Post-Filtration	Deep Bed Version of 1B	RO/NF Post-Filtration
Initial Cost, $ in millions	$1.7 million	$28 million	$32 million	$113 million
Annual Operating Costs, $ in millions/yr	$3.0 million to $6.0 million	$3.3 million to $6.3 million	$3.4 million to $6.4 million	$3.3 million
Present Worth (PW) of Annual Costs, $ in millions	$42 million to $82 million	$45 million to $86 million	$46 million to $86 million	$45 million
Total Present Worth (TPW), $ in millions	$44 million to $84 million	$73 million to $114 million	$78 million to $118 million	$158 million

Notes: GAC = Granular Activated Carbon; RO/NF = Reverse Osmosis/Nanofiltration

Option 1C was added after TM1 was written. Option 1C is a deeper bed version of Option 1B.

Option 1A's initial cost includes an initial load of GAC media and one-time replacement of sand and gravel. The GAC options (1A, 1B, 1C) would have higher initial costs if standby filters/contactors were added to provide full capacity when units are off-line during GAC replacement events.

Annual costs for the GAC options (1A, 1B, 1C) are a function of media life. The cost ranges in the table are based on 6,000 and 12,000 bed volumes (BV). A 6,000 BV case would need to change GAC twice as often as a 12,000 BV case. CFPUA is conducting testing to determine BV at Cape Fear River concentrations.

In accordance with recommendations in TM1, a detailed cost opinion was not prepared for Option 2, Ion Exchange (IX); however, it is the engineer's opinion that TPW for Option 2 would be roughly in line with Option 1B. IX is less widely practiced for organic contaminant removal than GAC or RO/NF. However, recent pilot testing elsewhere of IX resins has shown promise as a treatment technology for removal of perfluorinated compounds from drinking water. Therefore, as a contingency CFPUA is conducting IX testing.

As anticipated at the outset of this study, Option 1A has the lowest TPW, Option 3 the highest, and 1B/1C are between them. Option 1C, the deep bed version of 1B, has a higher cost by $4 million (a 14 percent increase in initial cost). The deeper beds would result in higher construction costs and more GAC media would need to be purchased for the initial loading. Operating costs for those options are almost the same, since the GAC consumption rate is the same while the feed water pumping costs would be slightly high to service the deeper contactors.

Because the costs for the GAC options (1A, 1B, and 1C) are directly dependent on the frequency of GAC replacement, a sensitivity analysis was conducted on those options. If the GAC bed life were reduced from an assumed value of 12,000 BV to only 6,000 BV, the GAC would need to be replaced twice as often. For example, at 12,000 BV the time period between GAC media replacement events is about every 5.2 months (156 days) at average flow conditions with all of the filters/contactors being operated in parallel. If the BV value is reduced by 50 percent to 6,000 BV, the time period

between replacement events would be cut in half, to about every 78 days and the annual operating costs would roughly double.

In addition to considering the costs, it is useful to consider non-financial factors when comparing these options. Related issues are summarized as follows.

- Option 1A (New GAC in Existing Filters). This is the lowest cost option due to the comparatively low initial cost. Currently the GAC media in the existing filters provides filtration, while if new GAC were installed it would provide both filtration and adsorption to remove dissolved organic materials. A key issue with all of the GAC options (1A, 1B, and 1C), is the change-out frequency. Testing is being conducted to verify preliminary assumptions. At the 6,000 BV to 12,000 BV cases considered herein, change-out would be every 78 days to 156 days for each unit. Such frequent servicing would reduce plant capacity, unless standby filters are added and could be an impediment to operations. Other aspects of GAC options (1A, 1B, and 1C) that can also be tested include a risk of chromatographic peaking (which could result in higher concentrations in the effluent than in the influent) and a benefit of removing other compounds such as Contaminants of Emerging Concern (CEC) or Pharmaceuticals and Personal Care Products (PPCP).

- Option 1B (GAC Contactors Post-Filtration). This option has the same advantages and limitations of Option 1A, since they both apply GAC; however, 1B has the added feature of locating the new process downstream from the filters. Therefore, while the frequency of GAC change-outs could be an impediment to the operations staff, GAC replacement events would not directly impact filtration activities. The GAC in Option 1B would remove organic materials via adsorption, but it would not also provide filtration; that would continue to be accomplished by the existing filters. As with Option 1A, 1B (and 1C) would provide the benefit of removing other CEC and PPCP compounds. If adsorption were not needed in the future, the change-out frequency of 1A could be reduced or mostly eliminated and Options 1B or 1C could be converted to use as filters, such as for a plant expansion.

- Option 1C (Deep Bed Version of 1B). Option 1C, a deep bed version of Option 1B, was included to consider the cost impact of contactors with a longer time period between breakthrough and therefore a longer time between GAC replacement events. Due to increased construction costs and a greater amount of GAC media initially installed, the capital costs of 1C would be higher than with 1B; however, the operating costs would be essentially the same, since the consumption of GAC would be the same. Having longer time periods between GAC replacement events would be less disruptive to plant operations.

- Option 2 (IX Post-Filtration). There are similarities between Option 2 (IX) and the post-filtration GAC options (1B and 1C), including operating costs affected by the number of BV and the associated frequency of media replacement. Testing is being conducted to allow comparison of the number of BV for GAC and IX media and better quantification of costs.

- Option 3 (RO/NF Post-Filtration). Option 3 has the highest costs, both initial and total present worth, as well as requiring the greatest amount of land. The evaluation indicates that the main RO/NF building would not fit on the existing Sweeney WTP site. An alternative location to consider would be the park area to the south adding to the complexity of the project. It is unknown if that land would be available for this purpose. In addition, Option 3 includes the drawbacks of consuming the greatest amount of raw water, disposal of the concentrate stream and post-treatment to control corrosion. The additional

raw water consumption could limit future plant expansion options and the concentrate disposal could increase the projected cost opinion, depending on the requirements of the regulatory agency. The costs for a concentrate disposal method have been included in the evaluation, but it is unknown at this time if the regulatory agency will accept this method.

9.0 Summary/Recommendations

1. This memorandum presents on planning-level cost opinions for treatment methods to remove organic chemicals known as perfluoroalkyl substances (PFASs), including a type called GenX.

2. As expected, Option 1A is the lowest cost option and Option 3 is the highest cost (refer to Tables ES-1 and 8-1). The initial costs are $1.7 million for Option 1A, $28 million for Option 1B, $32 million for Option 1C (a deep bed version of 1B), and $113 million for Option 3. The Total Present Worth values for these options are $44 million to $84 million, $73 million to $114 million, $78 million to $118 million, and $158 million, respectively.

3. A detailed cost opinion was not prepared for Option 2 (IX) in accordance with the recommendations in TM1; however, it is the engineer's opinion that Total Present Worth for Option 2 would be roughly in line with Option 1B.

4. The annual operating costs and the Total Present Worth of the GAC and IX options are sensitive to the frequency of media replacement. For example, doubling the GAC replacement frequency from about every 5 months to about every 2.5 months would roughly double the Present Worth of 1A and increase 1B and 1C by about 60 percent. Testing is being conducted to refine the understanding of this variable.

5. Frequent replacement of the media (GAC or IX) not only adds to the operating costs, frequent replacement could also be an impediment to operations of the WTP.

6. In addition, non-financial aspects that could influence consideration of GAC and IX include selectivity and chromatographic peaking. Regarding chromatographic peaking, this can result in higher concentrations in the effluent than in the influent for some compounds. Ongoing testing will help refine the understanding of these variables.

7. Limitations for Option 3 (RO/NF) include the need for additional land area, the size of a new process building, consumption of a larger amount of raw water, and the requirement to dispose of concentrated wastewater. It is currently unknown if it would be possible to acquire the additional land. It is also unknown if the regulatory agency would allow the concentrate disposal method that have been included kin the cost model. Increasing the raw water consumption rate could limit future plant expansion options.

10.0 List of Abbreviations

AACE	Association for the Advancement of Cost Engineering
BV	Bed Volume
CEC	Contaminants of Emerging Concern
EBCT	Empty Bed Contact Time
EPA	United States Environmental Protection Agency
ft^2	Square Foot
GAC	Granular Activated Carbon
gfd	gallons per ft^2 per day = gpd/ft^2
gpm	gallon per Minute
IX	Ion Exchange
MCL	Maximum Contaminant Level
mgd	million gallons per Day
NCDEQ	North Carolina Department of Environmental Quality
NF	Nanofiltration
ng/L	nanogram per Liter
PFAS	Perfluoroalkyl Substance
PFC	Perfluorinated Compound
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PFPrOPrA	Perfluoro-2-Propoxypropanoic Acid (aka GenX)
PPCP	Pharmaceuticals and Personal Care Products
PW	Present Worth
RO	Reverse Osmosis
TM1	Technical Memorandum 1
TM2	Technical Memorandum 2
TPW	Total Present Worth
UV	Ultraviolet
WTP	Water Treatment Plant
Yr	Year

11.0 References

Black & Veatch (2017). Technical Memorandum 1 Desktop Evaluation of Alternatives – GenX and Other PFAS Treatment Options Study, Project 196369, prepared for Cape Fear Public Utility Authority (CFPUA), July, 2017.

Black & Veatch Project 145726, Process Design Memorandum for Sweeney WTP Expansion, February 16, 2007.

Black & Veatch Project 145726, Civil Design Memorandum for Sweeney WTP Expansion, May 22, 2007.

CFPUA (2017). CFPUA Receives New GenX Results, Posted on Sept 13, 2017. (http://www.cfpua.org/CivicAlerts.aspx?AID=741)

Dickenson, Eric R. V., and Christopher Higgins (2016). Treatment Mitigation Strategies for Poly- and Perfluoroalkyl Substances, WEF Project 4322, ISBN 978-1-60573-234-3, Water Research Foundation, Denver, Colorado.

EPA (2016). Fact Sheet PFOA and PFOS Drinking Water Health Advisories, EPA 800-F-16-003, November 2016.

NCDEQ (2017a). NCDEQ confirmed that Chemours had stopped discharging GenX wastewater (https://deq.nc.gov/deq-verifies-chemours-has-stopped-discharging-genx-wastewater).

NCDEQ (2017b). GenX Sampling Sites (https://deq.nc.gov/news/hot-topics/genx-investigation/genx-sampling-sites).

Sun, M., Arevalo, E., Strynar, M., Lindstrom, A., Richardson, M., Kearns, B., Pickett, A., Smith, C., and Knappe, Detlef R. U. (2016). Legacy and Emerging Perfluoroalkyl Substances are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina, Environmental Science & Technology Letters 3(12): 415-419, American Chemical Society, November 10, 2016.

Water Research Foundation (WRF) (2016). Poly- and Perfluoroalkyl Substances: Background Technical Information, 5 pp., WRF, Denver, Colorado, August 2016.

FINAL

PROGRESS UPDATE

Emerging Contaminants Treatment Strategy Pilot Study

B&V PROJECT NO. 196369



PREPARED FOR

Cape Fear Public Utility Authority

1 NOVEMBER 2017

BLACK & VEATCH

©Black & Veatch Holding Company 2017 All rights reserved.

Table of Contents

1.0 Purpose **1**
2.0 Introduction **1**
3.0 Testing and Analysis **1**
3.1 Testing Goals 1
3.2 Means and Methods 1
3.2.1 Accelerated Column Test 2
3.2.2 Pilot Test 3
3.3 GAC Interim Results to Date 5
3.4 IX Interim Results to Date 6
4.0 Discussion **6**
5.0 Conclusions/Recommendations **6**

LIST OF TABLES

Table 3-1 Adsorbents 4
Table 3-2 Results of Most Recent Sample 5

LIST OF FIGURES

Figure 3-1 Accelerated Column Test Flow Diagram 2
Figure 3-2 Accelerated Column Test Equipment 2
Figure 3-3 Pilot Test Flow Diagram 3
Figure 3-4 Pilot Test Skid 4

1.0 Purpose

This document presents the status of ongoing bench- and pilot-scale testing to evaluate the performance of several proposed treatment technologies in their removal of perfluoroalkyl substances (PFASs), including perfluoro-2-propoxypropanoic acid (commonly known as GenX).

2.0 Introduction

PFASs have been detected in the Cape Fear River, which is the source of raw water for the Sweeney Water Treatment Plant (WTP). The Sweeney WTP provides drinking water to Cape Fear Public Utility Authority (CFPUA) customers in the City of Wilmington and New Hanover County in North Carolina.

In response to the detection of GenX and other PFASs in the Cape Fear River and because of concern over potential health effects, CFPUA is proactively investigating the feasibility and effectiveness of PFAS removal technologies. CFPUA is one of the first utilities in the United States to pursue treatment to target removal of these compounds. Initial evaluations performed by Black & Veatch were provided in Technical Memoranda 1 and 2. As a result of those evaluations, bench- and pilot-scale testing of granular activated carbon (GAC) filter media and ion exchange (IX) resins was initiated. The details of the bench- and pilot- scale testing are presented herein.

3.0 Testing and Analysis

Granular activated carbon filter media and ion exchange resin were selected for bench- and pilot-scale testing. Reverse osmosis/nanofiltration was excluded because of much higher life-cycle cost and potential challenges related to disposal of the concentrate, but the technology will be considered if testing of GAC and IX fail to meet testing goals. The following sections provide information on the testing.

3.1 TESTING GOALS

The primary goal of the testing is to establish the adsorption characteristics for PFASs and other contaminants of emerging concern (CECs) on GAC media and IX resin. These characteristics will be used to refine the previous study-related evaluations and identify the most advantageous short- and longer-term treatment strategies for removal of PFASs and CECs at the Sweeney WTP. The data will help define a design basis for full-scale implementation of the selected technology. Ancillary benefits are also being identified as part of the study, such as reductions in total organic carbon (TOC), disinfection byproduct (DBP) formation, and inorganic compounds.

3.2 MEANS AND METHODS

Pilot testing is used to determine the adsorption characteristics of PFASs on GAC media and IX resins. Accelerated column testing was performed on two GAC media as one month of operating results can be used to estimate up to one year of performance. The same accelerated testing is not available for IX resins. Each test is discussed in the following sections.

During the initial screening process, commercially available GAC media and IX resins were surveyed to identify products that have the highest likelihood of achieving PFAS removal for testing. Testing of surveyed media and resins was then prioritized based on experience and suitability with PFAS removal.

3.2.1 Accelerated Column Test

The accelerated column test is designed to simulate year-long operation of a full-scale bed of GAC using a smaller bench-scale column that is operated for around a month. The test consists of scaling down commercial GAC by pulverizing it into smaller particles to achieve a proportionate adsorption capacity and placing it in a scaled-down column. Empty bed contact time (EBCT) for the accelerated column test is maintained equivalent to the full-scale design. A sample of water from the plant is pumped through the column for several weeks. Samples are collected for analytical testing to establish a breakthrough curve for the GAC media. A flow diagram of the ACT rig is shown in Figure 3-1 and an image of the test rig in Figure 3-2.

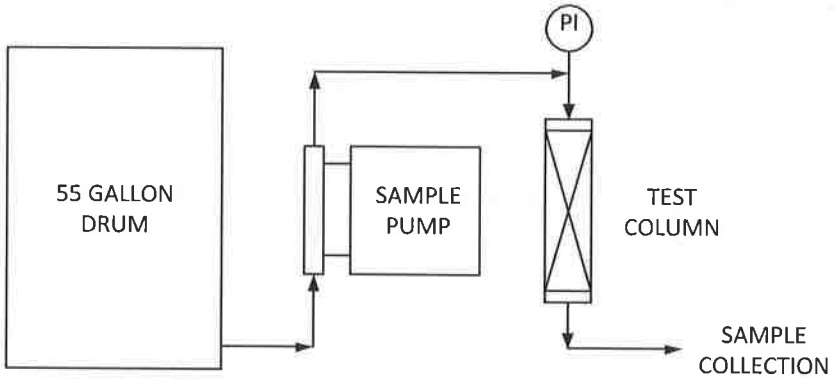


Figure 3-1 Accelerated Column Test Flow Diagram

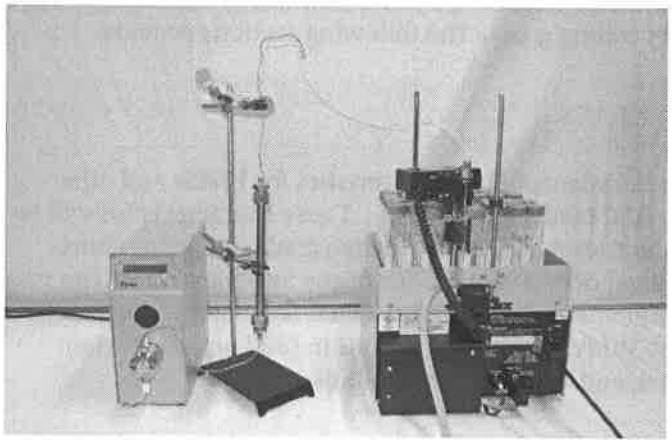


Figure 3-2 Accelerated Column Test Equipment

The ACT test for CFPUA was performed by Calgon Carbon Corporation, a supplier of granular activated carbon. Two 55 gallon drums of water drawn downstream from the existing filters at the Sweeney WTP were submitted for testing. Two ACTs were performed, one using Calgon's Filtasorb 400, and the other using Filtrasorb 600. Both GAC products were scaled down from mesh sizes of 12 by 40 for the test. Both tests were run simultaneously in parallel for 27 days to simulate one year of full-scale operation. Each test was run using an EBCT of 10 minutes.

3.2.2 Pilot Test

Pilot testing is used to evaluate performance of a design on a small scale in real-time prior to investment in full-scale implementation. The CFPUA pilot operates in parallel with the existing treatment scheme at the Sweeney WTP. The pilot consists of six test columns: four columns containing GAC media and two columns containing IX resin. A very small portion of the process flow in the WTP is diverted to each of the columns to assess placement within the overall process scheme and performance. A process flow diagram of the pilot is presented in Figure 3-3 and a picture of the GAC columns is illustrated in Figure 3-4.

Each column is equipped with valves and a flow meter to regulate flow through the column. Samples are collected at the inlet and outlet of the columns for analytical testing to measure adsorbent performance. Samples are collected at the following locations:

- Plant influent
- Existing filter influent
- Existing filter effluent
- Plant effluent prior to distribution
- Outlet of each test column

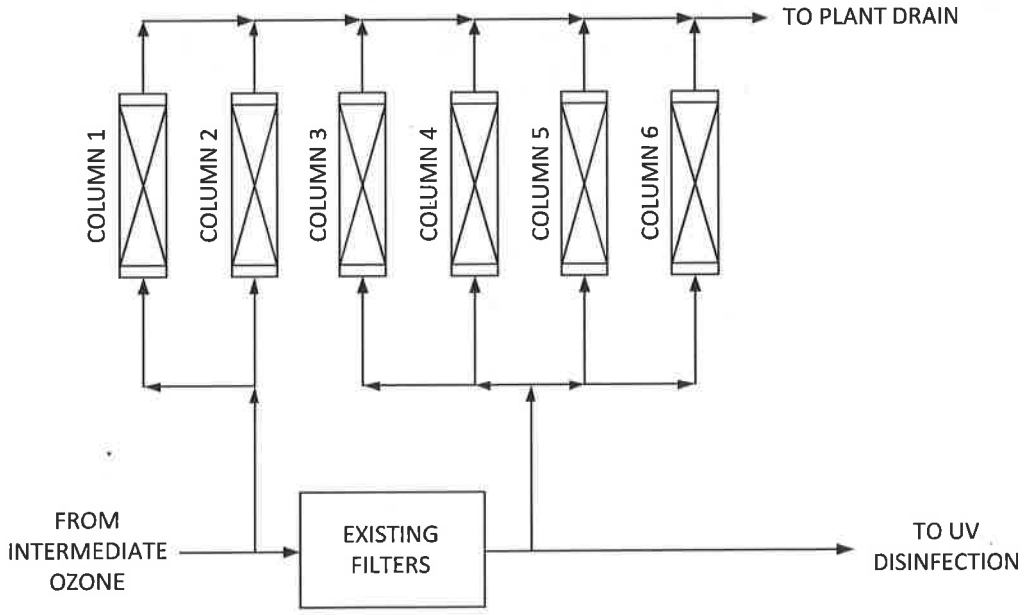


Figure 3-3 Pilot Test Flow Diagram

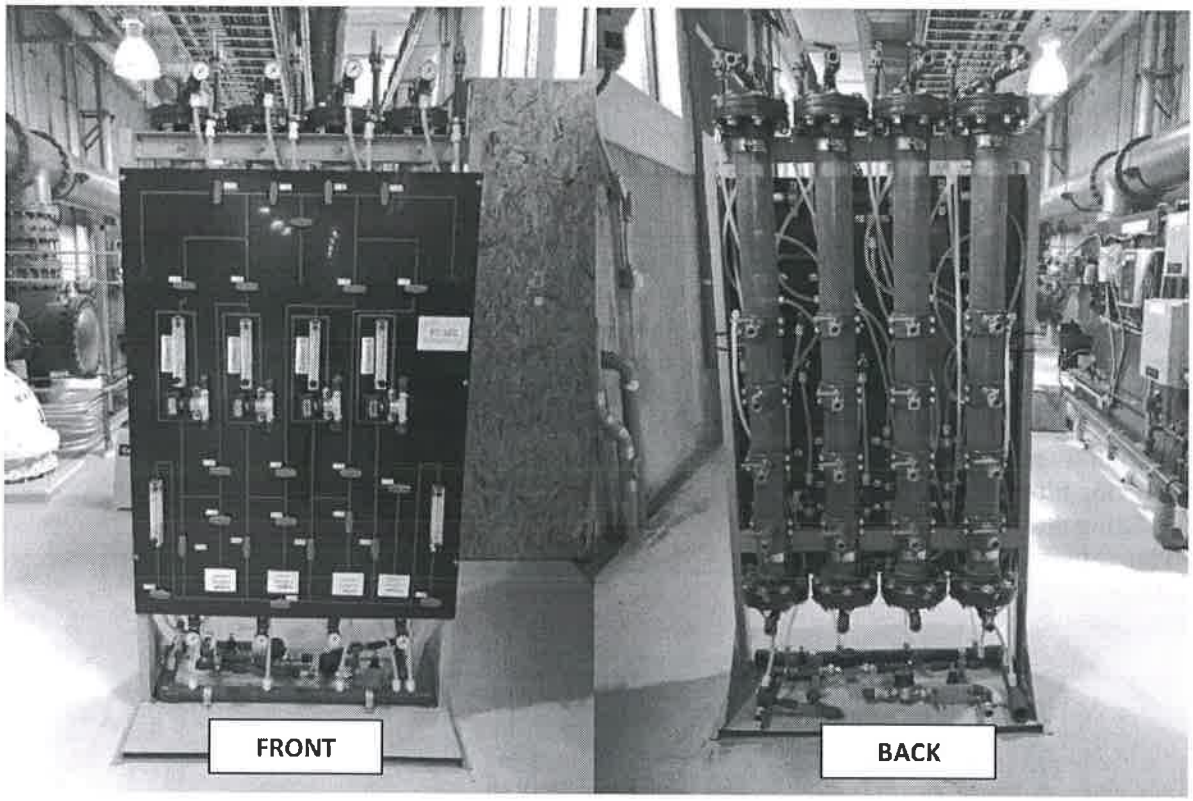


Figure 3-4 Pilot Test Skid

Operation of columns 1 through 4 began on August 2, 2017 and columns 5 and 6 (not shown) began operation on September 5, 2017. Each column containing GAC was run at an EBCT of 10 minutes. Each column containing IX resin was run at an EBCT of 1.5 minutes. The adsorbent selected for each test column is listed in Table 3-1. All test columns have operated continuously since their start.

Table 3-1 Adsorbents

Column	Type	Adsorbent	Supplier
Column 1	GAC	GAC 1 (Filtrasorb F400 12x40)	Calgon
Column 2	GAC	GAC 2 (Filtrasorb F300 12x30)	Calgon
Column 3	GAC	GAC 3 (Filtrasorb F400 12x40)	Calgon
Column 4	GAC	GAC 4 (AquaCarb 1230 CX)	Evoqua
Column 5	IX	IX 1 (DOWEX PSR-2)	Evoqua
Column 6	IX	IX 2 (CalRes 2304)	Calgon

3.3 GAC INTERIM RESULTS TO DATE

Granular activated carbon is used in the accelerated column testing and the pilot testing. Preliminary ACT results included a discrepancy in the dilution factors used and the laboratory is repeating the analysis. No ACT test results are available at this time.

Interim results of the ongoing pilot testing are presented in Table 3-2. All data is reported based on equivalent bed volumes of water treated.

Each GAC test column is exhibiting gradual breakthrough of TOC and PFASs, led by GenX. Columns 1 and 2, which are being tested using water from upstream of the existing filters, are showing slower breakthrough for all PFASs than columns 3 and 4, which are being tested using water from downstream of the existing filters. Testing data show higher values for each PFAS analyte in the water post filter than in the water pre filter. This may indicate that chromatographic peaking is occurring in the existing filters, where the existing media is desorbing PFASs to preferentially adsorb another compound leading to higher concentrations of PFASs in the post filter water.

Also included in Table 3-2 are other emerging contaminants that include Endocrine Disrupting Compounds (EDCs) and Pharmaceutical and Personal Care Products (PPCPs). The four GAC columns are highly effective for the removal of these compounds at this point whereas IX is ineffective for the removal of those compounds.

Table 3-2 Sampling Results as of October 3, 2017

Pilot Supply		**Intermediate Ozone**		**Biologically Active Filter Effluent**			
	Column Influent	**GAC-1**	**GAC-2**	**GAC-3**	**GAC-4**	**IX-1**	**IX-2**
Bed Volumes	---	8,800	9,200	8,800	9,100	27,400	27,400
PFASs							
	ng/L	**Percent Breakthrough**					
GenX	24 -42.2	68	90	100	113	0	0
PFHxA	18-41	50	63	74	80	0	0
PFHpA	11-28	36	44	62	62	0	0
PFOA	9.8-17	22	28	47	43	0	0
PFBS	4-6.4	3	26	45	58	0	0
PFHxS	5.4-11	0	9	28	27	0	0
PFOS	9.4-24	0	0	18	15	0	0
Endocrine Disrupting Compounds (EDCs)/Pharmaceutical and Personal Care Products (PPCPs) (Percent Breakthrough)							
	µg/L	**Percent Breakthrough**					
Sucralose	0.864-0.928	14	14	25	15	96	94
Tris(chloropropyl) phosphate	0.06-0.07	0	0	0	0	100	114
Cotinine	0.003	0	0	0	0	100	100
Acesulfame-K	0.02-0.04	0	0	0	0	0	0

3.4 IX INTERIM RESULTS TO DATE

Ion exchange is only undergoing pilot testing. Interim results of the ongoing pilot testing are presented in Table 3-2. Neither ion exchange test column has – to date – exhibited any breakthrough of PFASs through approximately 27,400 bed volumes treated. This indicates that both IX columns are adsorbing PFASs such that their levels in the treated water are not detectable.

4.0 Discussion

- The bench-scale and pilot testing is ongoing and scheduled to continue through the first quarter of 2018 until testing goals are achieved.
- PFAS are being observed in the pilot GAC media effluent.
    - Columns 3 and 4 are very near or above the influent concentration for GenX.
    - Other PFAS continue to be partially removed.
- Ion exchange adsorbents have yet to show any breakthrough of PFASs.
- GAC columns are more effectively removing EDCs and PPCPs than IX columns.
- Testing will evolve as data is received to refine short- and long-term treatment strategies. This includes the replacement of adsorbents that fail to perform.
    - GAC 1 – Continue piloting until regulatory review of alternative filter media configuration is complete. Also awaiting complete breakthrough of PFAS, EDCs, and PPCPs.
    - GAC 2 – Continue piloting until regulatory review of alternative filter media configuration is complete. Also awaiting complete breakthrough of PFAS, EDCs, and PPCPs.
    - GAC 3 – Continue piloting to observe complete breakthrough of PFAS in a post filtration location.
    - GAC 4 – Continue piloting to observe complete breakthrough of PFAS in a post filtration location. Maintain the opportunity to include an alternative supplier.
    - IX 1 – Continue piloting to observe breakthrough of PFAS.
    - IX 2 - Continue piloting to observe breakthrough of PFAS.
- Additional pilot columns are being considered for testing of other GAC and IX adsorbents.

5.0 Conclusions/Recommendations

The following conclusions and recommendations can be developed based on the interim testing results.

- PFAS are being detected in the pilot GAC media effluent after 1,600 bed volumes.
- EDCs and PPCPs are effectively removed by all GAC columns after 8,800 bed volumes.
- No PFAS have been observed in the IX column effluent after 27,400 bed volumes.
- EDCs and PPCPs are not effectively removed by either IX column.
- No cost evaluation has been completed comparing IX and GAC.

- No life-cycle costs have been developed comparing IX and GAC so it is premature to eliminate a technology at this time. Life-cycle cost development is occurring in parallel with the pilot study.

UNIVERSITY OF NORTH CAROLINA WILMINGTON

Cape Fear Public Utility Authority

Project update for the period covering September 1 – 30th, 2017

Summary:

We are progressing along with the analysis and are on schedule. The first month has involved finding vendors for standards and supplies for the per-and poly-fluorinated compounds (PFAS) analysis. The standards ordered and received so far are listed in figure 1. The standards are a combination of internal standards that are enriched with carbon-13 and authentic standards. As the research progresses more standards will be ordered for structural confirmation as well as QA/QC purposes. All reagent and consumables have been ordered and received for the solid phase isolation and pre-concentration of PFAS from water. Method validation is currently underway using published quality assurance and quality control protocols. The figures of merit that need to be addressed include recoveries, blanks and precision of analysis. Initial results are promising with linear calibration curves generated by the LC/QTOF high resolution mass spectrometer. Instrument blanks and laboratory blanks do not detect any PFAS compounds.

If you have any questions, please do not hesitate to contact me.

Best regards,

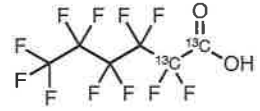
Ralph N. Mead, Ph.D.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

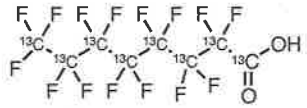
601 SOUTH COLLEGE ROAD · WILMINGTON, NORTH CAROLINA 28403-5932 · 910-962-3450 · FAX 910-962-3013



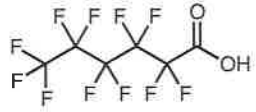
Sodium pefluoro-1-[$^{13}C_8$]octanesulfonate



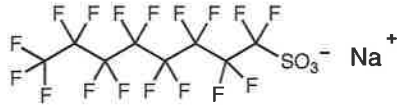
pefluoro-n-[1,2-$^{13}C_2$]hexanoic acid



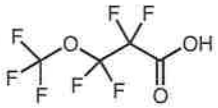
pefluoro-n-[$^{13}C_8$]octanoic acid



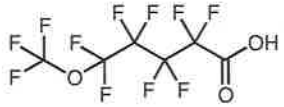
Perfluorooctanoic acid (PFOA)



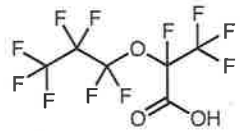
Sodium pefluorooctanesulfonate (PFOS)



Perfluro-3-methoxypropanoic acid



Perfluro(4-methoxybutanoic) acid



2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid

Figure 1: Structures of perfluorinated alkyl substances purchased to date as authentic standards. The ^{13}C enriched compounds will be used as internal and surrogate standards for the analysis. As the research progresses more standards will be purchased for structural conformation as well as QA/QC purposes.

Cape Fear Public Utility Authority

Project update for the period covering October 1 – 31st, 2017

Summary:

The focus of this month's efforts has been on method validation and figures of merit as outlined in the previous month's report; we are on target with our timeline. A mixture of perfluoroctanoic acid and perflouro-2-propoxypropanoicacid were used as initial surrogates since these compounds represent the linear saturated and ether homologues respectively. Baseline separation of both compounds has been achieved using ultrahigh performance liquid chromatography/mass spectrometry. The ion trap mass spectrometer is operated in multiple reaction monitoring mode where a precursor mass is isolated and subsequently fragmented and scanned by the mass spectrometer. The ion trap mass spectrometer is considered a tandem-in-space instrument and provides a full scan spectrum of the products ions generated. This gives multiple qualifier ions that aids in confirmation of the analyte of interest in addition to retention time. This can be observed in the product scan of perflouro-2-propoxypropanoic acid (figure 2a) and perfluorooctanoic acid (figure 2b). Typical calibration curves are presented for perflouro-2-propoxypropanoic acid (figure 3a) and perfluorooctanoic acid (figure 3b). Generating calibration curves of both compounds over several days gave average slopes and standard deviations of 223±28 and 4033±656 for perflouro-2-propoxypropanoic acid and perfluorooctanoic acid respectively illustrating the precision of the measurement. The average goodness of fit (R^2) for perflouro-2-propoxypropanoic acid and perfluorooctanoic acid was 0.998 and 0.999 respectively. Spike recoveries have been assessed for perfluorooctanoic acid using Cape Fear River water as the matrix. Briefly, a known concentration of (86 ppb) was

added to unfiltered upper Cape Fear River (Horseshoe Bend) and processed for LC/MS analysis. A corresponding unspiked sample was processed as well for background concentration and subtracted from the spiked sample. Recoveries for perfluorooctanoic acid were 80 % and 108 % (n=2). This range is within the requirements for EPA Method 537 of 70-130%. The limit of detection for perflouro-2-propoxypropanoic acid is 1 pg mass on column and 27 pg mass on column for perfluorooctanoic acid.

We are in discussion with Zerenex Molecular based in the United Kingdom for custom synthesis of perfluoro-2-methoxyacetic acid (PFMOAA) for quantification and structural conformation of this compound. Several of the standards outlined in the September presentation have been ordered for structural conformation and quantification as well. Lastly, the biosolids have been all been extracted and cleaned up over anion exchange column awaiting analysis by LC/MS.

The goals of the coming month are the following:

1. Complete the percent recoveries of PFAS in river water.
2. Incorporate the isotopically labeled internal standards in the analysis.
3. Obtain a new preparative solid phase extraction phase that selectively retains the fluorinated compounds. The mechanism of retention is different than the traditional anion exchange phase commonly used. If this new phase works than it will allow us to only investigate and characterize fluorine containing organic compounds. See this link for an example: http://fluorous.com/fspe.php
4. Complete analyses of biosolid samples.

Figure 1: Extracted ion chromatograms of perflouro-2-propoxypropanoic acid (a) and perflourooctanoic acid (b) analyzed by ultra high performance liquid chromatography/mass spectrometry. The ion trap mass spectrometer was operated in multiple reaction monitoring mode.

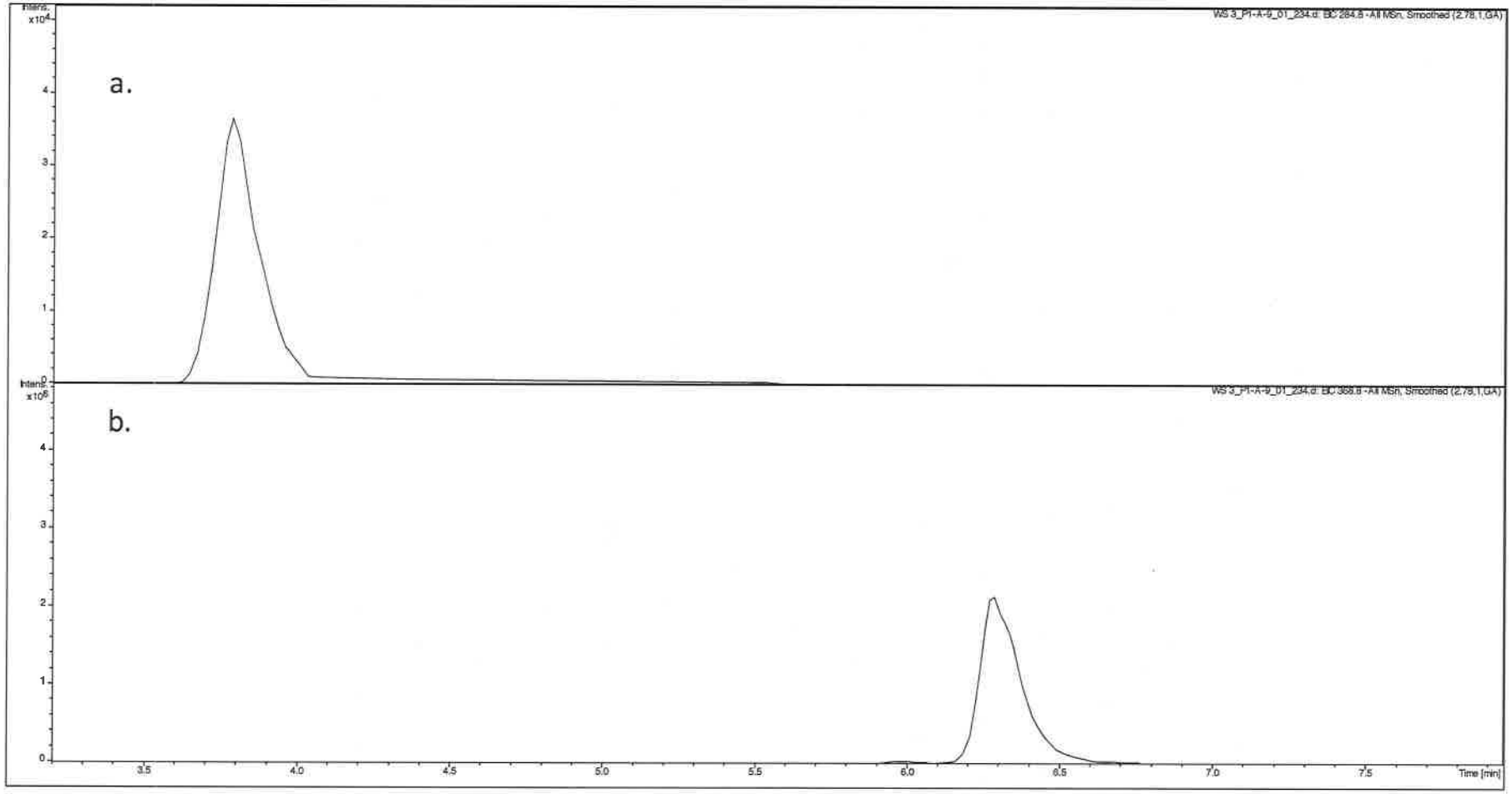


Figure 2: Product scans of perflouro-2-propoxypropanoic acid (a) and perflouroctanoic acid (b) analyzed by ultra high performance liquid chromatography/mass spectrometry. The ion trap mass spectrometer was operated in multiple reaction monitoring mode.

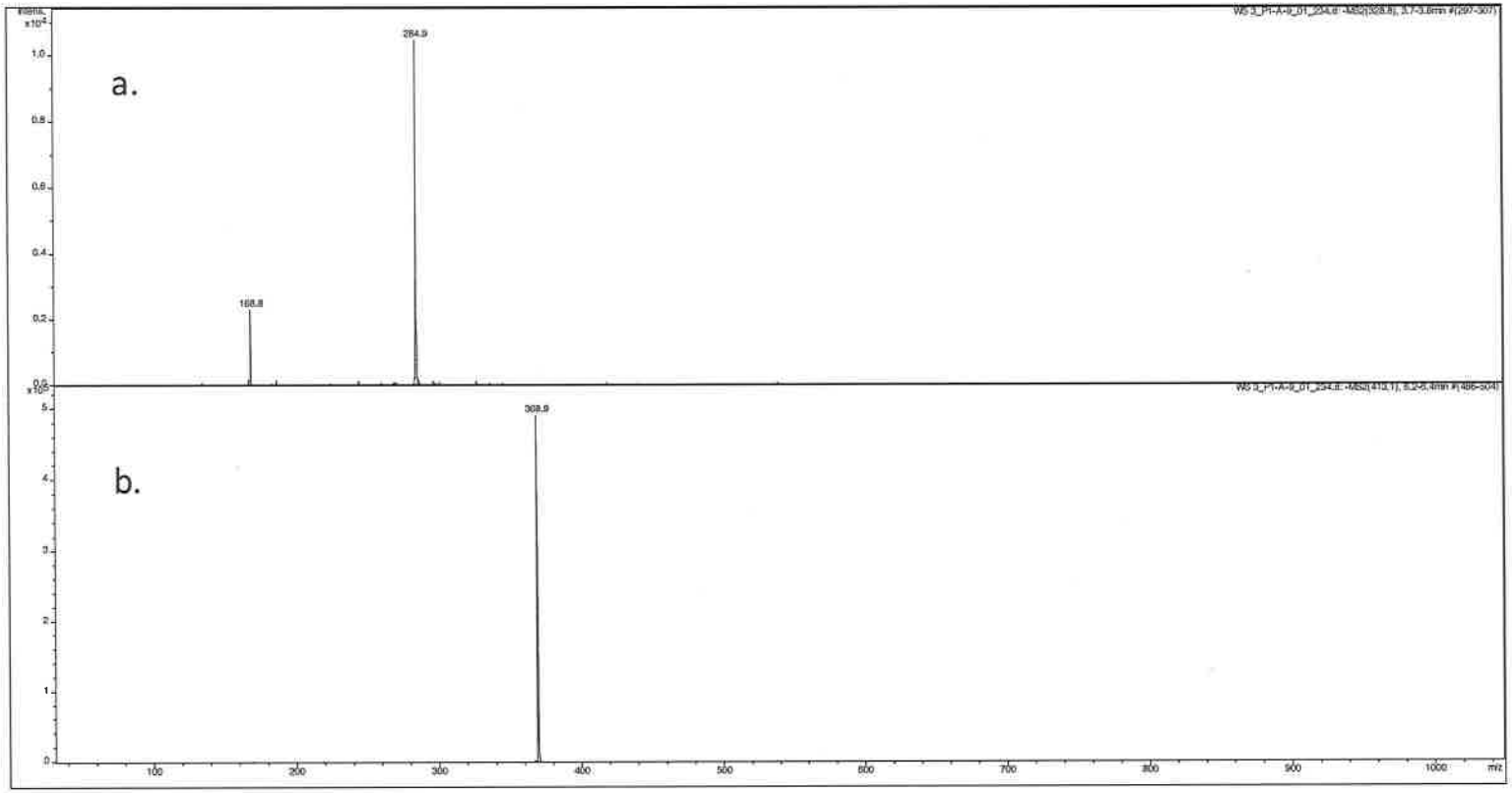
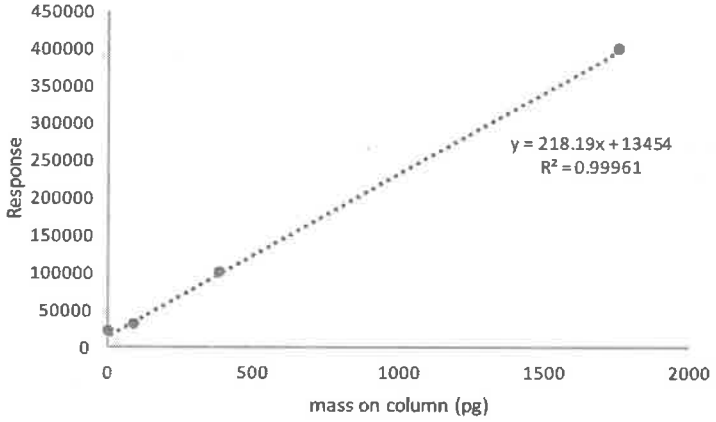
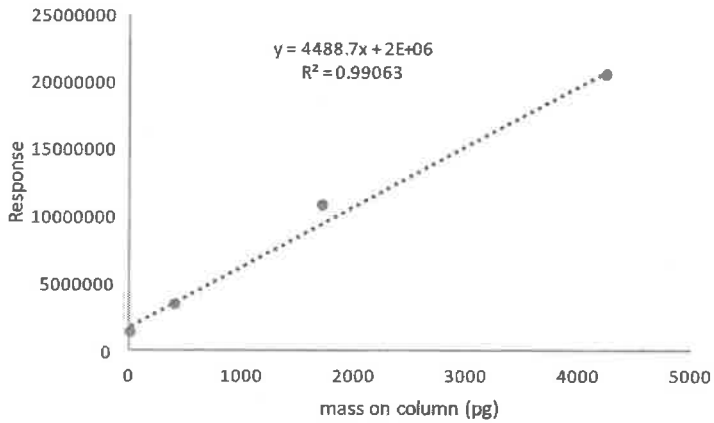


Figure 3: Typical calibration curves of perflouro-2-propoxypropanoic acid (a) and perflourooctanoic acid (b) analyzed by ultra high performance liquid chromatography/mass spectrometry. The average slope and standard deviation of replicate calibration curves (n=3) for perflouro-2-propoxypropanoic acid is 223±28 while the perflouroocanoic acid is 4033±656.

a.



b.



Cape Fear Public Utility Authority Board Meeting
Agenda Item

Item:	CFPUA Board Resolution
Submitted By:	Jim Flechtner, Executive Director
Approved By:	Jim Flechtner, Executive Director
Prepared By:	Lindsey Hallock, Director of Public and Environmental Policy
Meeting Date:	February 14, 2018

Background: In November 2017, the North Carolina Department of Environmental Quality (NCDEQ) suspended Chemours' authorization to discharge any process wastewater from its fluorochemical manufacturing areas to the Cape Fear River.

Despite this suspension, Cape Fear Public Utility Authority continues to detect levels of GenX, Nafion byproducts 1 and 2, and other fluorinated compounds in the water at Sweeney Water Treatment Plant.

While CFPUA is conducting a pilot study to investigate the potential to remove these compounds, it is currently unable to filter them from the drinking water.

Funding: No funding is necessary for this action.

Recommended Action: Consider the attached resolution that calls on NCDEQ to require that tenants of the Fayetteville Works site cease all operations due to their inability to operate without discharging fluorochemical compounds.

Agenda Placement: As recommended by the Executive Committee.

Attachments:

- Cape Fear Public Utility Authority Board Resolution_Feb2018_FINAL (PDF)

Cape Fear Public Utility Authority

Resolution

Whereas Cape Fear Public Utility Authority ("CFPUA") furnishes water to the citizens of the City of Wilmington and portions of New Hanover County.

Whereas tenants of the Fayetteville Works site have released, and continue to release, GenX and other fluorochemical compounds into the Cape Fear River from the manufacturing facility located in Fayetteville, North Carolina.

Whereas the Chemours company claims it trucks wastewater containing fluorochemicals off-site, but fluorochemical compounds continue to be detected at varying levels in the Cape Fear River and in CFPUA's treated drinking water.

Whereas tenants of the Fayetteville Works site have repeatedly demonstrated that they are not capable of continuing operations at the facility in a manner that does not cause the release of GenX and other fluorochemical compounds into the Cape Fear River.

Whereas CFPUA uses the Cape Fear River as source water for the majority of its 200,000 customers.

Whereas the Sweeney Water Treatment Plant, owned and operated by CFPUA, is unable to filter certain unregulated contaminants out of the drinking water.

Whereas the North Carolina Department of Environmental Quality (NCDEQ) Division of Water Resources is tasked with ensuring safe drinking water in accordance with federal requirements, issuing pollution control permits, monitoring permit compliance, evaluating environmental water quality and carrying out enforcement actions for violations of environmental regulations.

Now, therefore, be it resolved:

1. CFPUA requests that NCDEQ immediately require all tenants of the Fayetteville Works site to cease operations that result in the production of fluorochemical compounds, due to their inability to operate without discharging fluorochemical compounds into the Cape Fear River.

This 14th day of February 2018.

Michael C. Brown, III

Chairman of the Board

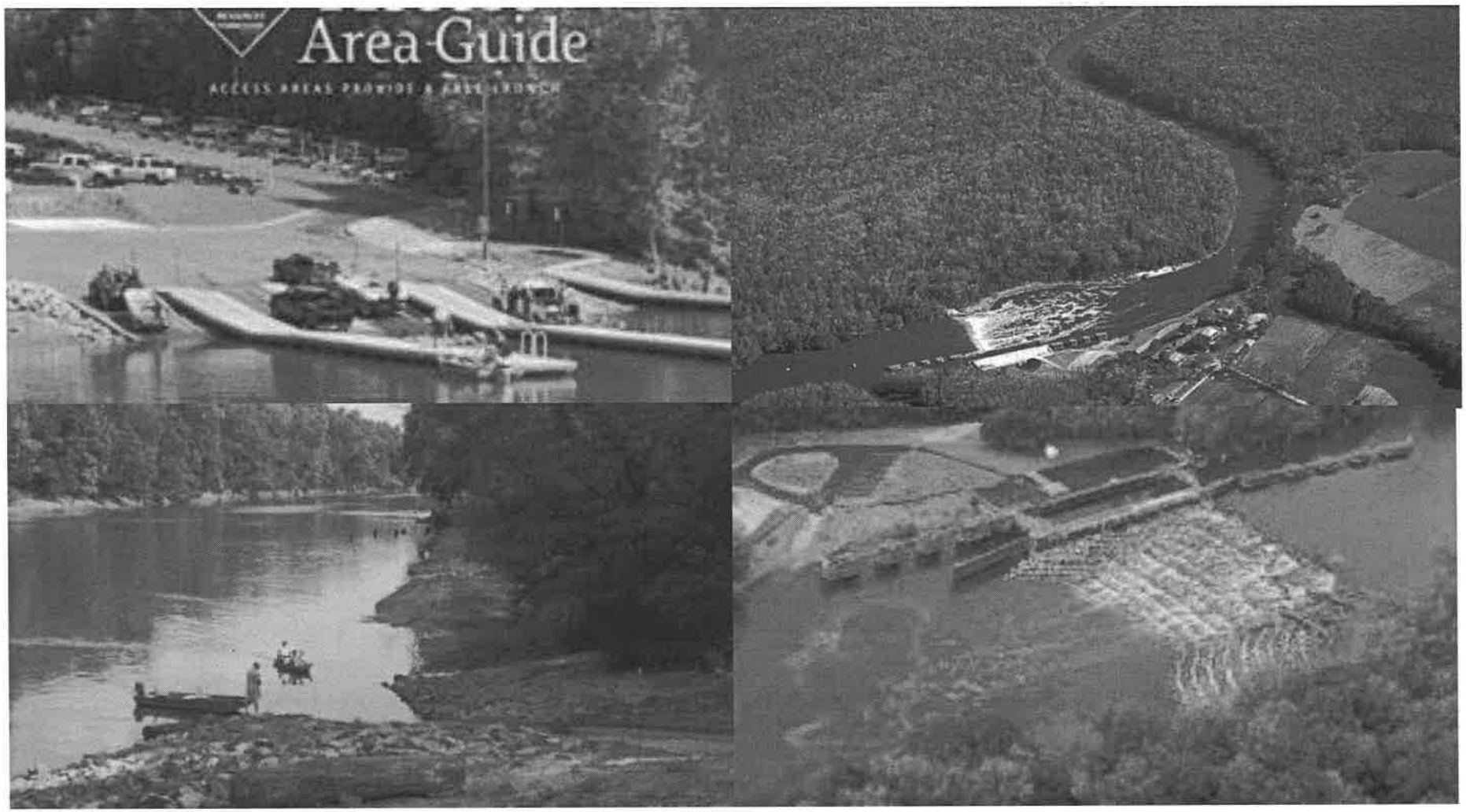
Attest:

Jennifer Adams, Secretary

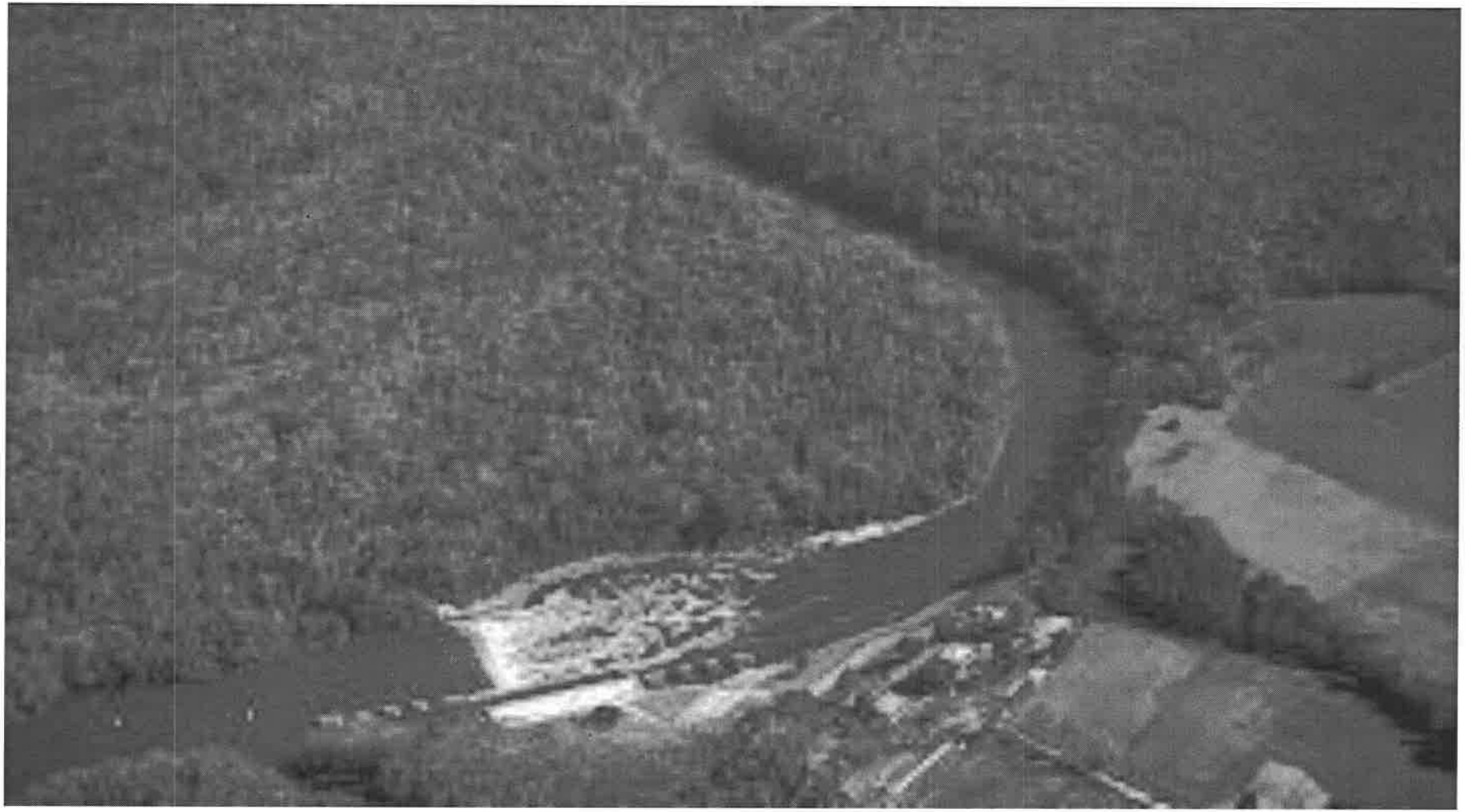
CAPE FEAR PUBLIC UTILITY AUTHORITY SEAL

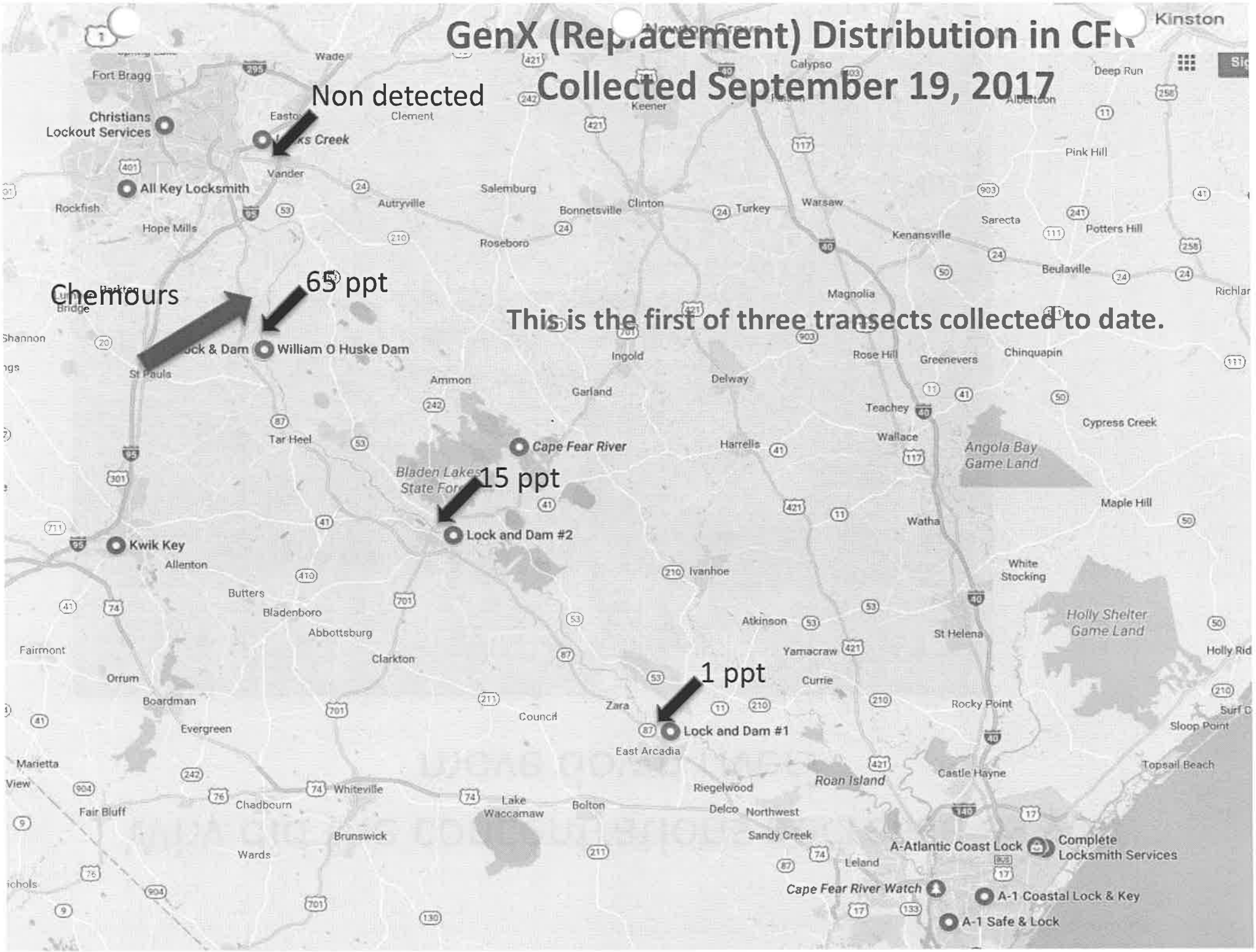
Sediments and GenX in The CFR

Ralph Mead, Brooks Avery, Steve Skrabal, Bob Kieber (Graduate students: Brittany Saleeby, Rachel Mott, Kate Tito)



Why are we interested in sediments? GenX in water column of CFR

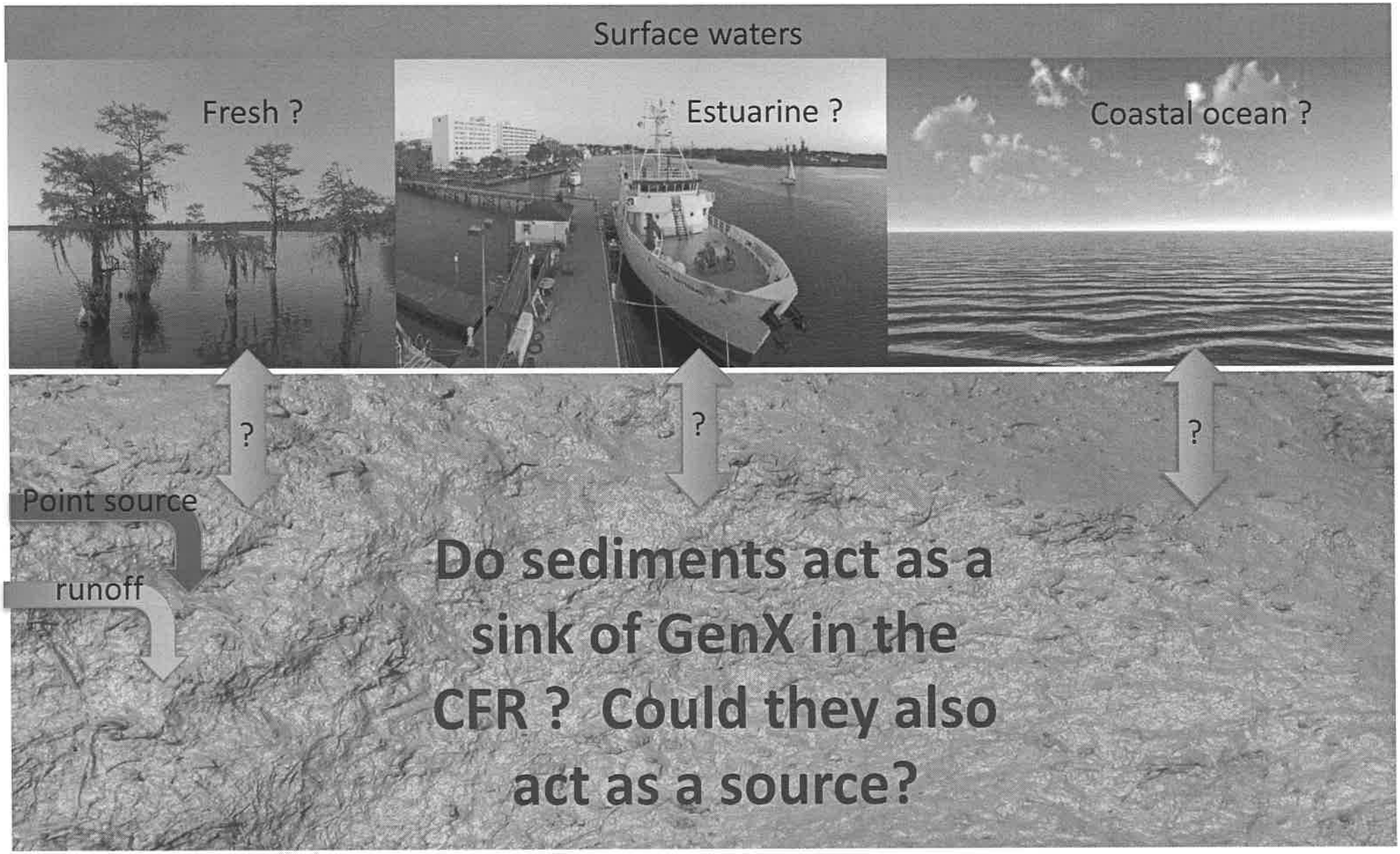



GenX (Replacement) Distribution in CFR
Collected September 19, 2017
Non detected
Chemours
65 ppt
15 ppt
1 ppt
This is the first of three transects collected to date.
Christians Lockout Services
All Key Locksmith
William O Huske Dam
Cape Fear River
Lock and Dam #2
Kwik Key
Lock and Dam #1
A-Atlantic Coast Lock
Complete Locksmith Services
Cape Fear River Watch
A-1 Coastal Lock & Key
A-1 Safe & Lock
Fort Bragg
Wade
Clement
Vander
Rockfish
Hope Mills
Autryville
Salemburg
Roseboro
Clinton
Bonnetsville
Turkey
Warsaw
Kenansville
Sarecta
Potters Hill
Beulaville
Pink Hill
Deep Run
Magnolia
Ingold
Garland
Ammon
Delway
Rose Hill
Greenevers
Chinquapin
Teachey
Wallace
Harrells
Cypress Creek
Angola Bay Game Land
Maple Hill
Watha
White Stocking
Holly Shelter Game Land
Atkinson
St Helena
Yamacraw
Currie
Rocky Point
Sloop Point
Topsail Beach
Castle Hayne
Roan Island
Riegelwood
Delco
Northwest
Sandy Creek
Leland
Bolton
Lake Waccamaw
Whiteville
Chadbourn
Fair Bluff
Brunswick
Wards
Evergreen
Boardman
Orrum
Fairmont
Clarkton
Abbottsburg
Bladenboro
Butters
Allenton
St Paula
Tar Heel
Shannon
Ivanhoe
Council
Zara
East Arcadia
Kinston

Why did the concentrations decrease as you move down river?



Environmental Compartments that may contain GenX



Deliverables: Sediments and HB56 (Part 1)

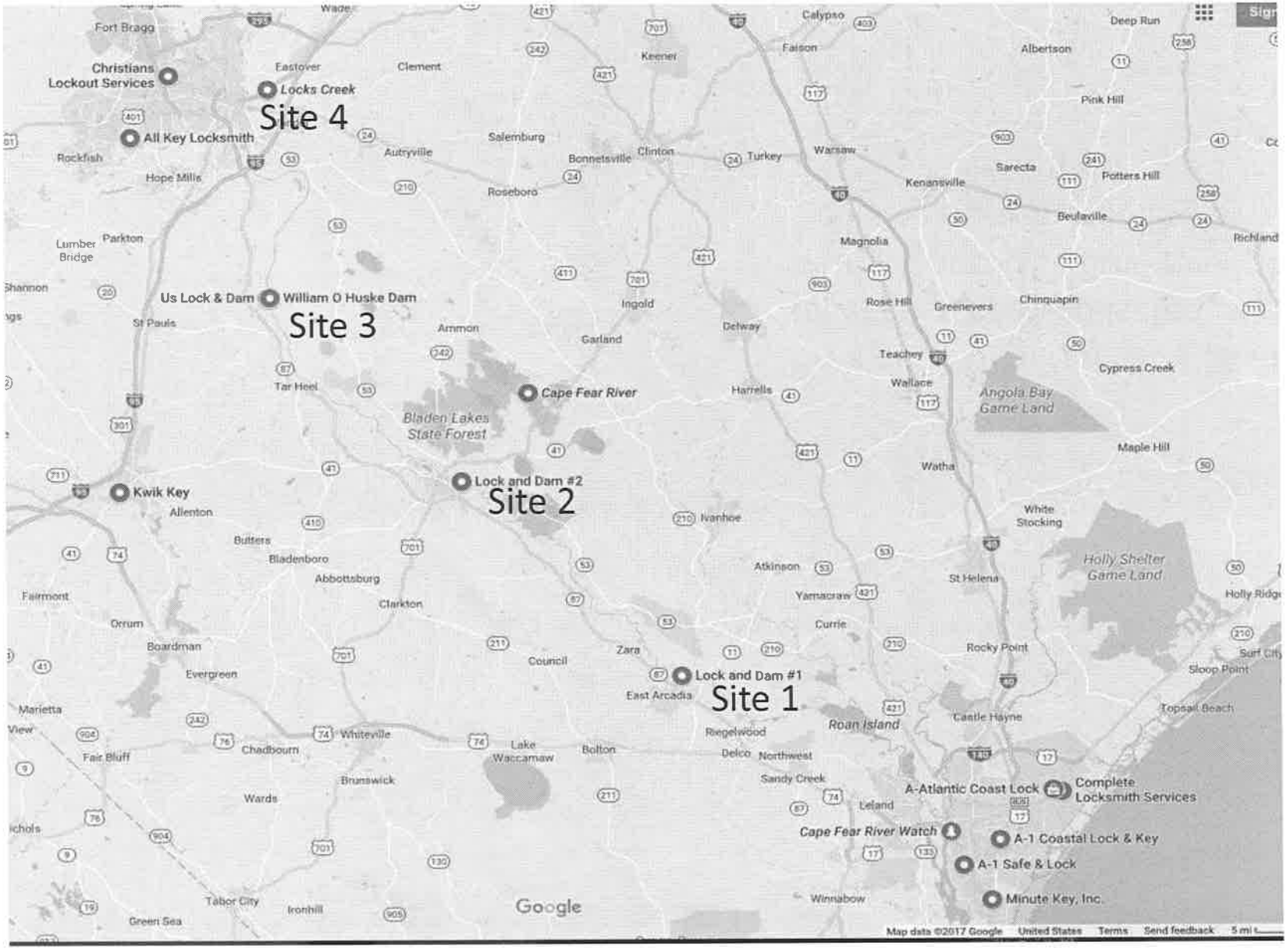
1. GenX in Cape Fear river sediments: Develop method for sedimentary analysis of GenX. Sediment samples have been collected along the river starting at Chemours facility ending at Southport.

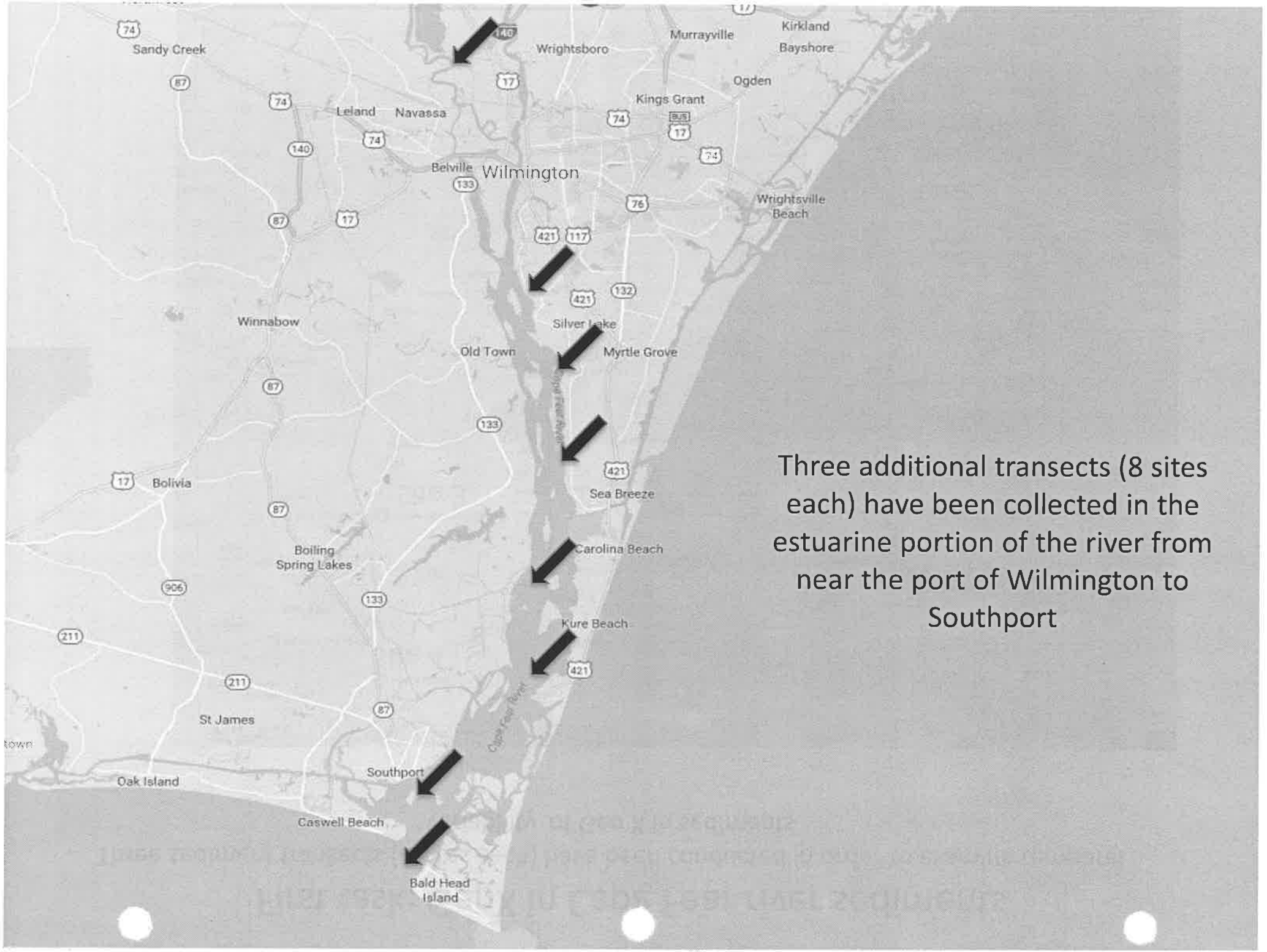
Date of Collection	Middle Cape Fear River	Lower Cape Fear River
9/11/17		X
9/19/17	X	
10/23/17		X
11/2/17	X	
1/30/18	X	
2/6/18		X

Timeline: method development has been ongoing since December when funds became available at UNCW. Sediment collection and analysis of GenX are currently ahead of schedule for this phase of the research.

First task: GenX in Cape Fear river sediments

Three sediment transects (4 sites each) have been conducted in order to examine temporal variability of Gen X in sediments





Three additional transects (8 sites each) have been collected in the estuarine portion of the river from near the port of Wilmington to Southport

Method Development

Method development for sediment analysis of GenX began in December 2017. This phase of the project is nearly complete.

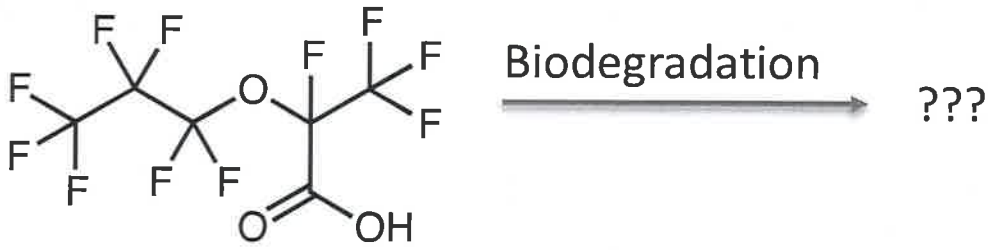
Efforts have focused on microwave (Munoz et al. 2017) and sonication (White et al. 2015) in the presence of methanol to extract GenX from sediments.

Current results suggest sonication is the most effective extraction strategy.

Now that the method development is nearly complete, analysis of the sediment transects will begin. Additional transects will be collected during summer and fall to explore seasonal variability.

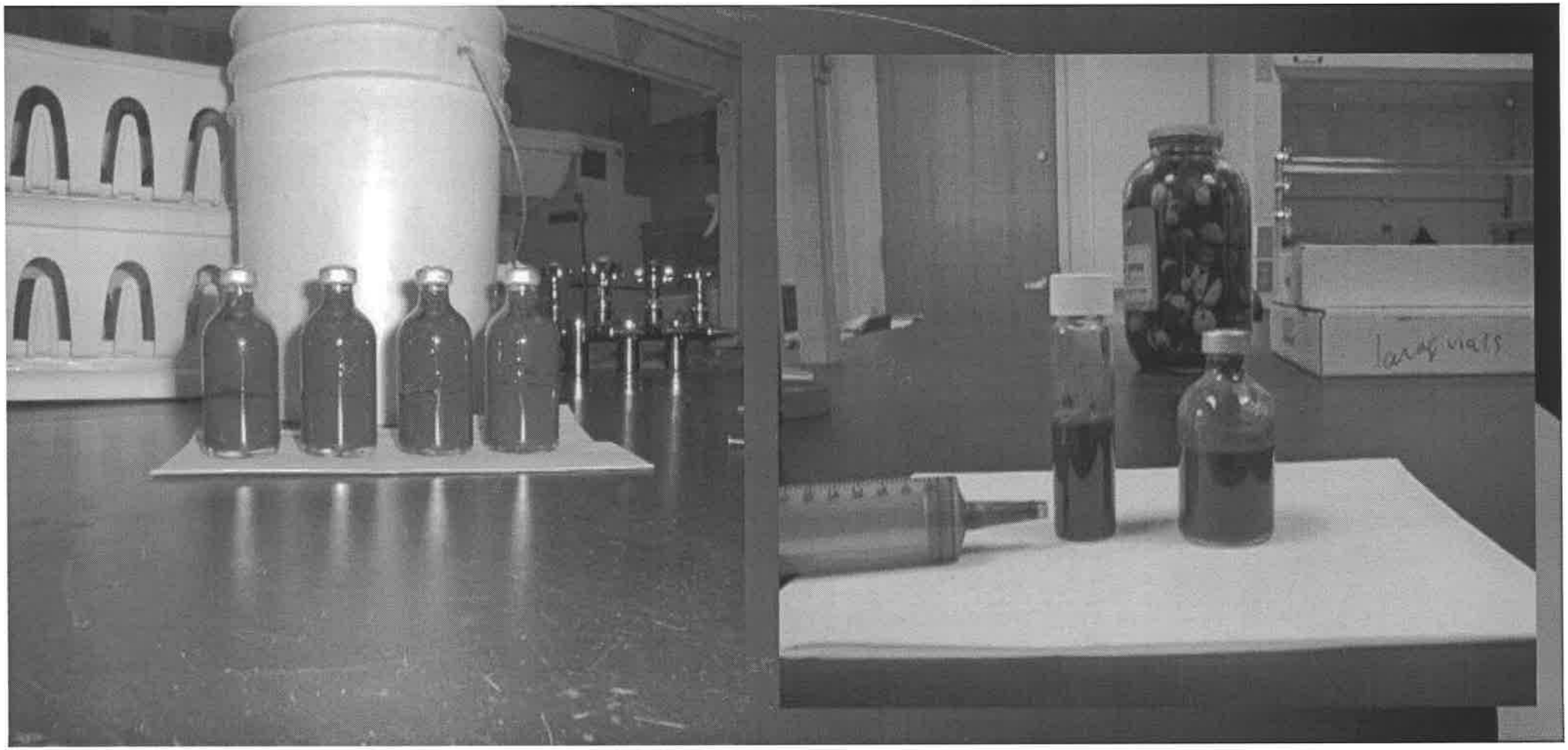
Deliverables: Sediments and HB56 (Part 2)

2. Genx Biodegradation Study: Fresh sediments will be collected for biotic degradation studies of GenX.



Timeline: Sediments will be collected and incubated for time series experiments lasting up to one year

Biodegradation studies: Sediments spiked with GenX and the concentration monitored as a function of time. Transformation products will be identified if present as well. Incubations will be carried out for up to one year.

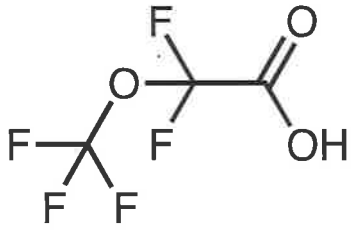


Acknowledgements

- HB56
- Department of Chemistry and Biochemistry
- UNCW (College of Arts and Sciences) and Sponsored Programs and Research Compliance)

Ancillary Deliverables

- Authentic Standard of PFMOAA has been obtained



- GenX is present in precipitation collected at NSF funded UNCW collection station
- Continued collection of raw and finished drinking water at CFPUA for PFECA and other no targeted compounds

House Select Committee on North Carolina River Water Quality, February 21, 2018, Comments from UNCW

Thank you for the opportunity to comment on and update the interim report requested by HB56. A more comprehensive report will be provided by the due date of April 1. Some of the research will be completed by that date; additional research will continue past that date. As outlined in the initial work plan and the written interim report, UNCW continues working closely with CFPUA and conducting research on unregulated compounds under contract with CFPUA.

Dr. Robert Kieber of the Department of Chemistry and Biochemistry will provide initial findings in regard to testing of the water column and updates on the collection and analysis of sediments, as well as plans for research on biodegradation. The following provides a brief update on the work being done on bioaccumulation by marine biologists at the UNCW Center for Marine Science.

The initial research on bioaccumulation has focused on the impacts of GenX on juvenile oysters to determine concentrations of GenX that impact growth, survival, and filtration rates. Early results suggest that very high concentrations of GenX (between 10 and 100 ppb) may decrease filtration rates in oysters. Tissue samples from these oysters are being analyzed for bioaccumulation.

Two additional experiments are planned for the coming month. In the first, oysters are being collected from various locations in the Cape Fear River. By the end of March, tissue will be analyzed to determine if bioaccumulation is occurring in the wild and, if so, if the levels of bioaccumulation varies from location to location.

In the second experiment, clean oysters will be exposed to various concentrations of GenX (0 to 5000 ppt) under controlled conditions for three consecutive weeks. Sub-samples will be tested for bioaccumulation on days 1, 3, 5, 7, 14, and 21. This also should be completed by the end of March, so that results can be reported on April 1.

Depending on the results of these experiments, future experiments could examine how quickly oysters rid themselves of GenX when exposure is ended. In addition, exposed oysters can be monitored for longer term biological impacts.

Interim Report from UNC Wilmington for the Environmental Review Commission

Pursuant to Section 20(a)(2) of Session Law 2017-209 (House Bill 56, effective October 4, 2017), the University of North Carolina at Wilmington (UNCW) received $250,000, in mid-November, from the Contingency and Emergency Fund. Subsequently, UNCW has implemented efforts to collect sediments from the Cape Fear River to be used for the identification and quantification of GenX and to conduct studies of GenX biodegradation and bioaccumulation. This work is in addition to ongoing analysis of water samples by UNCW under contract with the Cape Fear Public Utility Authority (CFPUA) and to other related work, such as two meetings of experts hosted by UNCW in December.

UNCW presented preliminary work plans to the House Select Committee on North Carolina Water Quality (available at this link) and to the Senate Select Committee on North Carolina River Water Quality (available at this link). Session Law 2017-209 calls for a final report on the work by UNCW on or before April 1, 2018. Some of the work, especially on biodegradation and bioaccumulation, will continue past that date. The following interim report outlines the process for sediment sampling and related progress up to this point.

- Objective 1: Cape Fear Public Utility quantification and identification of perflourinated alkyl substances in raw and finished drinking water

  Personnel Involved: Four senior faculty, one graduate student and one undergraduate student

  Status: Weekly sampling of raw and finished water has begun for the targeted quantification of GenX and other perflourinated alkyl substances (PFAS). To date, there are seven sampling events beginning November 15, 2017 (table 1). In addition, non-targeted analysis for other unknown PFAS compounds in the same samples by high resolution mass spectrometry has tentatively identified additional compounds. The data generated so far will be used by the utility to investigate the effectiveness of different filter media at removing PFAS.

Ancillary to the initial contract work, biosolids have also been analyzed for GenX which was detected in one out of three samples. The data generated was used by CFPUA to warrant a further, more comprehensive analysis of biosolids by a contract laboratory. Lastly, samples have been taken weekly from the discharge of the water from Westbrook aquifer and storage recovery project for PFAS analysis.

- Objective 2: Develop and implement the analysis of sediments

  Personnel involved: Four senior faculty (same personnel as Objective 1), one post-doctoral associate, one graduate student and one undergraduate student

  Status: A transect along the Cape Fear River has been sampled starting above the Chemours Fayetteville Works Facility with sample stations at Lock and Dam 3, Lock and Dam 2, and Lock and Dam 1 (Figure 1). In addition, sediment has been collected in the lower Cape Fear River to examine long-range sedimentary transport and fate of GenX (figure 2). Sediments are currently being processed and preliminary results indicate that sediments collected from William O. Huske Dam have measureable levels of GenX (1.3 pg/g).

- Objective 3: Conduct biodegradation studies in sediments

  Personnel Involved: Four senior faculty (same personnel as Objective 1), one post-doctorial associate (same personnel as Objective 1), one graduate student and one undergraduate student

  Status: Based upon results from Objective 1, sites will be chosen to collect sediments that will be used for biodegradation studies. Incubations will start by the middle of February 2018.

- Objective 4: Bioaccumulation in ecosystem

  Personnel Involved: Three senior faculty, two graduate students, one undergraduate Honors student, and a middle school student

  Status: Preliminary experiments have begun looking at growth, survival and filtration rates over various environmental concentrations. Initial experiments have focused on examining the impacts of GenX on juvenile oysters (10-20 mm length) to determine ranges that may result in any effect on the ecological responses of oysters. Results suggest that very high concentrations (between 10 and 100 ppb nominal concentrations) may decrease filtration in oysters. Tissues samples will be analyzed for bioaccumulation along with other sub-lethal responses in oysters in the next set of experiments.

For additional information, if needed, please contact:

- Mr. Mark Lanier, Assistant to the Chancellor, 910-962-3030, lanierm@uncw.edu
- Dr. Ralph Mead, Professor of Chemistry and Biochemistry, 910-962-2447, meadr@uncw.edu
- Dr. Ron Vetter, Associate Provost for Research, 910-962-3224, vetterr@uncw.edu
- Dr. Aswani Volety, Dean, College of Arts and Sciences, 910-962-7232, voletya@uncw.edu

Figure 1: Sediment and river water sample locations along the middle Cape Fear River sampled September and November 2017. The black arrows indicted sample locations while the red arrow in the manufacturing facility.

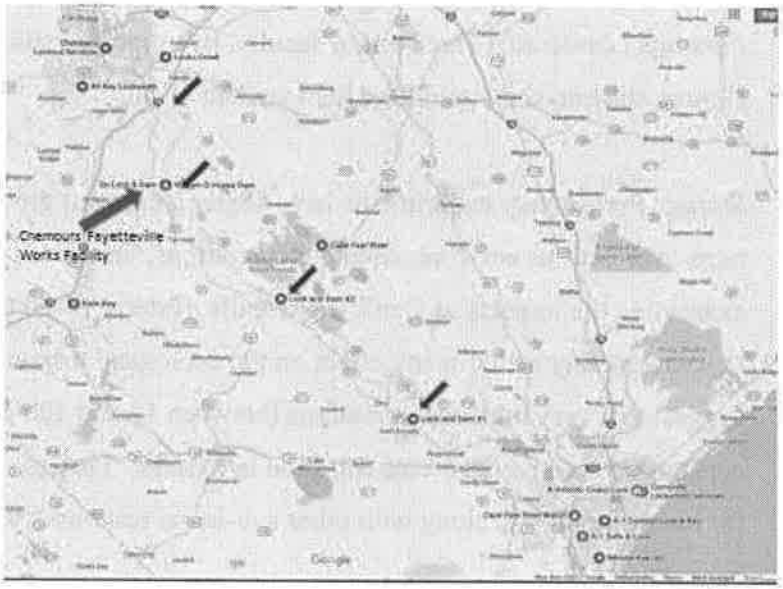


Figure 2: Sediment and river water sample locations along the lower Cape Fear River sampled September and November 2017. The black arrows indicted sample locations.

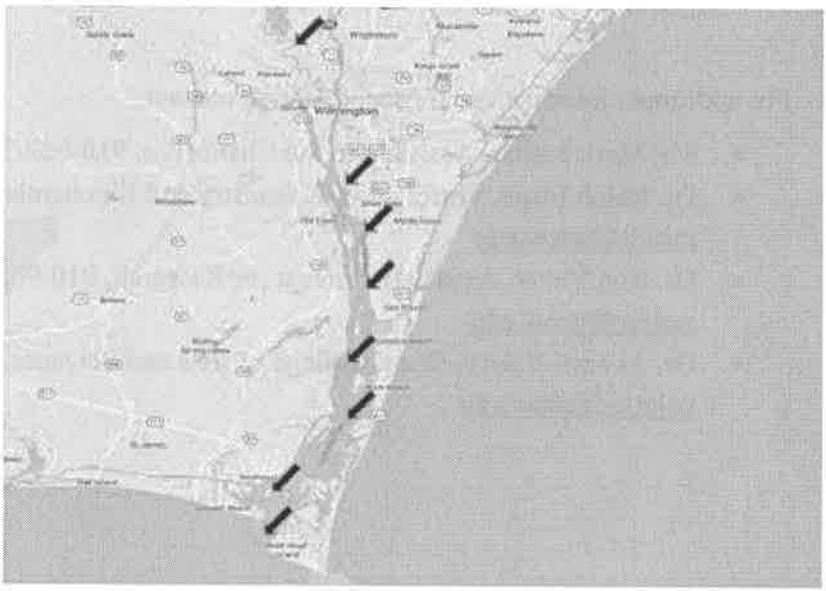


Table 1: Sample locations and dates for sediments and/or water samples

Location/Sample Type	Sample Dates
CFPUA Raw and Finished Water	Nov. 15, Nov. 22, Nov. 29, Dec. 6, Dec. 13, Dec. 21 and Dec. 28
CFPUA Biosolids	Sept. 19
Aquifer Storage and Recover (water only)	Sept. 21, Sept. 28, Oct. 4, Oct. 13, Oct. 19, Oct. 26, Nov. 1 and Nov. 7
Mid Cape Fear River (sediment and water)	September 19, 2017 and November 2, 2017
Lower Cape Fear River (sediment and water)	September 18, 2017 and October 23, 2017

Department of Chemistry and Biochemistry

University of North Carolina Wilmington

UNCW offers intensive, student-oriented programs in chemistry and biochemistry that award Bachelor of Arts, Bachelor of Science* and Master of Science degrees. Our expert faculty combine classroom instruction with innovative research to provide an ideal environment for training tomorrow's scientists, physicians and teachers.

THE DEPARTMENT IS AMONG THE **TOP 5 PERCENT** OF MASTER'S DEGREE-GRANTING INSTITUTIONS IN THE U.S.

Among NC public universities for 2016-17, UNCW is:

- **3rd** in total number of chemistry degrees (70)
- **2nd** in ACS-certified undergraduate chemistry degrees (33)
- **1st** in master's degrees (19)

Faculty and students use state-of-the-art instrumentation to conduct internally and externally funded research in:

- analytical chemistry
- biochemistry
- biopharmaceuticals
- chemical education
- computational and physical chemistry
- marine and atmospheric science
- natural product chemistry
- organic and inorganic synthesis



State-of-the-art instruments include:

- Agilent 1290 Infinity UHPLC w/Bruker Microtof-Q II high resolution mass spectrometer
- Agilent 1290 Infinity UHPLC w/ Bruker Amazon SL mass spectrometer
- Bruker 600 MHz NMR spectrometer
- Bruker Scion quadrapole GC/MS

In response to regional economic needs, the department is adding a track in pharmaceutical chemistry to the M.S. degree program. It is funded by a substantial gift from a local high-growth company that conducts contract chemical analyses for the pharmaceutical industry and employs many UNCW graduates.

Nearly 100 percent of UNCW chemistry graduates find relevant employment after completing their degrees, a strong indicator of the program's success. Enhancing the university's academic programs through applied learning experiences and research opportunities is among the priorities outlined in UNCW's Strategic Plan at **www.uncw.edu/strategicplan**.

To learn more, visit **uncw.edu/chem**.

* B.S. degree graduates are certified by the American Chemical Society's Committee on Professional Training.

Department of Chemistry and Biochemistry

University of North Carolina Wilmington

UNCW offers intensive, student-oriented programs in chemistry and biochemistry that award Bachelor of Arts, Bachelor of Science* and Master of Science degrees. Our expert faculty combine classroom instruction with innovative research to provide an ideal environment for training tomorrow's scientists, physicians and teachers.

THE DEPARTMENT IS AMONG THE **TOP 5 PERCENT** OF MASTER'S DEGREE-GRANTING INSTITUTIONS IN THE U.S.

Among NC public universities for 2016-17, UNCW is:

- **3rd** in total number of chemistry degrees (70)
- **2nd** in ACS-certified undergraduate chemistry degrees (33)
- **1st** in master's degrees (19)

Faculty and students use state-of-the-art instrumentation to conduct internally and externally funded research in:

- analytical chemistry
- biochemistry
- biopharmaceuticals
- chemical education
- computational and physical chemistry
- marine and atmospheric science
- natural product chemistry
- organic and inorganic synthesis



State-of-the-art instruments include:

- Agilent 1290 Infinity UHPLC w/Bruker Microtof-Q II high resolution mass spectrometer
- Agilent 1290 Infinity UHPLC w/ Bruker Amazon SL mass spectrometer
- Bruker 600 MHz NMR spectrometer
- Bruker Scion quadrapole GC/MS

In response to regional economic needs, the department is adding a track in pharmaceutical chemistry to the M.S. degree program. It is funded by a substantial gift from a local high-growth company that conducts contract chemical analyses for the pharmaceutical industry and employs many UNCW graduates.

Nearly 100 percent of UNCW chemistry graduates find relevant employment after completing their degrees, a strong indicator of the program's success. Enhancing the university's academic programs through applied learning experiences and research opportunities is among the priorities outlined in UNCW's Strategic Plan at **www.uncw.edu/strategicplan**.

To learn more, visit **uncw.edu/chem**.

* B.S. degree graduates are certified by the American Chemical Society's Committee on Professional Training.

Working Group on GenX Related Issues

G. Brooks Avery, Ph.D.

- B.S. The University of North Carolina, Greensboro
- M.S. The University of North Carolina, Wilmington
- Ph.D. The University of North Carolina, Chapel Hill

Robert J. Kieber, Ph.D.

- B.S., Cook College, Rutgers
- Ph.D., University of Maryland
- Postdoctoral, Rosentiel School of Marine and Atmospheric Science

Ralph Mead, Ph.D

- B.S. Florida State University
- Ph.D. Florida International University

Pamela J. Seaton, Ph.D., Chair of Chemistry and Biochemistry

- B.S., University of Washington, Seattle
- M.S., University of Alaska, Fairbanks
- Ph.D., University of Vermont, Burlington
- Postdoctoral, Oregon State University

Stephen A. Skrabal, Ph.D.

- B.S., College of William and Mary
- M.A., College of William and Mary
- Ph.D., University of Delaware
- Postdoctoral, Old Dominion University

Martin H. Posey, Ph.D., Director of the Center for Marine Science & Professor of Biology/Marine Biology

- Ph.D., Biology, University of Oregon, Eugene, OR, 1985
- B.A., Zoology, University of North Carolina at Chapel Hill, Chapel Hill, NC, 1980 *with highest honors*

Dr. Andrea Bourdelais, Ph.D., Center for Marine Science, Research Associate Professor

Dr. Chris Dumas, Ph.D.

- Ph.D., Natural Resource Economics. University of California, Berkeley
- M.S., Natural Resource Economics. University of California, Berkeley
- B.S., Economics; Conservation. North Carolina State University

Aswani K. Volety, Ph.D., Dean of the College of Arts and Sciences & Professor

- Ph.D., Marine Science, School of Marine Science, College of William & Mary
- M.S., Zoology with Specialization in Marine Biology, Andhra University, Visakhapatnam, India
- B.S., Zoology, Andhra University, Visakhapatnam, India

Ron Vetter, Ph.D., Associate Provost for Research, Dean of the Graduate School, and Professor

- Ph.D., University of Minnesota
- B.S., M.S., North Dakota State University

Mark Lanier, Assistant to the Chancellor/Assistant Secretary, Board of Trustees

EPA
United States
Environmental Protection
Agency

Mass Spectrometry and Chromatography Explained

Dr. Mark Strynar – US EPA

National Exposure Research Laboratory (NERL)



February 21st, 2018
Meeting of the House Select Committee on North Carolina River Quality

EPA United States Environmental Protection Agency

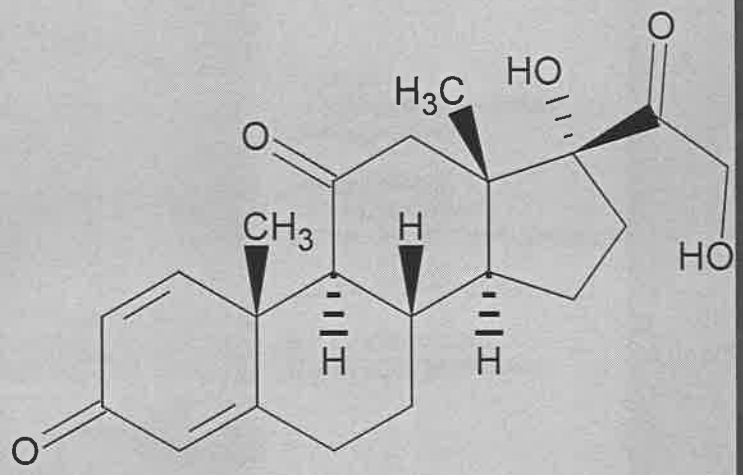
Questions to Answer?

- What is mass spectrometry?
- What are the types of mass spectrometry
  - (MS, MS/MS, QTOF, Orbitrap)
- What is resolution in mass spectrometry?
  (low resolution, high resolution, ultra-high resolution)
- What is mass accuracy?
- What is liquid and gas chromatography?
- What can be done with each mass spectrometer?; *i.e. targeted versus non-targeted work*
- *Questions I did not answer*

EPA
United States
Environmental Protection
Agency

What is Mass Spectrometry

Prednisone



Molecular Formula = $C_{21}H_{26}O_5$
Formula Weight = 358.42814
Composition = C(70.37%) H(7.31%) O(22.32%)
Monoisotopic Mass = 358.178024 Da
Nominal Mass = 358 Da
Average Mass = 358.4281 Da

EPA
United States
Environmental Protection
Agency

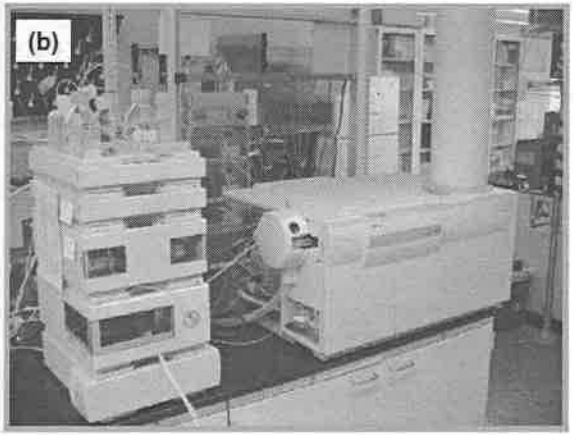


UPLC MS/MS System
UPLC - Waters Acquity

MS/MS - Micromass Quattro Premier XE

Column - Acquity UPLC BEH C18 1.7 um 2.1x50 mm

Gradient separation
A 2mM Ammonium Acetate
B Methanol



HPLC/TOFMS System
HPLC - Agilent 1100

TOFMS - Agilent LC/MSD TOF

Column - Agilent Eclipse Plus C18 3.5 um 3.0x50 mm custom packed

Gradient separation
A 2mM Ammonium Acetate
B Methanol

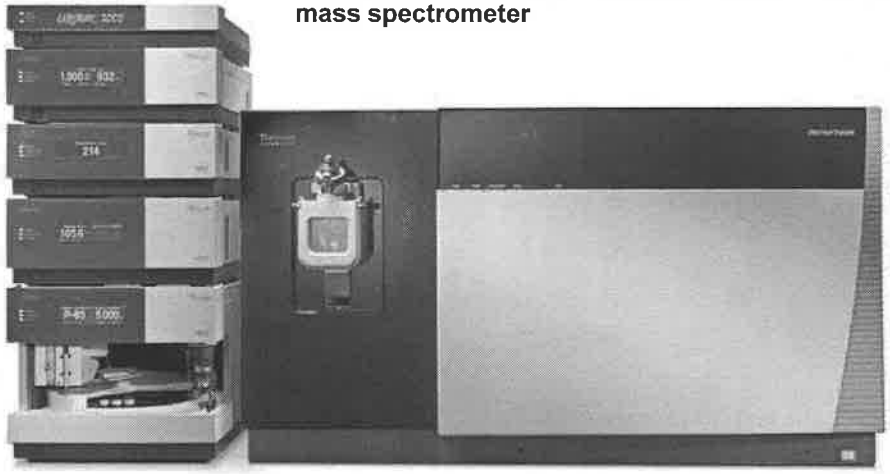
Figure 2. Picture of the (a) UPLC/MS/MS and (b) LC/TOFMS systems used

- Chevy
- Low resolution
- Nominal mass
- Inexpensive/common

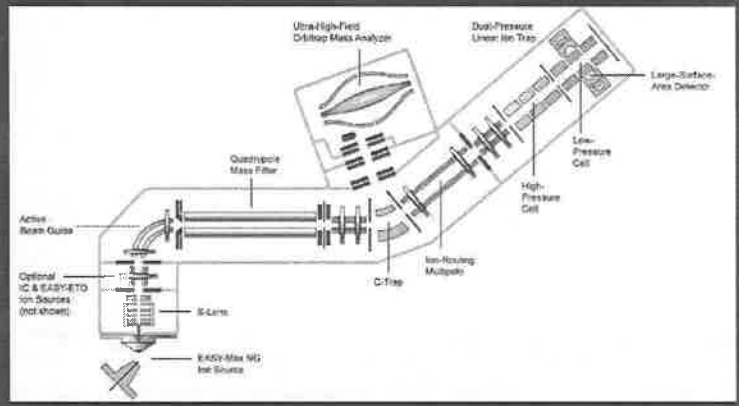
- Cadillac
- High resolution
- Exact mass
- More expensive/becoming more common

EPA
United States
Environmental Protection
Agency

The Thermo Scientific™ Orbitrap Fusion™ Tribrid™ mass spectrometer



- Tesla
- Ultra-high resolution
- Exact Mass/ Fine isotope structure
- Significantly more expensive; uncommon



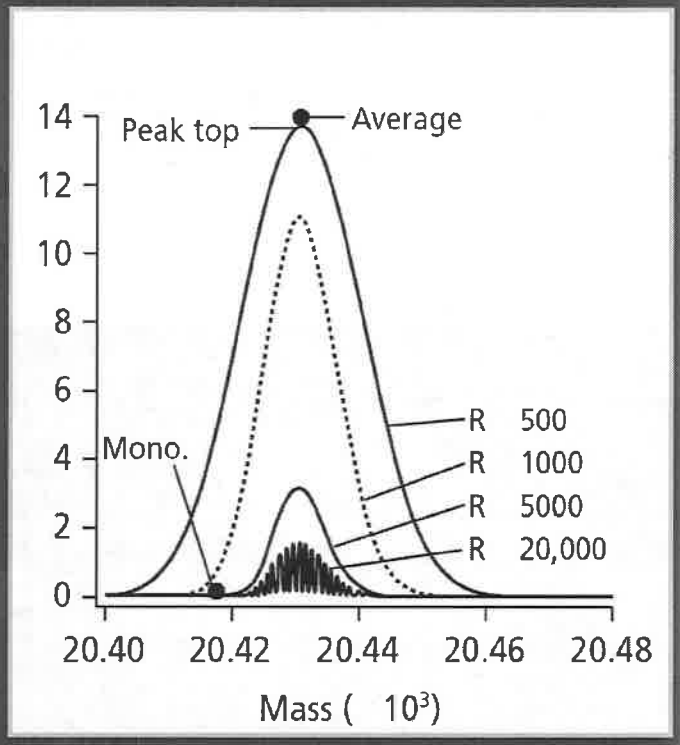
Office of Research and Development
National Exposure Research Lab/ Human Exposure and Atmospheric Science Division

What is resolution?

EPA United States Environmental Protection Agency

Resolution in mass spectrometry is the ability to differentiate a detected ion from any other

- Triple Quad or MS/MS 500-5,000 resolution
- TOF or QTOF ~25,000 resolution
- Orbitrap >250,000 resolution



From Balough, LCGC 2004

Scales example.

Lab scale



Bathroom Scale



EPA
United States
Environmental Protection
Agency

What is Mass Accuracy?

Mass Accuracy (Tune)

1633.9498 - 1633.9395 = 0.0103

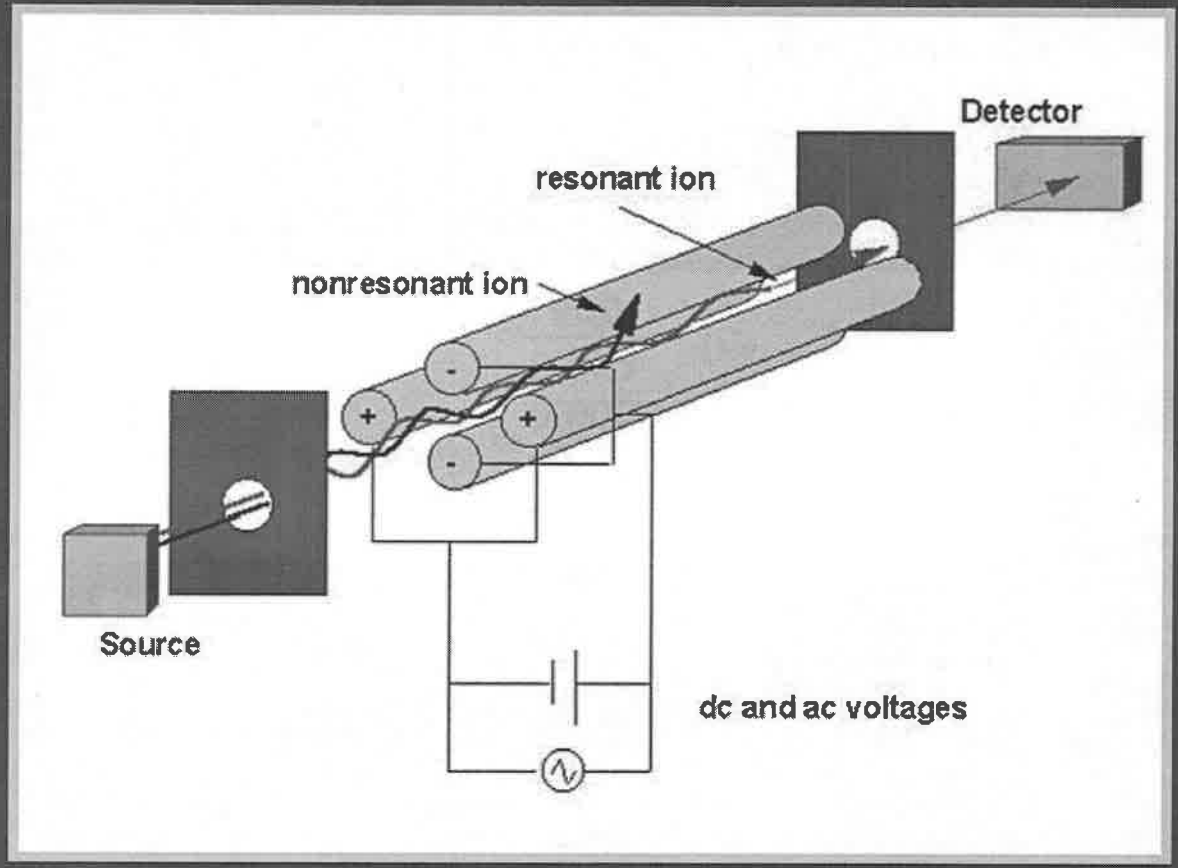
0.0103 / 1633.9498 10^6 = 6.3 ppm

True mass	400.0000
Measured mass	400.0020
Difference	0.0020 or 2 mmu
Error	$\frac{0.002}{400} \quad 10^6 \quad 5$ ppm

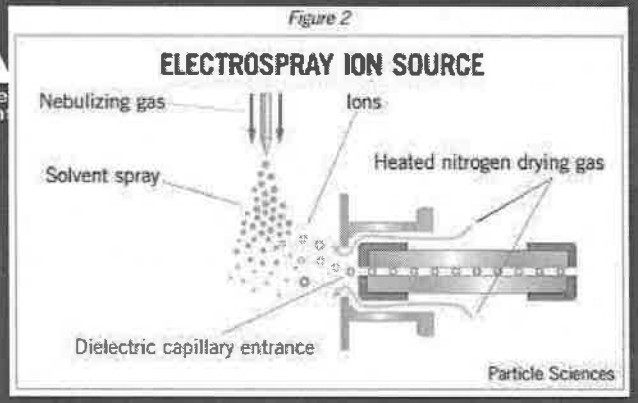
LCGC North America Vol 22 Number 2 February 2004 MS The Practical Art
Michael Balough "Debating Resolution and Mass Accuracy"

EPA
United States
Environmental Protection
Agency

Single Quad MS



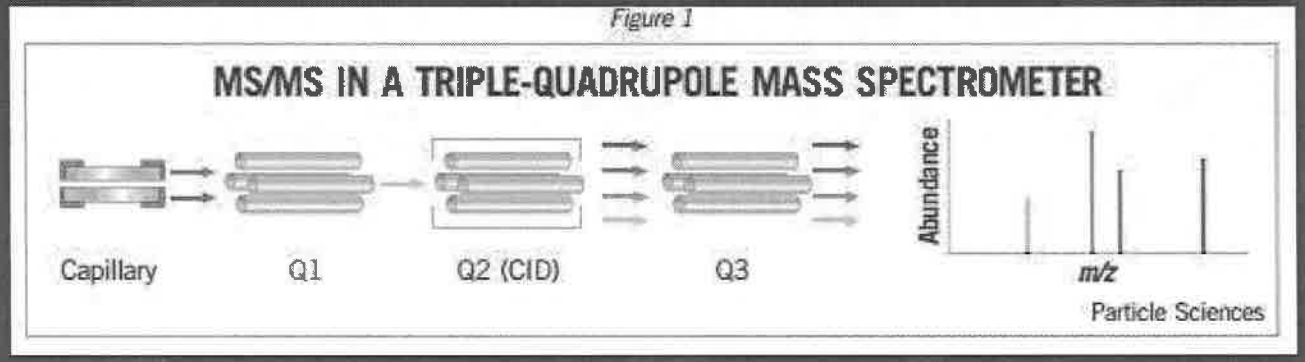
EPA United States Environmental Protection Agency



MS/MS or Triple Quad

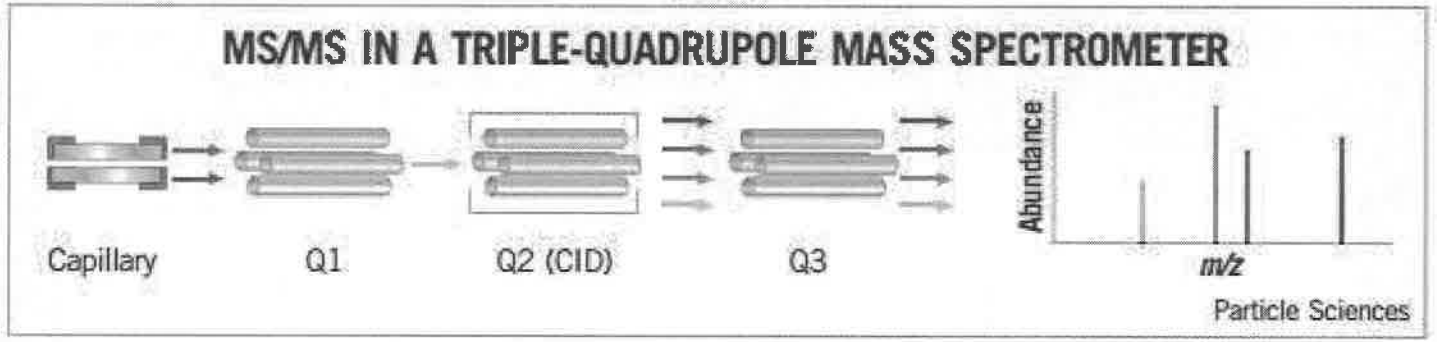
- MRM or transition
- Parent to daughter

Ex. PFOA 413-369
413-169

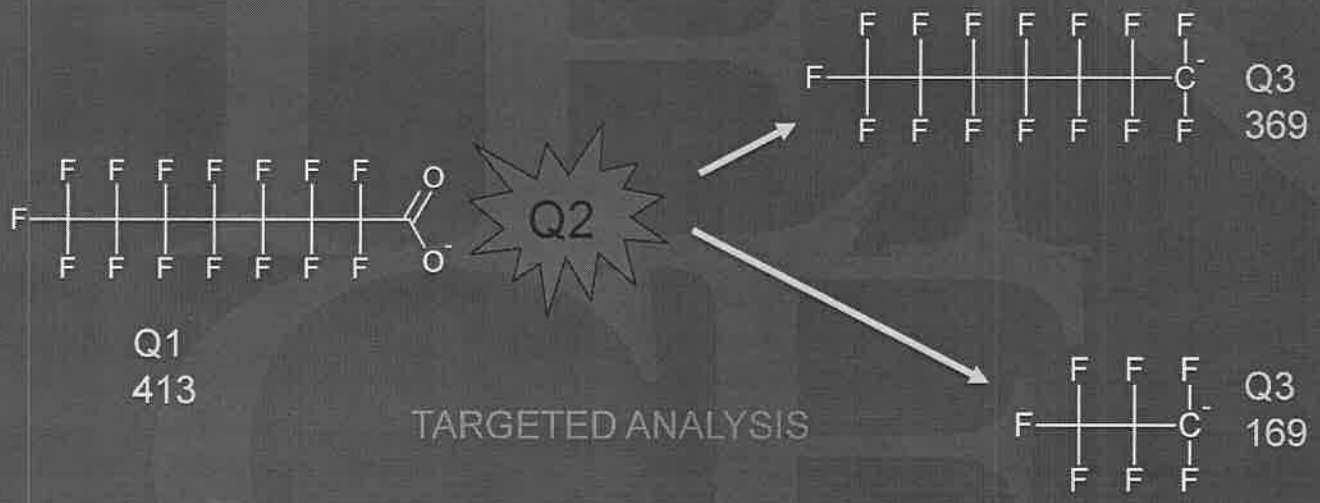


EPA United States Environmental Agency

Figure 1

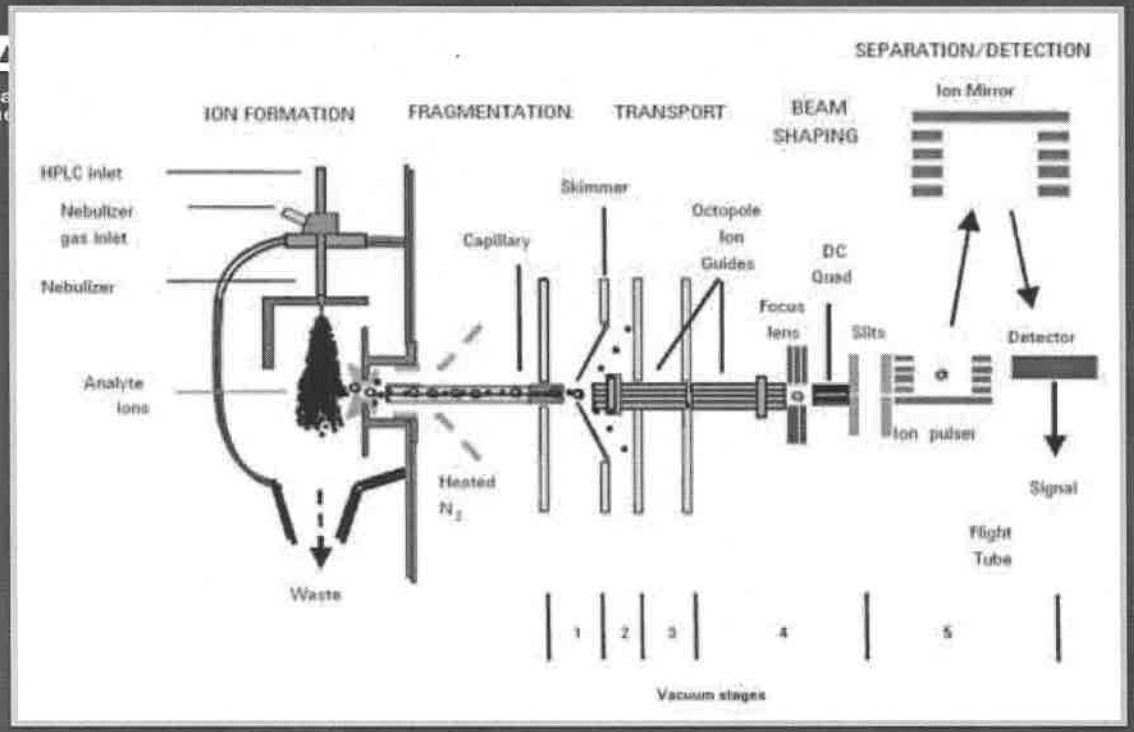


Ex. PFOA



TARGETED ANALYSIS

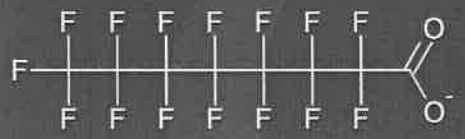
EPA United States Environmental Protection Agency



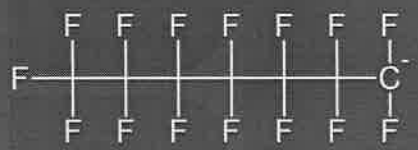
TOFMS or QTOFMS

Targeted Analysis or
Non-targeted Analysis
Post-analysis data mining

Ex. PFOA exact mass 412.9664 Da



368.9766 Da

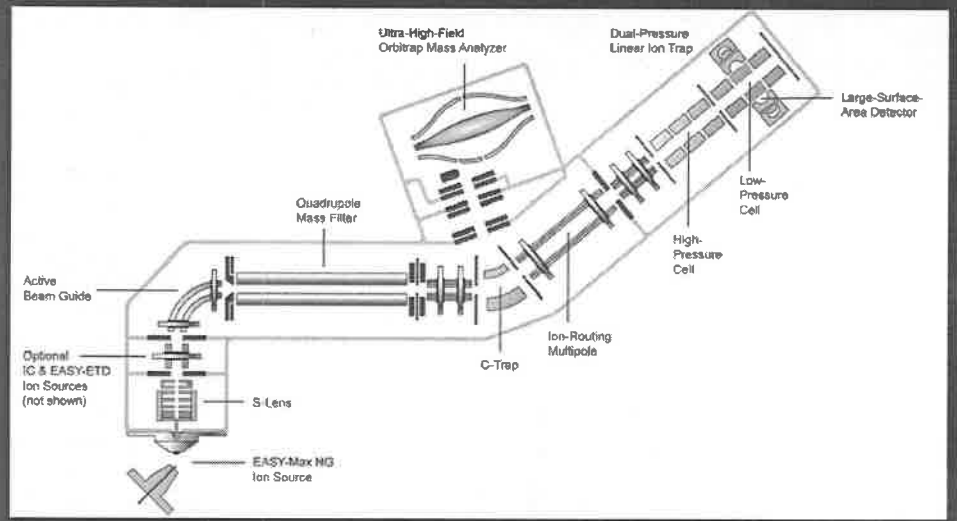


Office of Research and Development
National Exposure Research Lab/ Human Exposure and Atmospheric Science Division

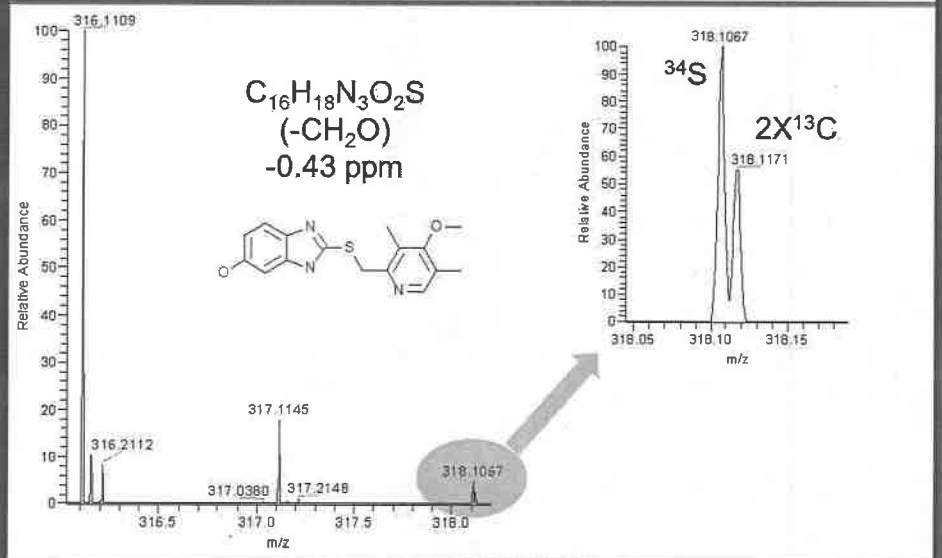
EPA
United States
Environmental Protection
Agency

Orbitrap

TARGETED ANALYSIS
NON TARGETED ANALYSIS
STRUCTURE ELUCIDATION
POST ANALYSIS DATA MINING



Resolution and Identification – Fine Isotope Structure

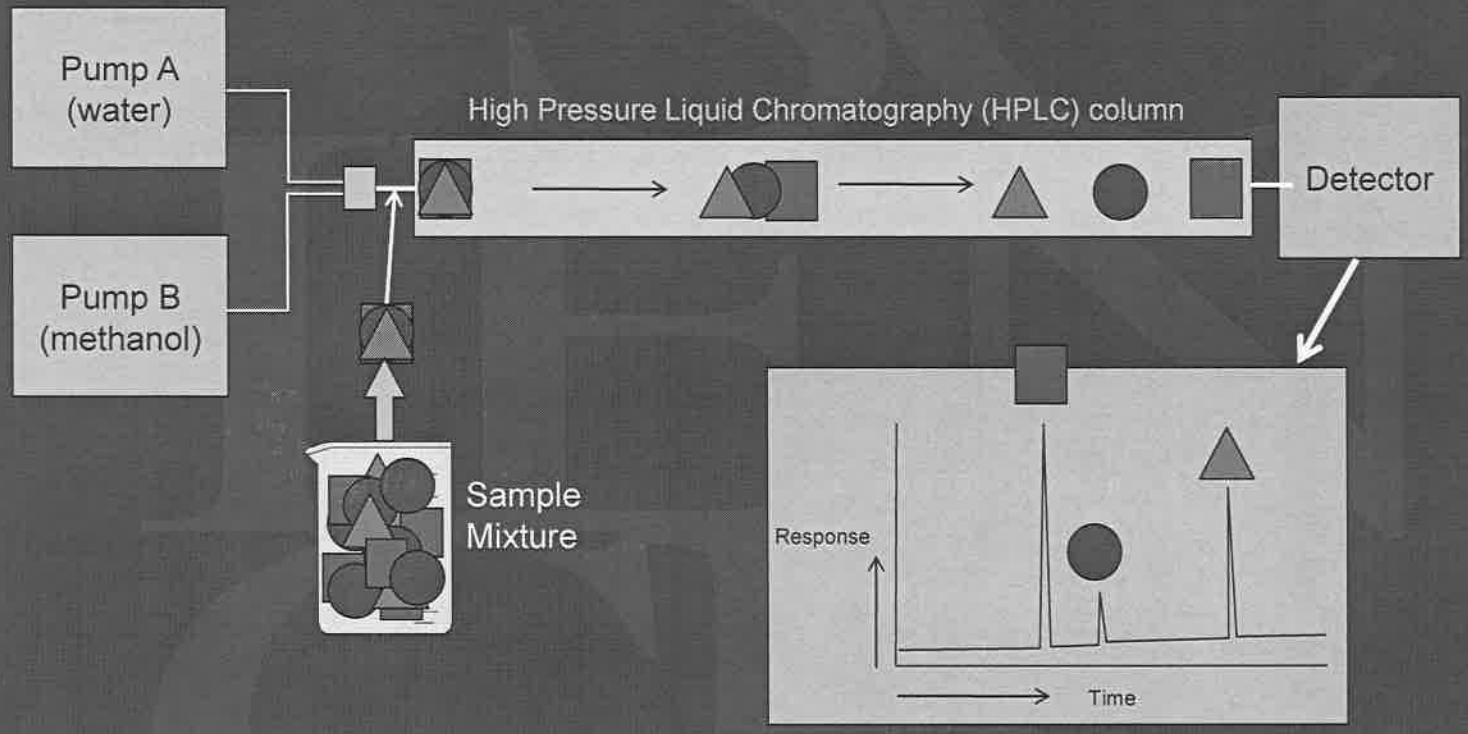


58

ThermoFisher SCIENTIFIC

EPA
United States
Environmental Protection
Agency

What is Liquid Chromatography; Gas Chromatography



****RT and response****

Office of Research and Development
National Exposure Research Lab/ Human Exposure and Atmospheric Science Division

EPA
United States
Environmental Protection
Agency

Liquid Chromatography vs Gas Chromatography

Non-volatile chemicals
Polar chemicals
Water soluble chemicals
Example: PFOA, GenX, Nafion BP

Volatile chemicals
Non-Polar chemicals
Water soluble chemicals
Example: Benzene, formaldehyde, HFPO

EPA
United States
Environmental Protection
Agency

Work done in collaboration with NC DEQ summer/fall 2017 (GenX)

Targeted analysis of PFAS in water samples (MS/MS or Triple Quad analysis) resolution 500-5000 GenX, legacy PFAS (PFOS/PFOA)

Non-targeted analysis of PFAS in water samples (TOFMS analysis) resolution 25,000 Nafion BP1, Nafion BP2, PFMOAA, PFO2HxA, PFO3OA, other previously undescribed analytes

Questions?

Strynar.mark@epa.gov
919-541-3706

Office of Research and Development
National Exposure Research Lab/ Human Exposure and Atmospheric Science Division

HOUSE BILL 189
Committee Substitute Favorable 1/10/18

Short Title: Short-Term Response to Emerging Contaminants. (Public)

Sponsors:

Referred to:

February 27, 2017

A BILL TO BE ENTITLED

AN ACT TO IMPLEMENT SHORT-TERM MEASURES TO RESPOND TO EMERGING CONTAMINANTS IN THE ENVIRONMENT.

The General Assembly of North Carolina enacts:

DIRECT THE DEPARTMENT OF HEALTH AND HUMAN SERVICES TO CONSULT WITH THE SECRETARIES' SCIENCE ADVISORY BOARD IN THE DEVELOPMENT OF HEALTH GOALS FOR CONTAMINANTS

SECTION 1.(a) For purposes of this section, the Secretaries' Science Advisory Board shall mean the Science Advisory Board established by the Secretary of Environmental Quality and the Secretary of Health and Human Services on July 28, 2017.

SECTION 1.(b) The Department of Health and Human Services shall consult with the Secretaries' Science Advisory Board on the Department's process for the establishment of health goals for contaminants. The Secretaries' Science Advisory Board shall review the process by which the Department establishes health goals for contaminants and make recommendations on how to improve the process, including how to promote greater public understanding of and confidence in the health goals.

SECTION 1.(c) To the extent practicable, the Department of Health and Human Services shall notify the Chair of the Secretaries' Science Advisory Board prior to issuing a provisional health goal for a contaminant. The Department of Health and Human Services shall submit all newly issued provisional health goals to the Secretaries' Science Advisory Board at their next scheduled meeting.

STUDY NPDES PERMIT PROGRAM

SECTION 2. The Department of Environmental Quality shall study the State's National Pollutant Discharge Elimination System (NPDES) permitting program to ensure that associated requirements are sufficient to protect public health, safety, welfare, and the environment. In conducting the study, the Department shall examine the adequacy of:

(1) Requirements for persons applying for individual NPDES permits to fully disclose in applications for new permits, permit renewals, or permit modifications, all pollutants, including emerging chemicals for which an applicable discharge standard has not been established under State or federal law, included in their discharge.

(2) Monitoring, sampling, and laboratory analytical requirements applicable to persons holding current NPDES permits and to persons applying for new NPDES permits. In assessing the adequacy of analytical requirements, the

Department shall evaluate the consistency of analytical methods used by private labs to detect and quantify pollutants, including emerging chemicals for which an applicable discharge standard has not been established under State or federal law. And, based on information gathered in that regard, whether, to ensure the accuracy of discharge sampling results, it would be feasible and advisable for the Department to develop a certified list of laboratories through which dischargers must obtain laboratory analyses of their discharge or whether the Department should require submission of discharge samples to the Department for laboratory analyses by the Department.

(3) Existing processes for developing standards or limitations for emerging chemicals for which an applicable discharge standard has not previously been established under State or federal law, included in a permittee's discharge.

(4) Internal permit review processes to ensure thorough and timely review of permit applications.

The Department shall submit an interim report with findings, including any recommendations for legislative action, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than April 1, 2018, and a final report with findings, including any recommendations for legislative action, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than December 1, 2018.

DIRECT THE DEPARTMENT OF ENVIRONMENTAL QUALITY TO COORDINATE AND SHARE WATER QUALITY DATA WITH STATES IN THE REGION

SECTION 3. Article 21 of Chapter 143 of the General Statutes is amended by adding a new section to read:

"**§ 143-215.1D. Coordination with neighboring states.**

The Department of Environmental Quality shall coordinate with the Georgia Department of Natural Resources, the South Carolina Department of Health and Environmental Control, the Tennessee Department of Environment and Conservation, the Virginia Department of Environmental Quality, and the West Virginia Department of Environmental Protection to improve processes for sharing information about contaminants identified in surface water or groundwater shared by or passing or flowing across the border of those states and this State. As needed, the Department shall share with those agencies water quality data for, and information about any contaminant identified in, surface water or groundwater shared by or passing or flowing across the border of those states and this State."

DEPARTMENT OF ENVIRONMENTAL QUALITY REPORTING AND NOTICE STUDY

SECTION 4. The Department of Environmental Quality shall study the statutory requirements for dischargers of untreated wastewater, untreated waste, and other substances to notify the Department and the public of discharges, including the volumetric thresholds that trigger the reporting requirements, to ensure that the requirements are sufficient to protect public health and provide adequate notice to the Department and the public. The Department shall consider whether there are any conflicts or redundancies in the statutory notice and reporting requirements. The Department shall also study its processes for notifying the General Assembly and the Environmental Management Commission of the presence in the environment of emerging chemicals for which an applicable discharge standard has not been established under State or federal law. The Department shall report its findings, including any legislative

recommendations, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than April 1, 2018.

WATER UTILITY CIVIL LIABILITY STUDY

SECTION 5. The School of Government at the University of North Carolina at Chapel Hill shall study the extent to which public and private water utilities may be held civilly liable for distribution of drinking water contaminated by a pollutant without applicable discharge standards established under State or federal law and the extent to which public water utilities and private water utilities are treated differently for purposes of civil liability. The School of Government shall submit the results of the study to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than April 1, 2018.

GENX FUNDING

SECTION 6.(a) The General Assembly finds that the discharges of the poly-fluoroalkyl chemical known as "GenX" (CAS registry number 62037-80-3 or 13252-13-6) demonstrate the need for supplemental funding to support the identification, characterization, and monitoring by scientists, engineers, and other professionals of GenX and other emerging contaminants in the land, air, and waters of the State. The purpose of this section is to repurpose existing funds to address these critical needs.

SECTION 6.(b) One million three hundred thousand dollars ($1,300,000) in nonrecurring funds appropriated to the Department of Environmental Quality for the 2016-2017 fiscal year and allocated for in situ nutrient management by Section 14.13(e) of S.L. 2016-94, as amended by Section 13.24 of S.L. 2017-57, is reallocated for the purposes described in subsection (d) of this section.

SECTION 6.(c) Twenty-five thousand dollars ($25,000) in nonrecurring funds appropriated to the Rural Economic Development Division of the Department of Commerce for the 2017-2018 fiscal year and provided as a grant-in-aid to the Town of Stedman by subdivision (15) of Section 15.8(b) of S.L. 2017-57 is transferred to the Department of Environmental Quality and allocated for the purposes described in subsection (d) of this section.

SECTION 6.(d) The funds provided to the Department of Environmental Quality by subsections (b) and (c) of this section shall be allocated for the 2017-2018 fiscal year as follows:

(1) Eight hundred thirteen thousand dollars ($813,000) to the Division of Water Resources for time-limited positions and operations support of water quality sampling related to GenX and other emerging contaminants and to address permitting backlogs.

(2) Two hundred thirty-two thousand nine hundred fifty dollars ($232,950) to the Division of Air Quality for sampling and analysis of atmospheric deposition of GenX and other emerging contaminants.

(3) Two hundred seventy-nine thousand fifty dollars ($279,050) to the Division of Waste Management for sampling and analysis of GenX and other emerging contaminants in groundwater wells, soil, and sediment.

SECTION 6.(e) Funds reallocated by this section shall not revert but shall remain available for nonrecurring expenses, including the establishment of time-limited positions, through June 30, 2019.

SECTION 7.(a) The sum of four hundred seventy-nine thousand seven hundred thirty-six dollars ($479,736) in recurring funds for the 2017-2018 fiscal year is appropriated from the unappropriated balance remaining in the General Fund to the Department of

Environmental Quality to support sampling and analysis activities associated with discharges of GenX and other emerging contaminants.

SECTION 7.(b) Notwithstanding Section 6.1(a) of S.L. 2017-57, five hundred thirty-seven thousand dollars ($537,000) in nonrecurring funds for the 2017-2018 fiscal year is allocated from the Contingency and Emergency Fund to the Department of Environmental Quality to support the acquisition by the Department of analytic equipment to evaluate in a more timely and cost-effective manner the threat to public health and safety resulting from discharges of GenX and other emerging contaminants.

SECTION 8.(a) Section 2.1 of S.L. 2017-57, as amended by Section 1.1 of S.L. 2017-197, reads as rewritten:

"**SECTION 2.1.** Appropriations from the General Fund of the State for the maintenance of the State departments, institutions, and agencies, and for other purposes as enumerated, are made for the fiscal biennium ending June 30, 2019, according to the following schedule:

Current Operations – General Fund	**FY 2017-2018**	**FY 2018-2019**
...		
NATURAL AND ECONOMIC RESOURCES		
...		
Department of Environmental Quality	~~78,170,327~~78,650,063	~~77,012,714~~77,492,450
...		
TOTAL CURRENT OPERATIONS – GENERAL FUND	**$ ~~22,980,769,893~~22,981,249,629**	**$ ~~23,650,253,958~~23,650,733,694**"

SECTION 8.(b) Section 2.2(a) of S.L. 2017-57 reads as rewritten:

"**SECTION 2.2.(a)** The General Fund availability used in developing the 2017-2019 fiscal biennial budget is shown below:

	FY 2017-2018	**FY 2018-2019**
Unappropriated Balance	$ 208,607,416	$ ~~499,303,328~~498,823,592
...		
Revised Unappropriated Balance	**108,607,416**	**~~499,303,328~~498,823,592**
...		
Beginning Unreserved Fund Balance	**471,279,046**	**~~499,303,328~~498,823,592**
...		
Total General Fund Availability	**23,623,979,046**	**~~24,634,803,328~~24,634,323,592**
...		
Revised General Fund Availability	**$ 23,529,781,221**	**$ ~~24,022,005,283~~24,021,525,547**
Less General Fund Net Appropriations	~~(23,030,477,893)~~(23,030,957,629)	~~(23,652,171,951)~~(23,652,651,687)
Unappropriated Balance Remaining	**$ ~~499,303,328~~498,823,592**	**$ ~~369,833,332~~368,873,860**"

SECTION 9. Nonrecurring funds appropriated by this act for the 2017-2018 fiscal year shall not revert but shall remain available for nonrecurring expenses through June 30, 2019.

EFFECTIVE DATE

SECTION 10. Except as otherwise provided, this act is effective when it becomes law.

ORIGINAL

TSCA NON-CONFIDENTIAL BUSINESS INFORMATION

DOCUMENT DESCRIPTION	DOCUMENT CONTROL NUMBER	DATE RECEIVED
8EHQ-06-16478	89130000232	1/9/13

COMMENTS: 8EFU

DOES NOT CONTAIN CBI

HR#350977

DuPont Haskell Global Centers
for Health and Environmental Sciences
1090 Elkton Road, P.O. Box 50
Newark, DE 19714-0050

January 8, 2013

Via Federal Express





RECEIVED
OPPT CBIC
2013 JAN -9 AM 10:32

Document Processing Center (Mail Code 7407M)
Room 6428
Attention: 8(e) Coordinator
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency
1201 Constitution Ave., NW
Washington, DC 20004

Dear 8(e) Coordinator:

8EHQ-06-16436/8EHQ-06-16478
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, ammonium salt
CAS # 62037-80-3

This letter is to inform you of the preliminary results of a 2 year rat oral gavage study with the above referenced test substance. This test substance is subject to a Consent Order, P-08-509.

A 2-year oral gavage study was conducted in Crl:CD(SD) rats (80/sex/concentration) with the test substance at doses of 0, 0.1 (males only), 1, 50, and 500 (females only) mg/kg bw/day. The rats were evaluated for mortality, clinical signs, body weight and weight gain, food consumption, and food efficiency, and received an ophthalmology examination pretest and after 1 and 2 years of dosing. Ten rats/sex/dose were designated for evaluation of chronic toxicity. These rats were evaluated for clinical pathology at 3, 6, and 12 months, and for anatomic pathology (organ weights, gross and microscopic pathology) at the end of 12 months. The remaining rats (70 rats/sex/dose; main study rats) were dosed for up to 23 (females) or 24 (males) months. Females were sacrificed at week 100 due to poor overall survival, although survival was comparable among all dose groups. Clinical pathology (WBC differential counts) was evaluated at 12, 18, and 24 months in all surviving main study rats. All animals received a gross pathology evaluation at necropsy, and organ weights were collected in animals surviving to terminal sacrifice. Microscopic examination of tissues was conducted in animals that survived to scheduled sacrifice (12 month and end of study), and in all animals that died prior to scheduled sacrifice.

No test substance-related differences in survival or in clinical or ophthalmological signs were observed in any dose group. No adverse effects on overall body weight and nutritional parameters were observed in any dose group, although these parameters were transiently lower than control (statistically significant) in high-dose males (50 mg/kg/day) and females (500 mg/kg/day) over some weekly/biweekly intervals, particularly during the middle of the study. In 500 mg/kg/day females, the body weight over the first year of the study was statistically significantly lower than in control, although the difference was not statistically significant at the end of two years. Test substance-related, adverse or potentially adverse findings were observed in some clinical and anatomic pathology parameters in females at 500 mg/kg/day and in males at 50 mg/kg/day parameters, as discussed below.

Clinical pathology: The following statistically significant differences were considered adverse:

500 mg/kg/day (females only):

- ↓ red blood cell mass parameters (RBC, HGB, HCT, most time points), with ↑ MCV and reduced MCHC at the 12 month time point.
- ↑P (12 month), ↑ BUN (12 month), ↑A/G ratio (all time points), ↓globulin (all time points),

CONTAINS NO CBI

- urine: ↑urine volume and pH, ↓specific gravity (6, 12 month)

50 mg/kg/day:
- ↑ALP (male all time points), ↑ALT (male 12 month), ↑albumin (male all time points), ↑A/G ratio (male all time points)

Anatomic pathology: Increases in the following microscopic pathology findings were considered adverse:

500 mg/kg/day (females):
- Liver: adenoma, hypertrophy (also ↑ at one year), degeneration and necrosis; ↑ liver weight (at one and two year)
- Kidney: papillary necrosis and edema, chronic progressive nephropathy (also ↑ at one year), dilated tubules,
- Stomach: non-glandular mucosal hyperplasia
- Tongue: mucosal hyperplasia/inflammation

50 mg/kg/day:
- Liver: ↑ liver weight (males at one year only), hypertrophy, degeneration and necrosis (also ↑ in males at one year), basophilic foci; (males only except hypertrophy)
- In males, marginal increases were observed in the following:
  - Pancreas: acinar cell tumors; equivocal acinar cell hyperplasia (both sexes)
  - Testes: interstitial cell tumors and hyperplasia

All other statistically significant changes in clinical and anatomic pathology parameters were considered spurious and/or nonadverse based on absence of a dose response, the transient occurrence of the finding, the minimal nature or direction of the change, and/or the lack of correlative changes in related parameters. These included:

500 mg/kg/day (females only)
- ↑ Cl (6 month), ↑albumin (3 month), ↓bilirubin (all time points), ↓total protein (3 month), ↓ cholesterol (6 month), ↓APTT (12 month)
- Uterus: stromal polyps (not significant by Fisher's exact test and within historical control range)
- Lung: histiocytosis (within historical control range)
- Adrenal: benign pheochromocytoma (not significant by Fisher's exact test, within historical control range and not associated with correlative increase in hyperplasia)

50 mg/kg/day:
- ↓red blood cell mass parameters (RBC, HGB, HCT) at all time points in males; ↓RBC in females (12 month)
- ↓APTT (12 month; female))
- ↑ Ca (male 12 month), ↑P (male 3 month), ↑A/G ratio (female 3 and 6 month), ↓globulin (female 6 month)
- Urine: ↓urine volume (male 12 month) and pH (male 6 and 12 month)

1 mg/kg/day:
- ↓HGB (female 3 month), ↑ALP (male 12 month), ↑ BUN (male 12 month), ↑albumin (male 12 month), ↑A/G ratio (male all time points), ↑Cl (female 6 month)
- Urine: ↑urine volume (male 12 month) and pH (male 6 and 12 month; female 6 month)

0.1 mg/kg/day (males only):
- ↑P (3 month)
- Urine: ↓urine volume and ↓ pH (both 12 month)

Under the conditions of this study, the no-observed-adverse-effect level (NOAEL) was considered to be 1 mg/kg/day in male and female rats. Test substance-related neoplastic changes were observed at the high dose (500 mg/kg/day in females; 50 mg/kg/day in males) and included hepatocellular tumors in females and, in males, equivocal increases in pancreatic acinar cell tumors and testicular interstitial cell tumors. These tumor findings are typical of those previously reported in rats following exposure to other PPARα agonists. Based on the high dose threshold for these tumor responses in this study, the lack of genotoxicity of the test material across a battery of *in vitro* and *in vivo* tests, and the known responses of the rat versus other species, including humans, to these PPARα-associated tumor responses, these tumor findings are not considered relevant for human risk assessment.

This information is submitted in accordance with current guidance issued by EPA indicating EPA's interpretation of Section 8(e) of the Toxic Substances Control Act or, where it is not clear that reporting criteria have been met, it is submitted as a precautionary measure and because it is information in which EPA may have an interest.

Sincerely,

S. Satheesh Anand, Ph.D., DABT
Senior Research Toxicologist

SSA/SAM: jhh
(302) 366-5314

FedEx Express **NEW Package US Airbill**

FedEx Tracking Number 8759 3684 8285

RECIPIENT: PEEL HERE

1 From This portion can be removed for Recipient's records.

Date 1/8/13 FedEx Tracking Number 875936848285

Sender's Name [illegible] Phone [illegible]

Company DUPONT / CR&D / STINE HASKEL

Address 1090 ELKTON RD Dept/Floor/Suite/Room

City NEWARK State DE ZIP 19711-3507

2 Your Internal Billing Reference

3 To

Recipient's Name [illegible] Phone [illegible]

Company [illegible]

Address [illegible]
We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept/Floor/Suite/Room

Address
Use this line for the HOLD location address or for continuation of your shipping address.

City [illegible] State ZIP [illegible]

HOLD Weekday
FedEx location address REQUIRED. NOT available for FedEx First Overnight.

HOLD Saturday
FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

0438872855

8759 3684 8285

Recipient's Copy

4 Express Package Service * To most locations.
NOTE: Service order has changed. Please select carefully.

Packages up to 150 lbs.
For packages over 150 lbs., use the new FedEx Express Freight US Airbill.

Next Business Day

- ☐ FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☐ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☑ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

- ☐ NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- ☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☐ Other

6 Special Handling and Delivery Signature Options

☐ SATURDAY Delivery
NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver

☐ No Signature Required — Package may be left without obtaining a signature for delivery.
☐ Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods?
One box must be checked.

☒ No ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below. Obtain recip Acct. No ☐

☐ Sender Acct. No. in Section 1 will be billed ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

Total Packages ____ Total Weight ____ lbs. Credit Card Auth.

*Our liability is limited to $100 unless you declare a higher value. See the current FedEx Service Guide for details.

611

Rev. Date 11/10 • Part #163134 • ©1994–2010 FedEx • PRINTED IN U.S.A. SRS

fedex.com 1.800.GoFedEx 1.800.463.3339

The Fayetteville Observer

Health official: Homes with GenX-contaminated wells need public water

By Steve DeVane
Staff writer
Posted Feb 20, 2018 at 9:00 PM

Residents who have private wells contaminated with a potentially cancer causing chemical need access to a public water system, Cumberland County's environmental health director said Tuesday.

More than 150 wells around the Chemours plant just across the Bladen County line have elevated levels of GenX, a compound that has been linked to several forms of cancer in animal studies. It isn't known if the effect is the same in humans.

Daniel Ortiz, the environmental health director for Cumberland County, talked to the county Board of Health about the contamination at its meeting. He said the department gets calls from residents concerned about the issue.

Residents with the contaminated wells are having to use bottled water to brush their teeth, Ortiz said.

"I feel really bad for these people," he said.

Ortiz said county commissioners are right to make running water lines to the area a priority.

Commissioners voted Monday to hire a company to do a preliminary engineering report that will estimate the cost of running water lines to the area.

Ortiz said the residents need public water, even though Chemours is testing filters on four houses in the area.

"It's just a temporary fix," he said.

Chemours makes GenX at the plant. The compound is used in nonstick cookware and other products.

The state started investigating GenX in June after news broke that researchers had reported the previous year that they had found it and similar compounds in the Cape Fear River downstream from the plant. The company agreed to stop discharging the chemical into the river, but it was later discovered in more than 250 private wells around the facility.

In other action at the Health Board meeting Tuesday, board members had a lively discussion after Dr. William Philbrick, board chairman, talked about an email he had received that he thought was written by county commissioners. The article questioned the management of the Health Department, mentioning problems with the Jail Health program, the closure of clinics, failure to notify women of test results and high fees for flu shots.

County Commissioners Jeannette Council, who is a member of the Health Board, said the document was a Fayetteville Observer editorial.

"I cannot sit here and be blamed," she said. "We did not do this."

Philbrick said the email looked like an official document.

"I didn't know where it came from," he said.

Philbrick defended the board, saying it had been doing good work for years. He said the board has only faced criticism in the past several months.

"All of a sudden now, we're the worst board that ever existed," he said.

Philbrick said he was thinking about resigning but did not take that step.

"I thought maybe I was the reason the board is going to pot," he said.

Dr. Connette McMahon, the vice chairwoman of the board, said the commentary was upsetting.

"I want to let people know we do care about the citizens of this county," she said.

Earlier, Ethelyn Holden Baker asked the board during the public comment portion of the meeting to reopen the adult health and dental clinics on a full-time basis.

The county closed the two clinics in July because of budget cuts. The Health Department worked out a partnership in September with Stedman-Wade Health Services to reopen them on a part-time basis.

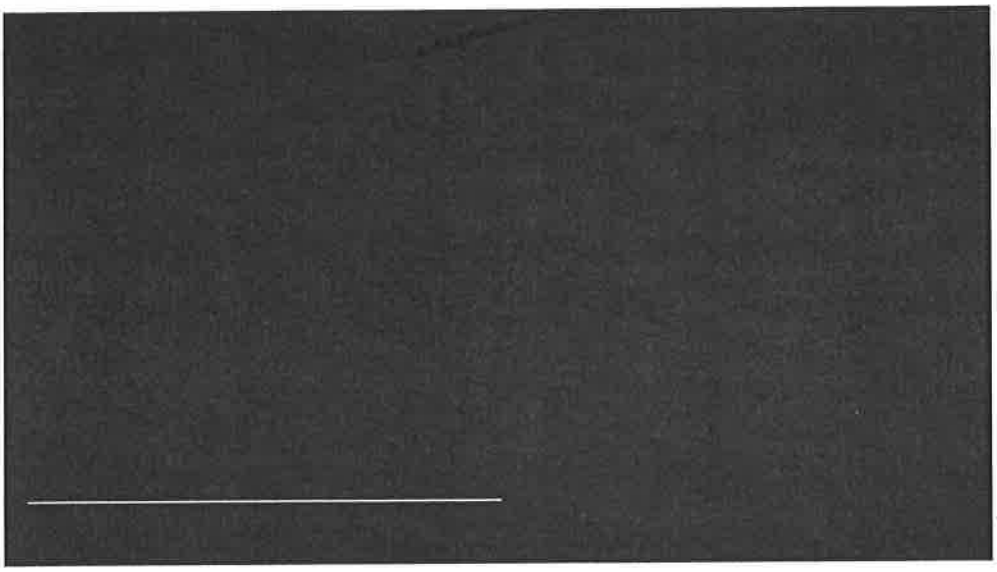
Baker said county residents deserve access to care. She said some residents who use the Health Department aren't happy with the services.

Philbrick thanked Baker and several people with her for coming to the meeting.

Staff writer Steve DeVane can be reached at sdevane@fayobserver.com or 486-3572.

SIGN UP FOR DAILY E-MAIL
Wake up to the day's top news, delivered to your inbox

MOST POPULAR STORIES



Reimbursement forms
2/21/18

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. William Brisson

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 180
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

William Brisson
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Ted Davis, Jr.

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 280
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Jimmy Dixon

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

Jimmy Dixon
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Elmer Floyd

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

Elmer Floyd
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Holly Grange

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Yes ☒ No ☐

Car Mileage
(Fill out this line if mileage is different than what is certified on file) on file

Number of Round Trips 1

Holly Grange
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Pricey Harrison

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 162
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Frank Iler

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ON FILE
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Bob Muller

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Bob Steinburg

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage Same
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Rep. Bob Steinburg
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Larry Yarborough

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Kyle Hall

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): House Select Committee on NC River Quality

Date(s) of Meeting: February 21, 2018

Member: Rep. Pat McElraft

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 2

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file) on file

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

Select Committee on North Carolina River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: February 21, 2018

Member: Rep. Harry Warren

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☒
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 262
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: _____ Ext._____

Committee Sergeants at Arms

NAME OF COMMITTEE HSE SELECT COMMITTEE ON N.C. RIVER QUALITY

DATE: 2/21/2018 Room: 634 LOB

House Sgt-At Arms:

1. Name: JONAS CHERRY
2. Name: DAVID LEIGHTON
3. Name: TERRY McCRAW
4. Name: JIM MORAN
5. Name:

Senate Sgt-At Arms:

1. Name:
2. Name:
3. Name:
4. Name:
5. Name:

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — February 21, 2018

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
PRESTON HOWARD	NCMA
Ryan Merwald	WM
Kimbery Neptune	NCGA
Sarah McQuillan	KGANC
Leona Whichard	LWV ODC 344 Cedar Club Circle Chapel Hill, NC 27517
Rob Lawler	PLA
[illegible]	NCDAGCS
Justin Clayton	Governor
Jill Lucas	NCDEQ
TYLER NEWMAN	BASF
Chris Anderson	

Mike Pjetraj, Div. Air Qual.

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — February 21, 2018

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Cassie Gavin	Sierra Club
Jeremy Iloulian	Duke Law
MK Austin, PA, MPH	UNC/Maternal + Child Health
Phoebe Lowden	MWC
Tom Bean	EDF, NC WF
Betsy McCorkle	KGANC
Mark Strynar	U.S. EPA
Will Robinson	The Nature Cons.
Beth Markison	Wilmington Stop Bank
Scott Laster	KGANC
Chris Wall	PC

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — February 21, 2018

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
John Hasell	MFS
Will Morgan	MFS
SHERRI WHITE	SELC
Rebecca Anderson	SELC
Mary Maclean Abell	SELC
Matthew Starr	Riverkeeper
Jenna Calderone	Put NC First
Mott Gross	DHHS
Grady McCallie	NC Conservation Net/L.
Lindsey Dowling	FSP
David Collins	Wildwest

VISITOR REGISTRATION SHEET

HSE. SELECT COMM. N.C. RIVER QUALITY — 2/21/2018

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Emma Shelly	TPG
LT McCrimmon	DHHS
MARK BOSTON	DHHS

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — February 21, 2018

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
[signature]	CSS
Christine Wilson	ACS CAN

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Thursday, March 22, 2018
TIME: **9:30 AM**
LOCATION: **643 LOB**
COMMENTS: **An agenda will be sent to committee members before the meeting.**

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 4:16 PM on Wednesday, March 07, 2018.

___ Principal Clerk
___ Reading Clerk – House Chamber

Judy Lowe (Committee Assistant)

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. ELMER FLOYD
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB MULLER
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER McGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

JUDY LOWE
COMMITTEE CLERK

AGENDA
9:30 a.m. Thursday, March 22, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Department of Environmental Quality update on response to emerging compounds and responses to previous questions *(1 hour)*

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

   Mike Abraczinskas, Director, Division of Air Quality
   Department of Environmental Quality

4. Committee discussion and announcements

5. Adjourn

SITE VISIT:

The business meeting will be followed by a tour of the Department of Environmental Quality's Water Sciences and Air Quality Lab Complex at 4403 Reedy Creek Road, Raleigh, North Carolina. The tour will begin at approximately 11:00 a.m. and is expected to last approximately one hour. This is a site visit; no votes will be taken. Subject to space limitations and operational requirements of the Lab Complex, members of the press and the public will also be accommodated for purposes of the site visit.

ADDITIONAL INFORMATION:

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578 or may visit the Committee's website at:
http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

House Select Committee on North Carolina River Quality
Thursday, March 22, 2018 at 9:30 AM
Room 643 of the Legislative Office Building

MINUTES

The House Select Committee on North Carolina River Quality met at 9:30 AM on March 22, 2018 in Room 643 of the Legislative Office Building. Representatives Brisson, Davis, Dixon, Floyd, Grange, K. Hall, McElraft, Muller, Steinburg, and Yarborough attended.

Representative Ted Davis, Jr., Senior Chair, presided.

Representative Davis called the Committee to order and thanked the members of the Committee for attending. He reminded all in attendance that after the meeting, there would be a tour of the Department of Environmental Quality's (DEQ) Water Science and Air Quality Lab Complex.

Representative Davis recognized the House Sergeant at Arms present: Jonas Cherry, John Gilbert, Dean Marshboune, and Jim Moran.

Representative Davis asked the Co-Chairs for comments. Representative Holly Grange welcomed all in attendance and voiced her excitement for the presentation from DEQ and the tour following the meeting.

Representative Davis welcomed Sheila Holman, Assistant Secretary for DEQ for a presentation on DEQ's update on responses to emerging compounds and responses to previous questions from the Committee. The slides for the presentation can be found in Attachment 1.

Assistant Secretary Holman thanked the Committee for its leadership on the issue of river quality. She informed the Committee that she would give an overview of each of the three divisions within DEQ and take questions at the end of the presentation.

Division of Water Resources

The first two slides included were reminders of any sampling that was occurring at the time of the meeting as well as a map of their locations. The data for the Chemours outfall was up to January 2018 (see slide 5). October saw a large spike in GenX concentration due to the recent spill, and other spikes were observed in December and January, despite the revocation of Chemours's wastewater permit. Because of the spike, DEQ observed that the Northwest Brunswick water treatment plant had "one excursion over the provisional health goal of 140 parts per trillion (PPT) established by the Department of Health and Human Services" in July (see slide 6). The Cape Fear Public Utility Authority (CFPUA) also experienced an uptick in GenX concentration in the October time frame but did not go over the health goal. Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) levels were also included in the graphs.

Assistant Secretary Holman noted that DEQ is trying to understand the spikes in GenX after the processed wastewater was stopped from being released into the treatment system and discharge.

The Company has said that this could be because of rainwater landing on soil containing GenX. The graph on Slide 8 shows that relationship. There seems to be a correlation between rain events and increased GenX concentration according to DEQ. The Company has been asked to continue its on-site remediation efforts based on the immediate action Notice of Violation (NOV). The Department hopes that as the work continues to be done, those spikes will disappear.

Division of Waste Management

Slides 10 and 11 showed the parcels with wells that had been tested. Assistant Secretary Holman noted that the Department was in "Phase 4" of sampling. This includes 287 residences that were tested. The percentage of tests above the health goals was shrinking during Phase 4 of sampling.

Slide 12 explained Robeson County's own testing of drinking water wells, as they had concerned citizens about the wells. Twenty-Seven wells had been tested, and twenty-five of those detected GenX.

Slide 13 summarized the private well collections through all phases.

Slide 14 noted Chemours's submission of a proposal to install granular activated carbon filtration systems in residences with GenX present in the well >140 ppt. Assistant Secretary Holman noted that the filtration system has been effective in reducing GenX, PFOA, and PFOS concentrations. DEQ has agreements with five property owners to install those filtration systems.

This month, DEQ started doing fish tissue testing. Slide 15 outlines the first steps of this sampling.

Division of Air Quality (DAQ)

Slide 17 outlines "stack testing" over the past weeks. Chemours hired an outside consultant to do the testing while the Division of Air Quality (DAQ) observed. The testing timeline is outlined in slide 18.

The Air Emissions Testing had split samples for both Test America Laboratories and the United States Environmental Protection Agency (U.S. EPA). DAQ staff were analyzing the stack test at the time of the meeting. Slide 20 noted future testing required for Chemours by DAQ for Hexafluoropropylene oxide (HFPO) Monomer, E-1, and Nafion byproducts 1 & 2. DAQ has also been conducting wet deposition monitors. This process was outlined in slide 21. DAQ conducted temporary site rainwater sampling during the dates on Slide 22. The pictures on slides 23, 24, and 25 corresponded to samplings from January 28 through 29 and February 4 through 5. As stated in Slide 26, DAQ has received permission from the property owners to site three fixed rain samplers for analysis.

Slides 27through 29 regarded control techniques to eliminate or reduce air emissions. Slide 29 included a statement from Chemours that they are: "implementing a comprehensive program to identify, evaluate, and abate Per- and polyfluoroalkyl substances (PFAS) air emissions at Fayetteville Works. The centerpiece of this program is a longer term effort to install a state of the

art thermal oxidizer unit for air emissions from the facility, which is expected to be at least 99.99% effective for HFPO Dimer Acid and other PFAS compounds."

Questions

Representative William Brisson: On the rain results with the stacks, what kind of area was the last test results?

Holman: These results are actually wastewater results at the wastewater outfall, so this is all water quality results and the sampling we do at the outfall.

Representative Brisson: My question was the area. Is that the whole area?

Holman: This is the composite sampling for the wastewater coming out of the outfall at the plant. This is the water quality results. This represented the results from the January 28 through 29 rain event. This represented it for February 4 through 5. This one shows the composite analysis. You have one of the samplers at 2.9 miles. Most of them are the 1.1-1.9 mile range around the plant measured from the center of the facility.

Representative Brisson: The Robeson County tests, is the testing they're doing approximately four miles from the plant?

Holman: I believe their testing was approximately four miles from the plant, and I am getting a nod yes from my waste management staff.

Representative Brisson: The carbon filtration systems we're looking at, I've seen that they're about $300 a month. I don't know what that's going to be about, but I do know that the people in that area shouldn't be paying that. Shouldn't we be focusing on providing these people with drinking water?

Holman: I will check on the monthly cost. I had not heard that they are that expensive. I hear your point, and DEQ agrees and will continue discussions about permanent water supply options with Bladen and Cumberland counties which would look at extending public water lines.

Representative Brisson: Why is there a delay on the air quality reports?

Holman: They just arrived a week or so ago. Our process will have our technical staff take a look through the consultant's report and make sure that there are no issues or errors that need to be addressed before their release.

Representative Brisson: What you're saying is that the staff hasn't taken time to give the report to us today?

Holman: They are actively reviewing them right now. They are not small reports.

Representative Davis: How long does it take for the Department to do what Representative Brisson is asking?

Holman: We're talking about a brand new methodology. I think we are two days away.

Representative Larry Yarborough: What is the stormwater control on the plant site? Do they appear to be inadequate or is this from the entire region that has caused this spike?

Holman: The stormwater would go through the wastewater and merges and goes through the outfall. This is still hypothesis because we don't have soil samples everywhere, but we believe GenX is being picked up in the immediate area.

Representative Yarborough: We had that one outlier, and I assume this is very raw data. How do you treat that as a datapoint?

Holman: Imagine that the air emissions are variable. There may be times where we see all nondetects. The team of meteorologists look at the wind speeds and directions, and they provide advice as to where to place these temporary samplers. We got lucky that we got the opportunity to see a high level of GenX. We will continue to try to find out if this is a valid sample.

Representative Jimmy Dixon: The public utility authority from the last meeting said the drinking water coming through their plant was safe – is that correct?

Holman: I don't know – trying to recall what they said. I think our data would suggest that the levels of GenX are below the health advisory that was established by Department of Health and Human Services (DHHS).

Representative Dixon: My recollection of the quality of water being within the levels in Wilmington was accurate, correct?

Holman: That's my understanding, yes.

Representative Dixon: How often do you communicate with the Authority down there for updates?

Holman: I believe staff are pretty involved. Obviously they're posting their data as they are getting it like we are. I know there have been contacts to see "did you sample on this day and what were you seeing." I know there has been ongoing dialogue.

Representative Dixon: What data did DEQ use from West Virginia when they were required to stop processing?

Holman: I do not know.

Representative Dixon: Why was the decision made to ignore the public comments that was a forewarning of the potential problems we have now?

Holman: I don't have an answer. A lot of my time and energy is dedicated to determining what is and how to fix it, but I can see if I can find an answer.

Representative Davis: When we began this committee, I said that this committee was going to find out how we got to where we are. You can't fix a problem and make sure it won't happen again if you don't know how you got there.

Representative Bob Muller: Do you have a date for the installment of the thermal oxidizer?

Holman: I do not, but the oxidizer is an intensive piece of equipment. I would guess a number of months.

Representative Muller: This leaves an open-ended question.

Holman: That question has been posed, and we are waiting on a response from the Company. We will follow up when we have an answer.

Representative Muller: Regarding slide 20, we don't have a test method, and we're asking the Company to come up with one? I don't understand that.

Holman: It's a joint effort, and Chemours is working with the U.S. EPA. Sometimes the Company has to develop the method with the U.S. EPA. It's not literally Chemours coming up with the method.

Representative Chuck McGrady: Does the Department still need the spectrometer and staff from earlier this year?

Holman: Yes we do still have the same needs. We would need staff and are working on seeing if there is an existing spectrometer.

Representative McGrady: Are there additional needs for funding from the General Assembly to address the GenX issue and emerging contaminants?

Holman: Correct.

Representative Elmer Floyd: In this picture (slide 23) the reading was about three miles from the plant, correct?

Holman: Yes, so just about 3 miles from the center, we saw about 17 ppt for that rain event.

Representative Floyd: I thought we were moving southeast for the sampling.

Holman: We are moving southwest and a little southeast. This was based on the next phase. Phase 4 was based on what we saw in Phase 2 and 3. What you see is there aren't a lot of values south and east of the facility, so we are continuing to see where those private wells were impacted.

Representative Floyd: At some point it's five miles out.

Holman: Terms of well testing we started a mile from the center. We're using the well data to tell us where to go next.

Representative Floyd: It's amazing how some wells can be zero, and next door…

Holman: Right, and we're trying to get more information on the depth of wells. It seems that the more shallow wells have a higher concentration.

Representative Davis: There has been some reference to the DHHS health goal in effect now. Are you taking in part of the discussions with the Science Advisory Board (SAB) about changing those health goals?

Holman: Yes, I am part of those discussions. The most recent meeting was this past Monday. We were able to get all of the health studies, and the members want to look at benchmark dose modeling. This would help guide where the starting points should be. Two members volunteered to help DHHS with dose modeling.

Representative Davis: Is DEQ taking any part in monitoring food for GenX?

Holman: DEQ is currently working with both the Department of Agriculture and Consumer Services and DHHS to test crops near the facility. The SAB received information about crops grown near a facility in the Netherlands recently.

Representative Davis: Where are we going with monitoring and testing? What point do you monitor or reach an alarm where you need to take action?

Holman: Part of the purpose of the surface water monitoring is to understand what is going into the Cape Fear River and what is causing those spikes. We will be asking them to do soil testing off-site. The purpose of the air emissions is to look at the role the air emissions play in the off-site groundwater contamination and how to address that. The purpose of gathering the data is three-fold. First: Make sure that the Company is complying with all that the Agency has asked them to do. Second: what are the additional asks we need to make so we are minimizing the impact on the impact and public health. Third: It informs whether there are additional enforcement regulatory actions the Agency needs to take.

Representative Davis: Could you give us an update on any enforcement actions taken against Chemours?

Holman: The first enforcement action was in September, the filing of the 60-day notice that was the intent to suspend the discharge permit. Also a complaint was filed in Bladen County Superior Court which led to the Consent Order signed on September 8. Over the course of the following months, the Agency determined it was appropriate to do a partial suspension of the wastewater discharge. Since then the company has been disposing of the water in other ways. In December the Division of Waste Management sent an NOV for immediate action regarding the contaminated

well water on site. In January we weren't satisfied with the response we received from the Company so we did the immediate action NOV to address the groundwater contamination and spikes in the Cape Fear River and air emissions. Our investigation is ongoing, and we want to make sure we have a good data set and facts to pursue.

Representative Davis: Do you know when the investigations might be concluded?

Holman: The air emissions is still incomplete. There may be interim actions and then final actions when we have the complete dataset.

Representative Davis: There has been talk about partially or completely shutting down the plant, I've got a question for staff (Jeffery Hudson). In these discussions, does the General Assembly have the authority to shut down the plant?

Jeffery Hudson: The General Assembly would have to enact laws of general applicability. It cannot name a company or facility through legislation. It can empower agencies to take enforcement actions where there is a violation of the law. This could be injunctive, revocation, civil, or criminal penalties.

Representative Davis: What criteria would DEQ use to partially or totally shut down, and what procedures would Chemours have to contest that action?

Holman: We've invoked a series of those already. There has to be a 60-day notice of revocation to the facility under current statutes. We address their permits and the things that come from noncompliance.

Representative Davis: So you have to give a 60-day notice of a partial or complete shutdown?

Holman: In most instances, yes.

Representative Davis: In what instances would you not?

Holman: There is some authority under the abatement of an imminent hazard. There can be quicker action in that instance. That is typically when you follow the definition of imminent hazard or imminent threat to life. I can think of one such instance from my career when it had to deal with a phone manufacturer and a compound called methylene chloride. The compound that we are dealing with is not one that rises to the level of imminent hazard. It isn't being regulated by the U.S. EPA.

Representative Davis: Say I am Chemours, and you give me a 60-day notice. What happens after that?

Holman: Typically that notice would have actions that the Agency wants the Company to take. They could also challenge the 60-day notice.

Representative Davis: Is there a hearing? What happens if you get to that 60 days, and things have not been resolved satisfactorily?

Holman: If the Company challenges the 60-day notice, there would be a hearing and evaluation whether the Agency took the action within their authority or in an arbitrary or capricious manner.

Representative Davis: Who would conduct the hearing?

Holman: It would come before the Office of Administrative Hearings (OAH).

Representative Davis: So when you or the Agency's attorneys are there they present why they think the permit should be revoked. Then the Company would have the opportunity to rebut or explain to not allow the revocation to be granted, correct?

Holman: Yes that is correct.

Representative Davis: Let's say if the Company does not contest the 60-day notice, then after the 60 days the permit is revoked, correct?

Holman: I think we would have to take the action of the revocation.

Representative Davis: Let's say that the person conducting the hearing says that the Agency does not have enough to revoke, is there anything else they can do?

Holman: The Department could choose to appeal that decision.

Representative Davis: If the person conducting the hearing says that the Agency does have enough to go forward, what would happen then?

Holman: Either party has the ability to appeal.

Representative Davis: Where does that appeal go to?

Holman: Can I ask Mr. Hudson to answer that?

Representative Davis: Yes.

Hudson: That appeal would go from the OAH to Superior Court.

Representative Davis: Do you know if that is a bench hearing with a judge or are they entitled to a jury?

Hudson: I do not know.

Representative Davis: Is there an appeals process after Superior Court?

Hudson: Yes once it is in that system it is like any other case because it is a government action it goes to the OAH and then to Superior Court, possibly to Court of Appeals, and then Supreme Court.

Representative Davis: I'm assuming that during this time I could get a stay to continue operations while the appeal is pending?

Hudson: Yes.

Representative Davis: The reason I am asking this is that it is not a simple process like going into a plant and saying "you're shut down." It seems like a very drawn out process. I'm assuming that you are keeping tabs on what is going on and looking at whether or not you are going to give the 60-day notice of revocation or not, correct?

Holman: Absolutely.

Representative Pat McElraft: About the thermal oxidizer unit, do you know how much that will cost the Company or how long it would take to get that retrofitted into their system.

Holman: I understand that those systems are anywhere from $40 to 70 million, and the timeline is several months. We will reply to the Committee when we have a timeline.

Representative Dixon: If the standard had remained at 70,000 ppt, would any of that have happened?

Holman: I do not believe so, no.

Representative Dixon: So the thing that changed was the standard ppt as far as health is concerned?

Holman: Certainly when it comes to drinking water, yes.

Representative Dixon: Relative to the West Virginia situation, it was DEQ that made the decision to issue the permits, not the General Assembly, correct?

Holman: Correct.

Representative Dixon: I'd like to make that point. That the permitting, even in light of the West Virginia situation, was a decision that the General Assembly has placed on DEQ, formerly the Department of Environment and Natural Resources. The question now is whether the General Assembly wants to re-involve itself in these issues, correct?

Representative Davis: That is correct. If anyone on the Committee has anything they want to recommend, it is certainly their prerogative.

Representative Dixon: It is the current majority taking this action and not the previous majority which did not do what we are now trying to do.

Representative Davis: I think it is very important what the SAB is going to recommend a health goal as a guide to determine if anyone is in violation of those goals. Once they release something, I'd like them to come to the Committee and explain their rationale.

Representative Dixon: I'd really like to express to DEQ how much I appreciate their efforts to try to balance exactly where you are in the context of the current political climate.

Representative Floyd: Representative McGrady mentioned possibly getting some funding that may be necessary. Since it is in Cumberland County, and the County is trying to provide some type of water, is it possible that a grant can developed to extend water in this area?

Representative Davis: One of the things I had talked about earlier was the fact that I had asked DHHS and DEQ to get any legislation they would like for us to consider to this committee before the Short Session. DHHS has done that, and the Appropriations Chairs will have to look at that. We can look at that, but as of now it is in the hands of the Appropriations Chairs.

The meeting adjourned at 10:55 AM.

Representative Ted Davis, Jr., Senior Chair
Presiding

Andrew Bowers, Committee Clerk

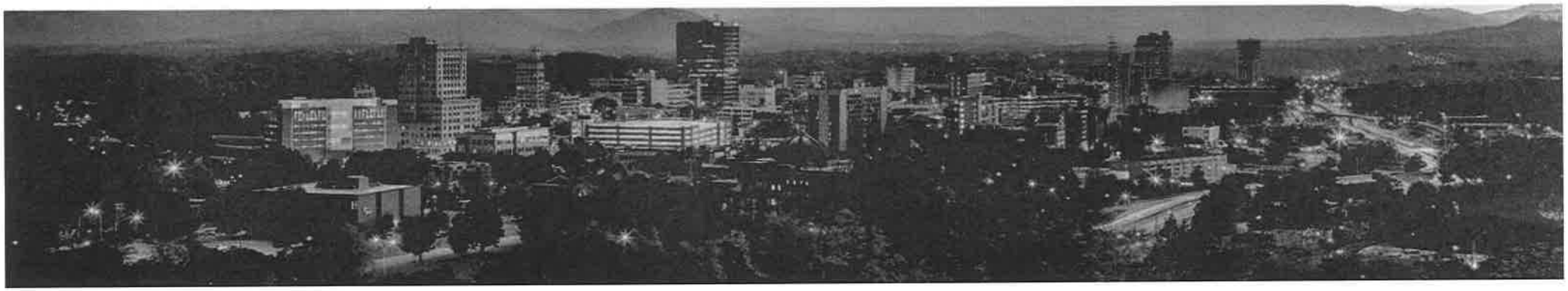


Nothing Compares
NORTH CAROLINA

NC DEPARTMENT OF ENVIRONMENTAL QUALITY

GenX Update

03/22/2018



Attachment #1



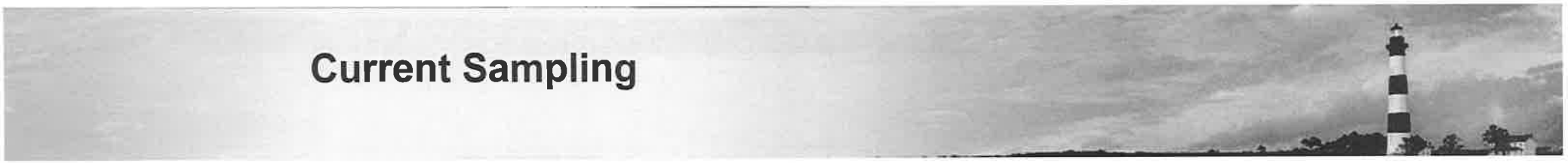
Nothing Compares

NORTH CAROLINA

Division of Water Resources



Current Sampling



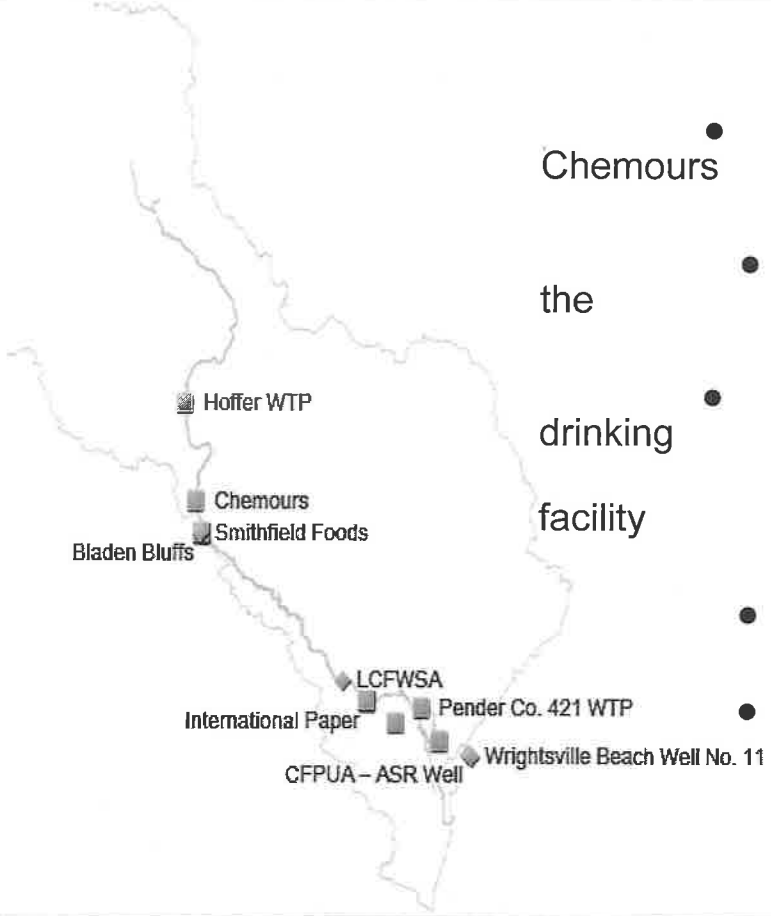
Division of Water Resources

- 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

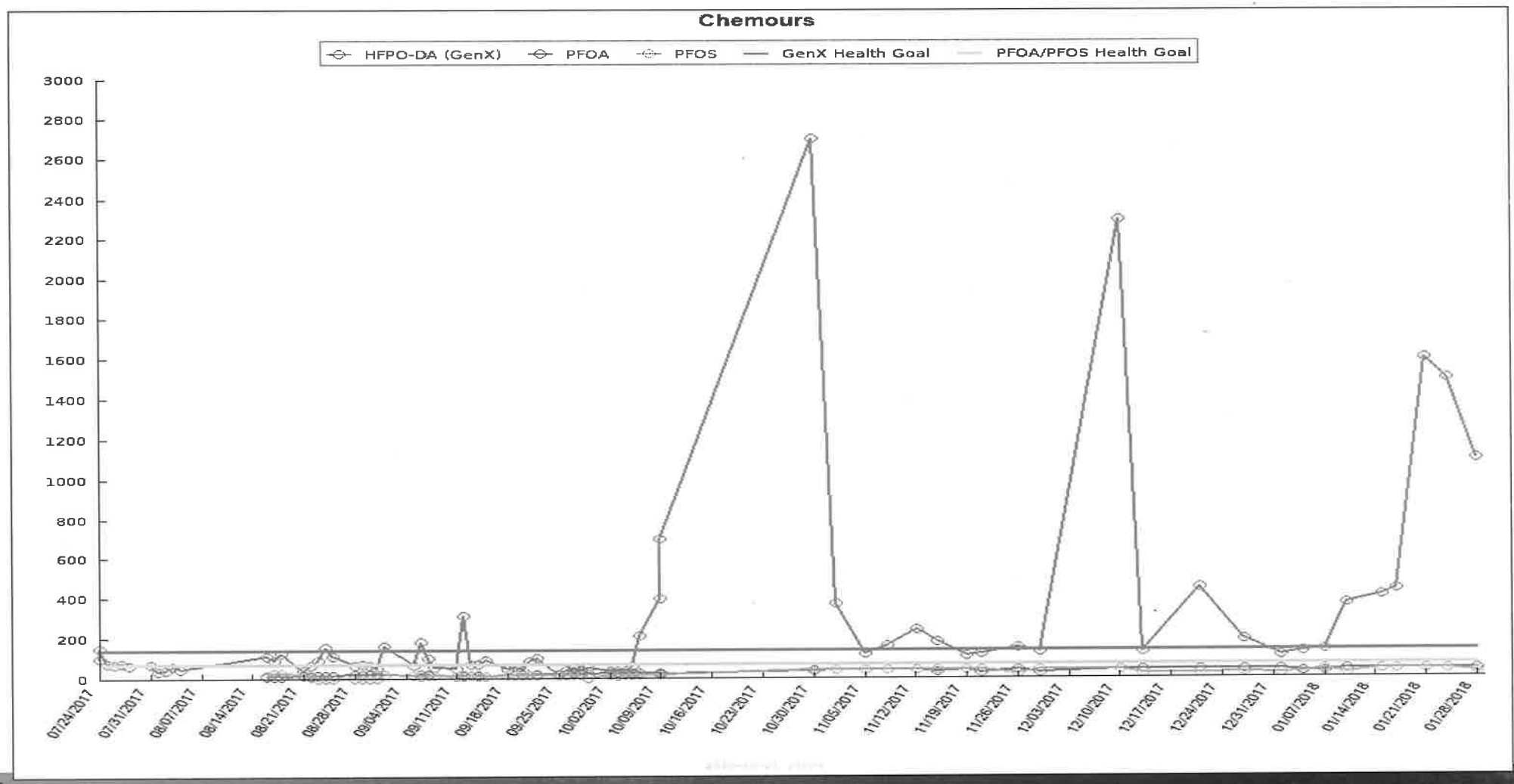
- Other watersheds across North Carolina
  - Began monthly monitoring in Jordan Lake watershed Jan. 2nd

DEQ Sampling - Cape Fear River

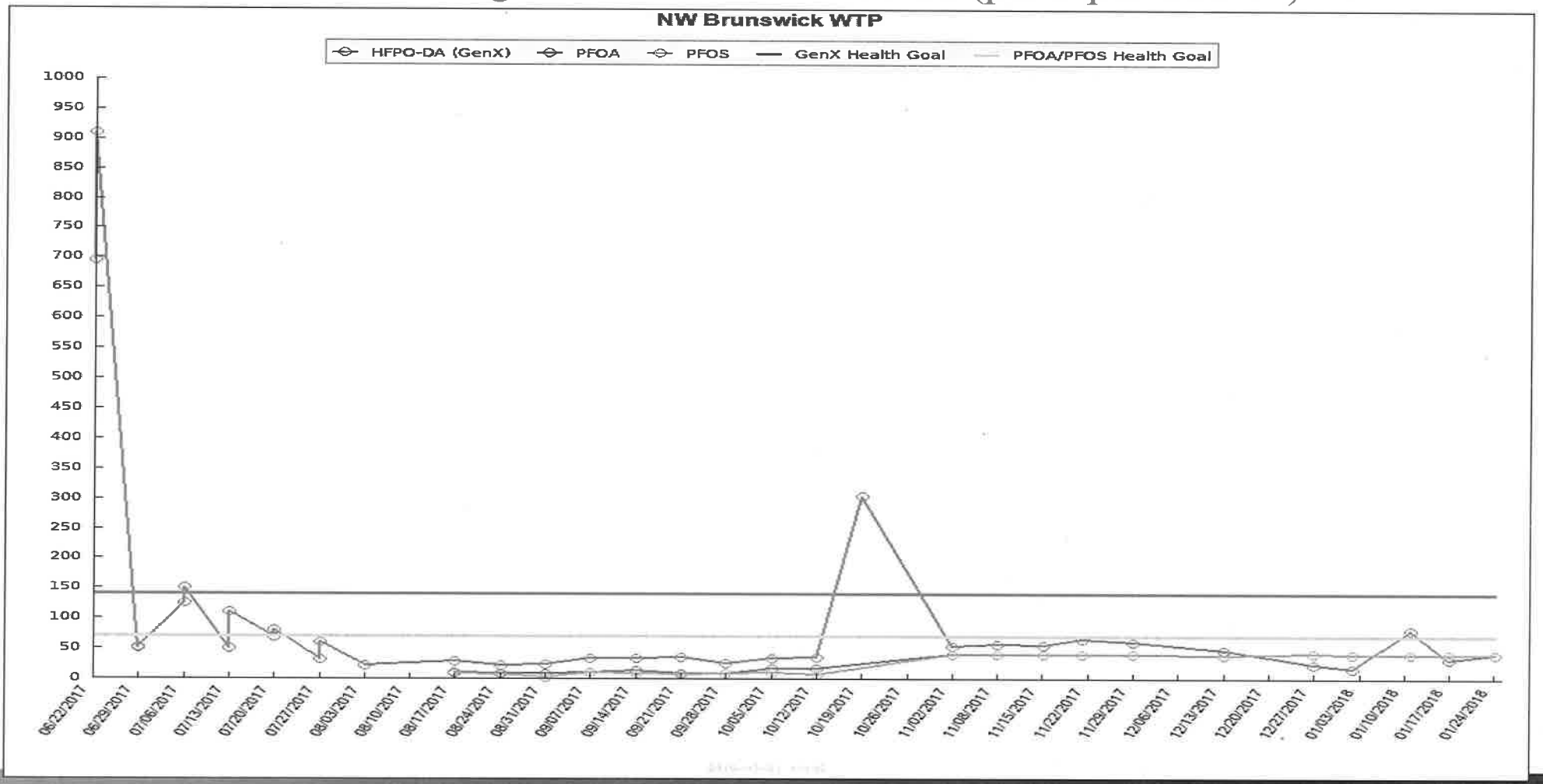


- Process area sampling at Chemours
- Weekly composite sampling at the Chemours wastewater outfall 002
- Weekly sampling of finished drinking water downstream of the Chemours facility
- Aquifer Storage Recovery Well
- Nearby Public Water Supply Wells

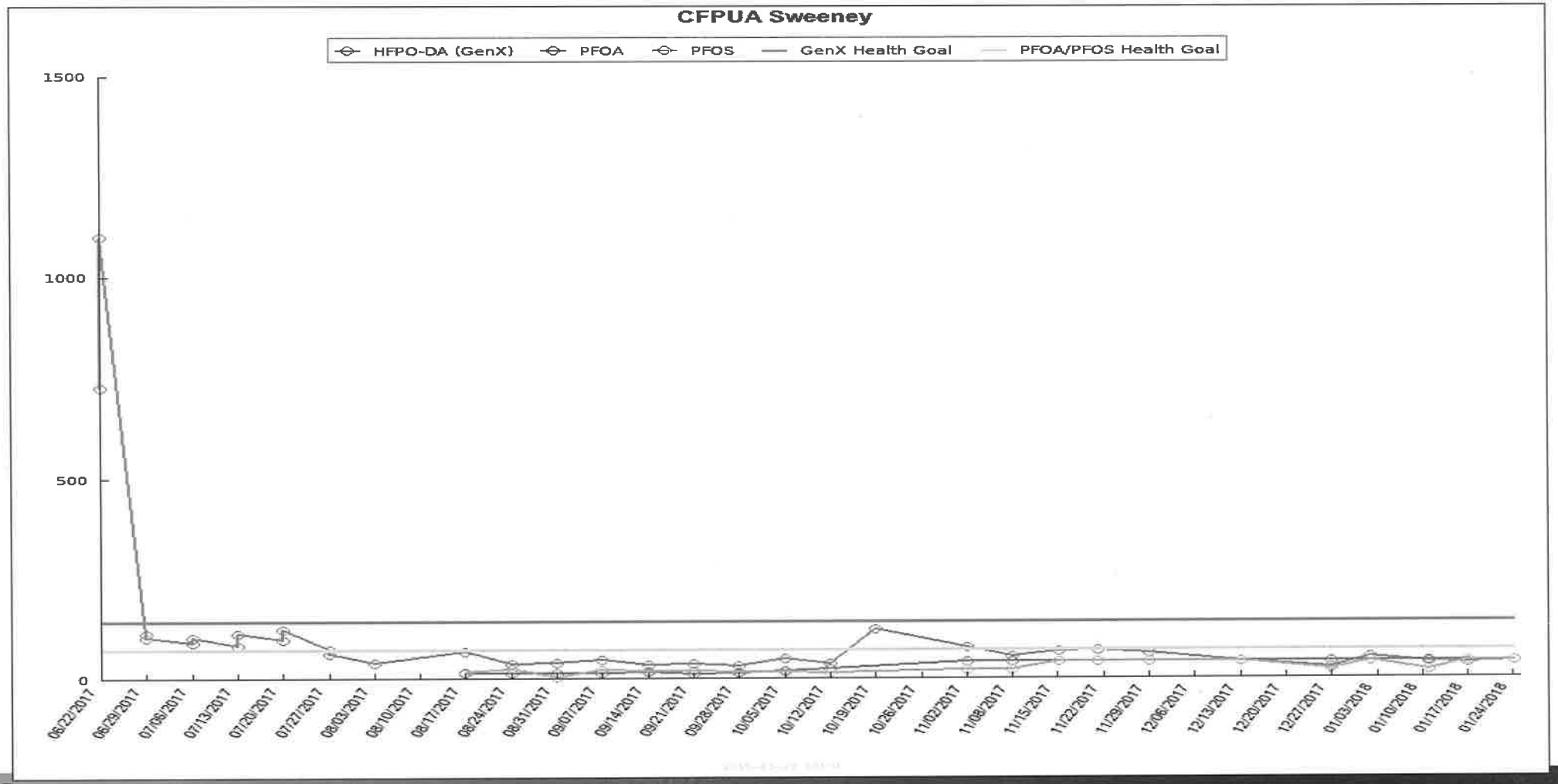
Data at Chemours Outfall 002 GenX (parts per trillion)



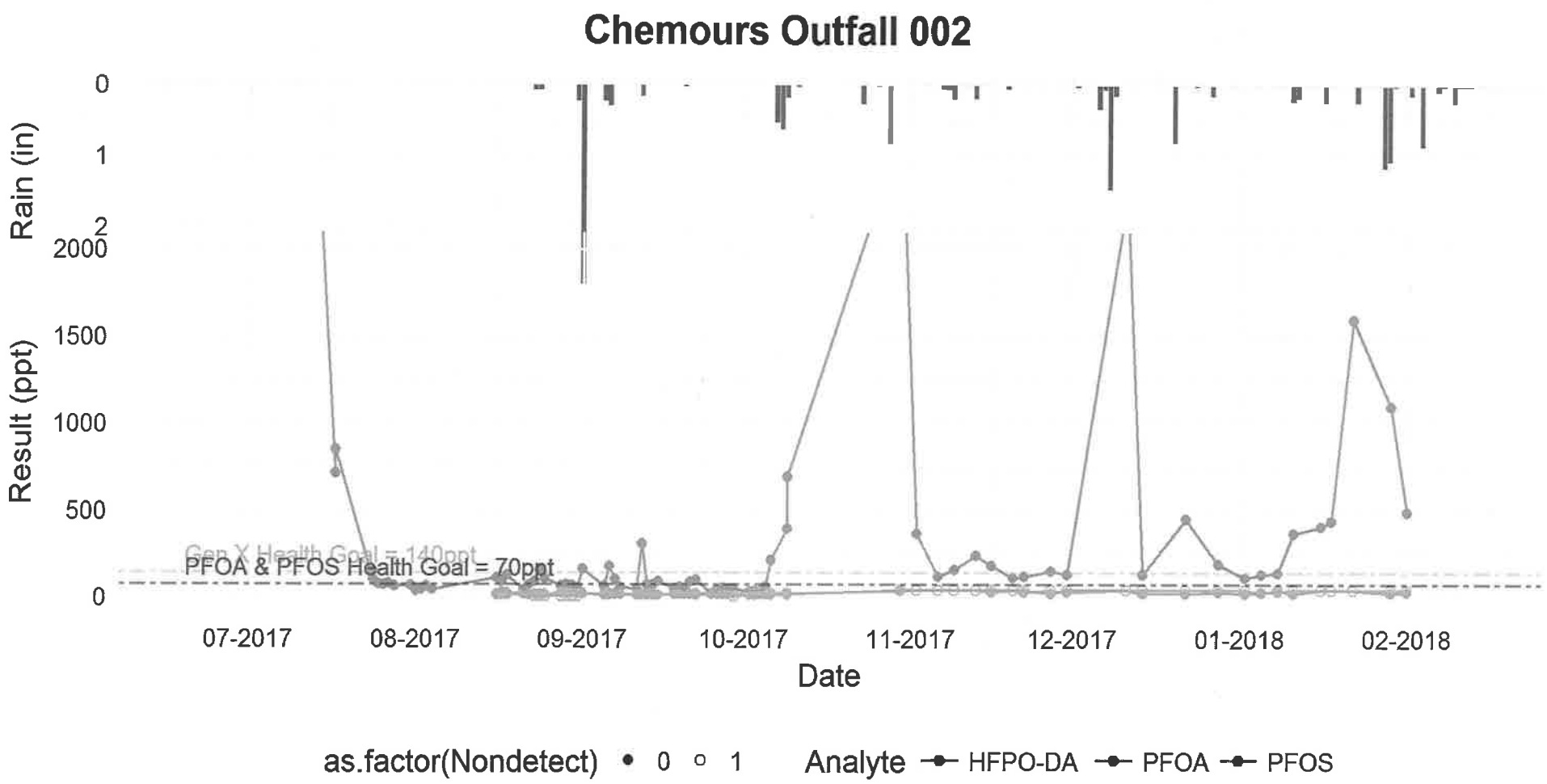
Data at Drinking Water Facilities -GenX (parts per trillion)



Data at Drinking Water Facilities-GenX (parts per trillion)



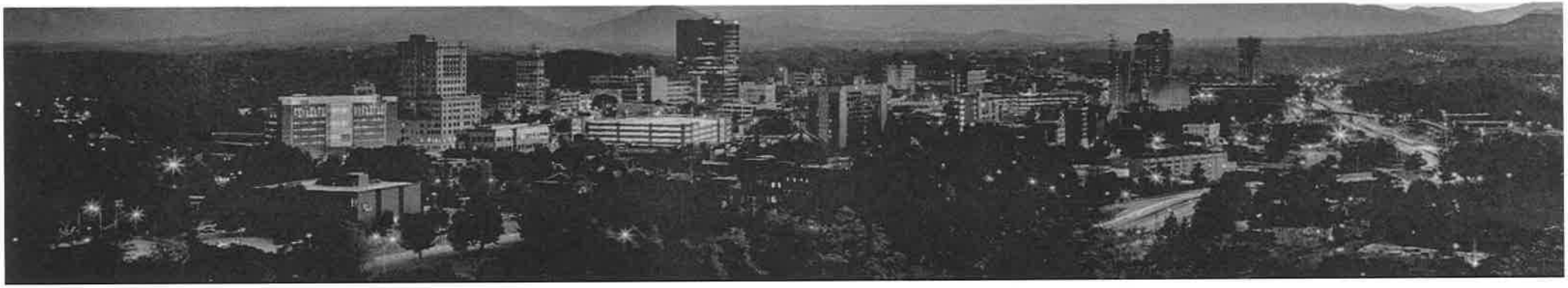
Rain Results





Nothing Compares
NORTH CAROLINA

Division of Waste Management



Division of Waste Management

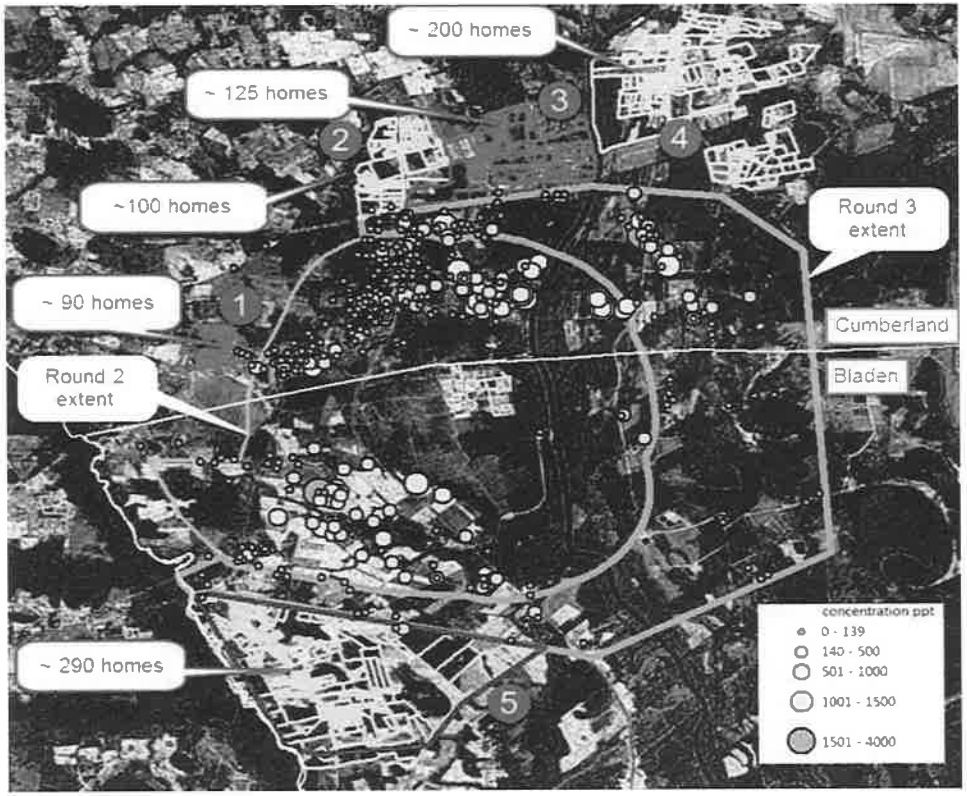


Well Sampling Results
in the Chemours area,
Phases 1-4
(up to ~ 4 mi. from facility border)

GenX: NC health goal = 140 ng/l

Red = > 140 ng/l
Yellow= 0-140 ng/l
Green = Non detect

Division of Waste Management



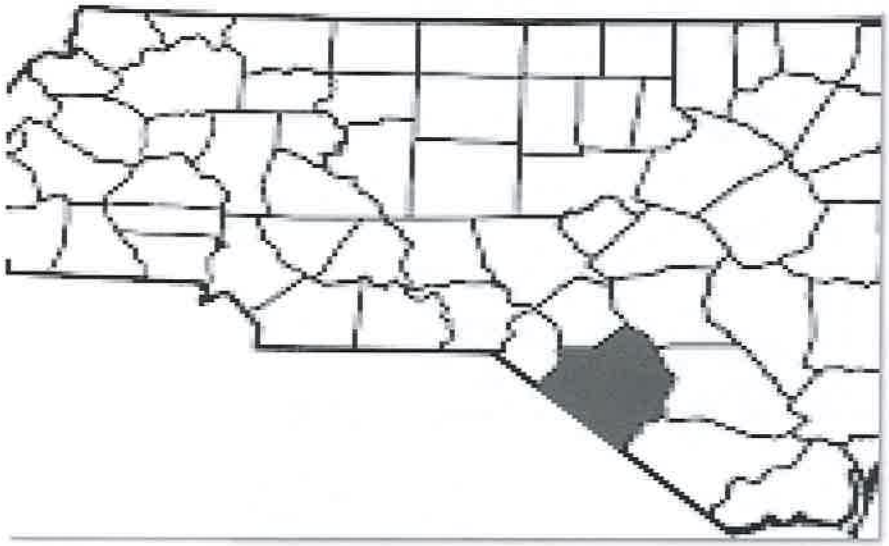
Chemours "Phase 4" sampling plan

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

287 residences have been sampled thus far in phase 4

Data is showing a lower percentage of wells above the health goal

Robeson County Private Well Testing



- Robeson County tested 27 drinking water wells at residences.
- Sample dates: 1/29/18 and 2/13/18
- Results:
  - 25 wells had GenX detections and two were ND; highest was just under 42 ng/l
  - 25 wells had PFOS+PFOA detections and two were ND; highest was just under 25 ng/l combined
  - 0 wells exceeded the health goal for GenX (140 ng/l)
  - 0 wells exceeded the health goal for PFOS + PFOA (70 ng/l)
  - 1 well was ND for all three compounds
- Robeson County is planning to test a few additional wells and surface water features



Division of Waste Management

Combined Phase I, II, III , IV (partial) Private Well PFAS Data

Includes Robeson Co Data

Private Well Water GenX Summary	Phase I, II, III, IV partial Combined (%)
Distance from Chemours' border	Up to 4 miles
Well Collection Dates	9/6/2017 – 2/18
Number of Wells tested	748
Number of Exceedances of the GenX Provisional Health Goal	190
Number of Not-Detected ("ND") GenX Analyses	198
Number of GenX Detections Less than the Health Goal [a]	360
Maximum Detected GenX Concentration	4000 ng/L

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

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 at or above 140 ppt
- DEQ has provided initial feedback to Chemours to include the requirement to install 5 additional filter systems for sampling
- Installation of the systems should start this week
- Sampling data regarding the effectiveness of the systems will be shared online



Fish Tissue Testing

Marshwood Lake Testing by DEQ

- DEQ sampled Marshwood Lake on March 14:
  - Five surface water samples
  - Two composite sediment samples
  - Two fish species composite samples (Largemouth Bass and Redear Sunfish, composites from multiple fish)

- A drinking water well onsite at the lake was sampled
- A composite sediment sample was taken from Lock & Dam 3 in the Cape Fear River

- All samples collected will be analyzed using USEPA M537-modified for Full PFAS Suite at GEL Labs.
- Surface water will also be tested for Total Organic Carbon, Dissolved Organic Carbon, pH and Total Particulates





Nothing Compares

NORTH CAROLINA

Division of Air Quality

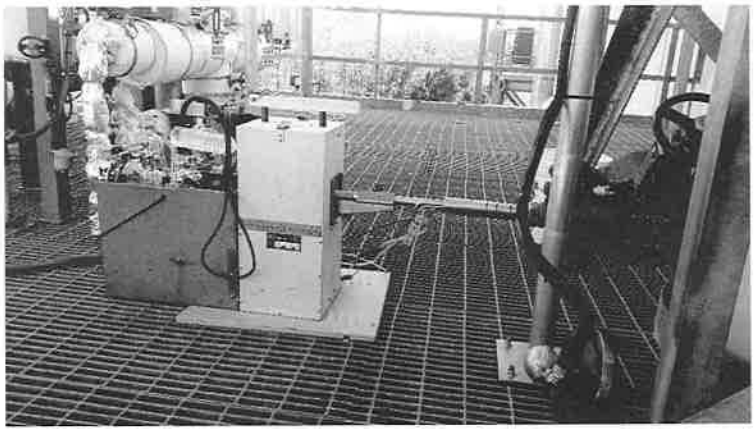


Air Emissions Testing or "Stack Testing"

Target contaminant – C_3 Dimer Acid (GenX)

Purpose of testing is to quantify the emission rate of GenX during specific chemical campaigns at various processes

DAQ staff are on-site for every day of testing



Division of Air Quality

Air Emissions Testing

Preliminary Testing – January 9, 2018 Polymer Processing Aid (PPA) process

Testing – January 22-26, 2018
- PPA process
- Vinyl Ethers North - Division Scrubber Stack

February 26 – March 2, 2018
- PPA process
- Vinyl Ethers South



Division of Air Quality

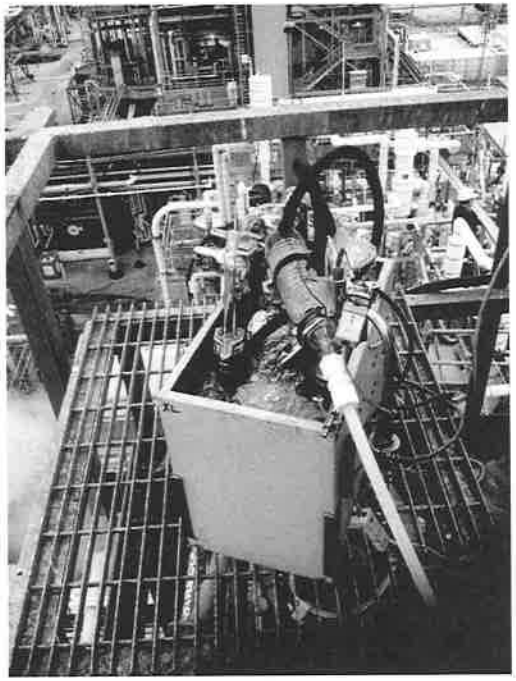
Air Emissions Testing

DAQ required Chemours to provide split samples for independent assessment by EPA lab

Results of January testing have been submitted and are being analyzed by DAQ staff

Testing ongoing this week: March 19-23

- Vinyl Ethers North – Division Scrubber Stack
- IXM Polymers Stack
- Semi-works Stack



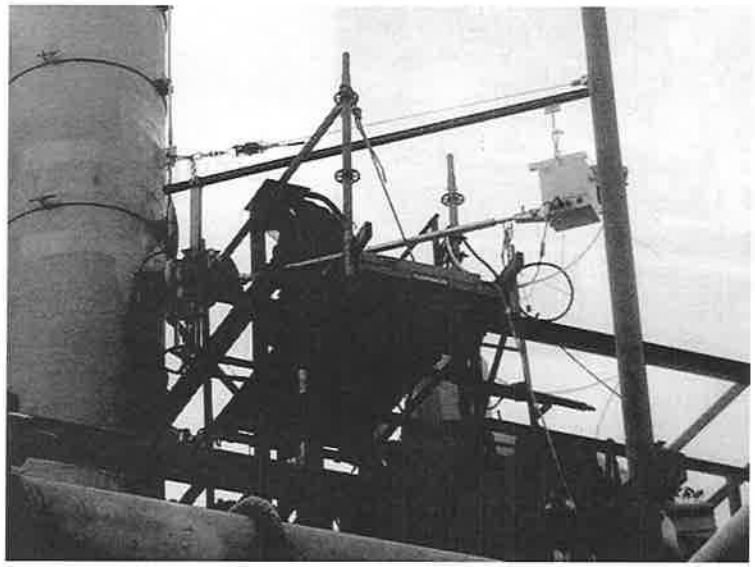
Division of Air Quality

Air Emissions Testing

Future testing:

DAQ has required Chemours to develop test methods and quantify emissions for other chemicals beginning with:

- HFPO Monomer –
  - testing targeted for April
- E-1 –
  - testing targeted for May
- Nafion byproducts 1&2 –
  - targeted for May



Division of Air Quality



Ambient Air Quality Monitoring

- Network of wet deposition monitors planned

- Goal: Quantify near-field deposition rates and confirm cause/effect relationships. Quantify "background" amounts of PFAS in rainwater.
- Preliminary wet deposition samples under analysis

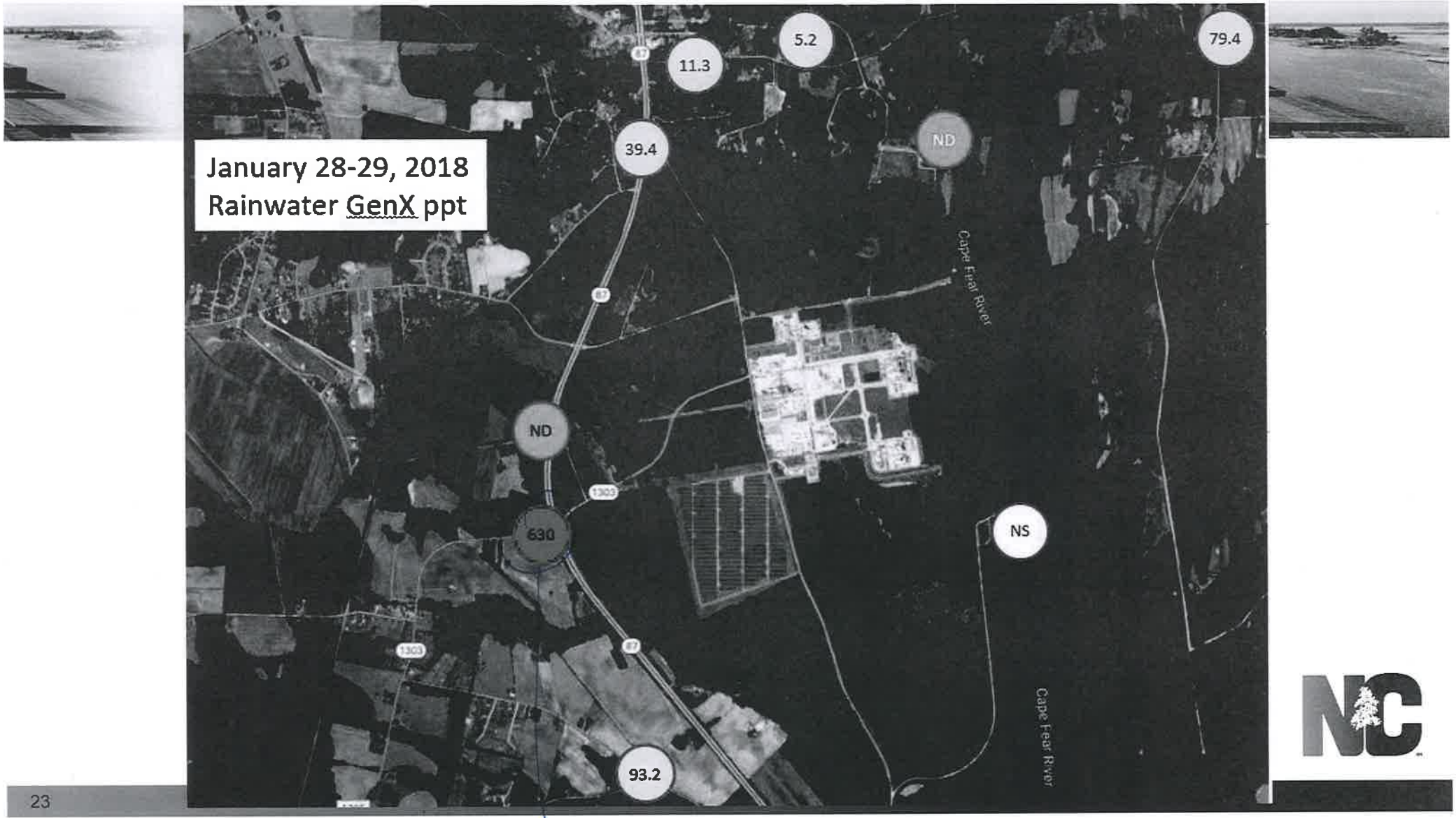
    - Source-oriented sites near Chemours
        - 2 northeast of facility
        - 2 southwest of facility

    - Background sites
        - Asheville
        - Raleigh
        - Candor
        - Wilmington

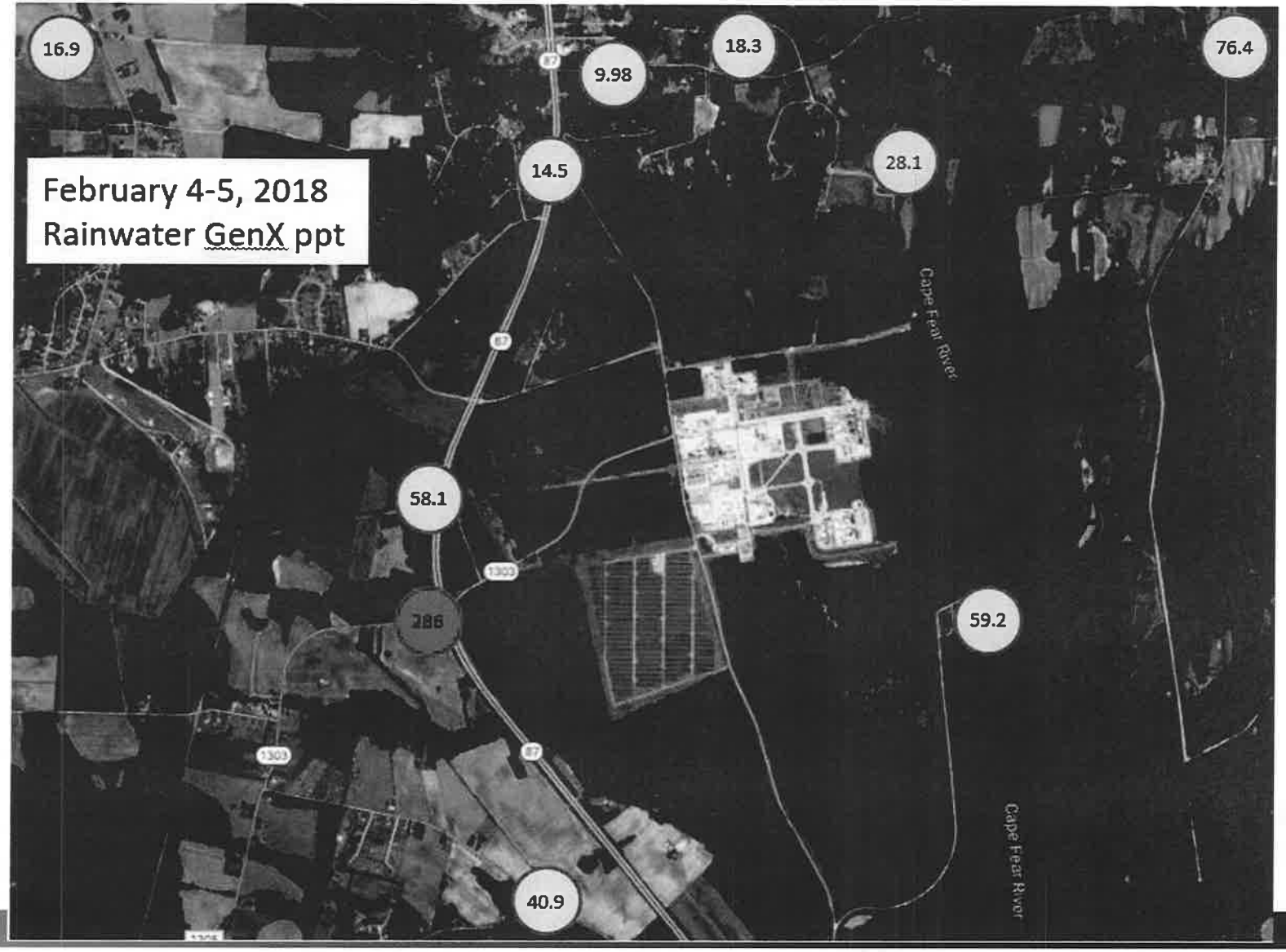


Ambient Air Quality Monitoring

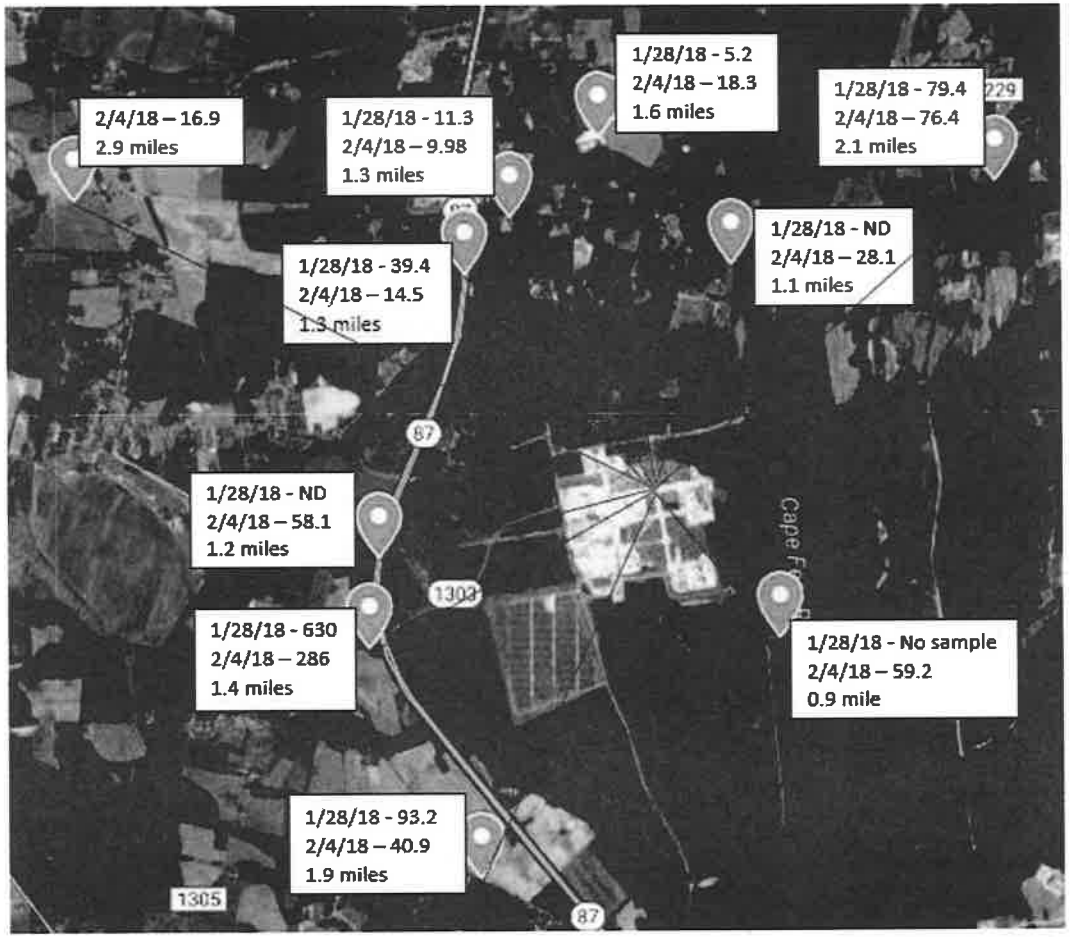
- In the interim, DAQ has been performing a series of temporary site rainwater sampling:
  - January 28-29
  - February 4-5
  - February 28-March 1
  - March 6-7
  - March 9-12
  - March 19-21


January 28-29, 2018
Rainwater GenX ppt
11.3
5.2
79.4
39.4
ND
ND
630
NS
93.2
Cape Fear River
Cape Fear River
1303
1303
87
87

red


February 4-5, 2018
Rainwater GenX ppt
16.9
9.98
18.3
76.4
14.5
28.1
58.1
286
59.2
40.9
Cape Fear River
Cape Fear River

Composite analysis Jan 28 and Feb 4 rain events



Division of Air Quality



Ambient Air Quality Monitoring

- DAQ has received permission from property owners to site 3 fixed rain samplers. Temporary sampling will be performed at those locations until permanent equipment is delivered.

- DAQ is analyzing the rainwater data, meteorological data and process data to generate a baseline of rainwater impact during early 2018.

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — March 22, 2018

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Julie Woosley	NCDEQ, DWM
Ellen Lorscheider	NCDEQ DWM
Timothy Webster	NCDEQ, Legislative Affairs
Brian Powell	NC Conservation Network
Boots Rainey Pearson	SELC
Mymacle Azizi	SELC
Cassie Gavin	Sierra Club
Rivian Mercaldo	WWF
Jenna Calderon	BFNC
Adam Vagnier	Stantec
Matt Gross	DHHS

VISITOR REGISTRATION SHEET

House Select Committee on NC River Quality — March 22, 2018

Name of Committee — **Date**

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
L T McCrimmon	DHHS
[signature]	[signature]

N.C. General Assembly

Administrative Division
Financial Services Section

Copies

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Ted Davis Jr.

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Yes ☐ No ☐ N/A

Car Mileage
(Fill out this line if mileage is different than what is certified on file) N/A

Number of Round Trips N/A

Attended the School Safety Committee meeting yesterday and submitted a Reimbursement form including mileage.

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Bob Steinburg

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage Same
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Rep. Bob Steinburg
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Larry Yarborough

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Pat McElraft

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.) Yes ☑ No ☐

Car Mileage
(Fill out this line if mileage is different than what is certified on file) on file

Number of Round Trips 1

Pat McElraft
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

10/8
(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative William Brisson

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 180
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Kyle Hall

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Chuck McGrady

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Holly Grange

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage
(Fill out this line if mileage is different than what is certified on file) already here

Number of Round Trips

Holly Grange
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: March 22, 2018

Member: Rep. Harry Warren

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ■
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 262
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Harry Warren
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: _____ Ext._____

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Bob Muller

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Elmer Floyd

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips _____

Elmer Floyd
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

House Select Committee on NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh, NC

Date(s) of Meeting: Thursday, March 22, 2018

Member: Representative Jimmy Dixon

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Jimmy Dixon
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Judy Lowe Ext. 3-5786

Andrew Bowers (Rep. Ted Davis)

From: Andrew Bowers (Rep. Ted Davis)
Sent: Wednesday, April 18, 2018 12:26 PM
To: Andrew Bowers (Rep. Ted Davis)
Cc: Jeffrey Hudson (Legislative Analysis)
Subject: <NCGA> House Select Committee on North Carolina River Quality Committee Meeting Notice for Thursday, April 26, 2018 at 9:30 AM
Attachments: Add Meeting to Calendar_LINC_.ics

NORTH CAROLINA HOUSE OF REPRESENTATIVES
COMMITTEE MEETING NOTICE
AND
BILL SPONSOR NOTIFICATION
2017-2018 SESSION

You are hereby notified that the **House Select Committee on North Carolina River Quality** will meet as follows:

DAY & DATE: Thursday, April 26, 2018
TIME: **9:30 AM**
LOCATION: **643 LOB**
COMMENTS: **An agenda will be sent to the committee members when it has been completed.**

Respectfully,
Representative Ted Davis, Jr., Senior Chair
Representative Holly Grange, Co-Chair
Representative Frank Iler, Co-Chair

I hereby certify this notice was filed by the committee assistant at the following offices at 12:24 PM on Wednesday, April 18, 2018.

___ Principal Clerk
___ Reading Clerk – House Chamber

Andrew Bowers (Committee Assistant)

General Assembly of North Carolina

House Select Committee on North Carolina River Quality
State Legislative Building
Raleigh, North Carolina

SENIOR CHAIRMAN
REP. TED DAVIS, JR.

COMMITTEE CHAIRMEN
REP. HOLLY GRANGE
REP. FRANK ILER

COMMITTEE MEMBERS
REP. WILLIAM BRISSON
REP. JIMMY DIXON
REP. ELMER FLOYD
REP. KYLE HALL
REP. PRICEY HARRISON
REP. PAT MCELRAFT
REP. CHUCK MCGRADY
REP. BOB MULLER
REP. BOB STEINBURG
REP. SCOTT STONE
REP. LARRY YARBOROUGH

COMMITTEE STAFF
JEFF HUDSON
COMMITTEE COUNSEL
545 LEGISLATIVE OFFICE BUILDING
300 NORTH SALISBURY STREET
RALEIGH, NORTH CAROLINA 27603
(919) 733-2578

JENNIFER McGINNIS
COMMITTEE COUNSEL

CHRIS SAUNDERS
COMMITTEE COUNSEL

MARIAH MATHESON
COMMITTEE ASSISTANT

ANDREW BOWERS
COMMITTEE CLERK

AGENDA
9:30 a.m. Thursday, April 26, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Approval of minutes
   September 28, 2017 Minutes
   October 26, 2017 Minutes
   November 30, 2017 Minutes
   January 4, 2018 Minutes

4. Department of Environmental Quality update on response to emerging compounds *(1 hour)*
   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

5. Final report on implementation of Section 20(a)(1) of S.L. 2017-209 (House Bill 56) (GenX Response Measures) *(45 minutes)*
   Jim Flechtner, Executive Director
   Cape Fear Public Utility Authority

6. Final report on implementation of Section 20(a)(2) of S.L. 2017-209 (House Bill 56) (GenX Response Measures) *(45 minutes)*

   Dr. Ralph Mead, Professor, Department of Chemistry and Biochemistry
   University of North Carolina Wilmington

   Mark Lanier, Assistant to the Chancellor
   University of North Carolina Wilmington

7. Approval of committee report

8. Committee discussion and announcements

9. Adjourn

ADDITIONAL INFORMATION:

Persons having questions about the Committee meeting or other matters related to the Committee may contact Jeff Hudson or Jennifer McGinnis, Committee Counsels, or other Committee staff at (919) 733-2578 or may visit the Committee's website at:
http://www.ncleg.net/gascripts/Committees/committees.asp?sAction=ViewCommittee&sActionDetails=House+Select_185

HOUSE SELECT COMMITTEE ON NORTH CAROLINA RIVER QUALITY
April 26, 2018
Room 643 LOB

The House Select Committee on North Carolina met on Thursday, April 26 at 9:34 AM. The meeting was held in Room 643 LOB. Members present were: Representative Ted Davis, Jr., Frank Iler, William Brisson, Jimmy Dixon, Elmer Floyd, Pricey Harrison, Pat McElraft, Chuck McGrady, Bob Muller, Bob Steinburg, Scott Stone, and Larry Yarborough.

Representative Ted Davis presided.

Representative Ted Davis welcomed all in attendance and thanked the Sergeant at Arms for their service.

Representative Davis recognized Co-Chair Representative Frank Iler for any comments, and Representative Iler stated that he was looking forward to moving forward legislation in the Short session.

Representative Davis brought the approval of minutes from the September 28th, 2017, October 26th, 2017, November 30th, 2017, and January 4th, 2018 meetings. Representative Chuck McGrady motioned to approve the minutes, seconded by Representative Pat McElraft. The motion passed unanimously.

DEQ Emerging Compounds Update

Representative Davis welcomed Assistant Secretary for the Department of Environmental Quality (DEQ) Sheila Holman to present an update on the response to emerging compounds. Attachment #5 contains Assistant Secretary Holman's presentation.

Assistant Director Holman explained the spikes on the graph on Slide 4. She then explained the graph on Slide 5, which shows data found from the Northwest Brunswick Water Facility, adding that the compounds in the water there were below the health goals. Assistant Director Holman moved on to the Division of Waste Management and explained Slides 7-13.

Assistant Director Holman then continued to the section of her presentation regarding the Division of Air Quality (Slides 15-20). Asst. Dir. Holman summarized DEQ's Division of Air Quality's findings using Slide 21. Using Slides 22-23, Asst. Dir. Holman reviewed recent

actions taken by DEQ against Chemours. Asst. Dir. Holman answered questions that were unanswered at the March 22nd meeting and then took questions from the Committee.

Questions

Representative Frank Iler: I have results from NW Brunswick County from March. I'll see if you have any similar results anywhere else. The samples collected on March 1, 5, 18 was around 9 ppt. raw water and finished water. Do you have similar results anywhere else?

Asst. Dir. Holman: I think we have similar results at all of the other Lower Cape Fear Facilities, and later you will hear from the Cape Fear Public Utilities Authority with theirs. But yes we are seeing similar results.

Representative Scott Stone: On the rainwater collection, how do you calculate from a context standpoint what it would the concentration end up being in the ground water because it isn't a one for one I wouldn't think and I'm curious, has that process been used for any other contaminant in the state?

Asst. Dir. Holman: We have mercury deposition monitors and I think a few other types of deposition, but mercury I'm most familiar with. The national acid deposition monitoring network as well were looking at – um – I'll get you the list of the compounds, I'm drawing a blank right now. To your point about what we know what lands on the ground and what ends up in the groundwater, that modeling has not been done yet. Right now we are looking at where we are seeing GenX being deposited in areas that could explain the groundwater concentration.

Rep. Stone: If we are presenting data to the public that shows 630 ppt. in the rainwater, the average citizen is going to see oh lord 630 in the rainwater and will look at that as groundwater, when we know that is probably not what it is, so it may be premature to present that data until we have the modeling in the future. Do you have a prediction of when the Science Advisory Board will have a revised number?

Asst. Dir. Holman: To your point about making some rainwater and what could be in the groundwater, we would probably need to caveat that to help people understand it. Regarding the SAB work, at the January meeting, the Directors directed DHHS to do benchmark dose modeling. That is ongoing, and the SAB is scheduled to take that back up on June 18th.

Representative Jimmy Dixon: Madam Secretary you answered Rep. Stone's question, and I'd like to make a statement about it. Here we are again having discussions and discussing things that are in the public domain without knowing if we've properly set the health standard. It's a classic example of putting the cart before the horse. This is a critical problem. We are not sure if the 140 is a problem. We started at 71,000, and we're here discussing all kinds of things, and we don't even know where the goal line is. Every point of the data says that the water is safe to drink, and that's the message we need to get out.

Representative Pricey Harrison: How are you covering all of the costs of this extra work?

Asst. Dir. Holman: We are shifting resources, so lower priority tasks are not getting done right now. We have been covering lab analysis but will be seeking to get compensation from Chemours for a lot of the lab analysis in the near future.

Rep. Harrison: Does the additional media testing include the sludge issue?

Asst. Dir. Holman: There have been preliminary sludge evaluations done, and I should probably ask Michael Scott.

Director of the Division of Waste Management Michael Scott: We have spoken with the company about the sludge, and we are in dialogue about that data so that appropriate next steps can be done.

Representative Elmer Floyd: You mentioned the company will take the costs of the experimental carbon filters. Previously that was between $300 and $1500 depending on the installation.

Asst. Dir. Holman: I think that's correct.

Rep. Floyd: If the number increases, will they continue to pay?

Asst. Dir. Holman: I think the company would like to install more immediately. They are ready to employ more units.

Rep. Floyd: I'm concerned of the long range plan. Would they bear the cost of the long range plan?

Asst. Dir. Holman: The company views the filtration systems as an intermediate option. They would like homes to be put on public water.

Rep. Floyd: So you are saying they would assume responsibility for the filters in my area?

Asst. Dir. Holman: Yes.

Representative Bob Muller: On Chart 16 in the presentation, you showed the buckets that are collecting the rainwater. When we took a tour of your facility at the last meeting, you showed a more sophisticated implementation of those bucket-trappers. Do you have a schedule for when those will be going in?

Asst. Dir. Holman: I will ask Micah Brezenskis to talk about the installation of the atmospheric deposition monitors.

Director of the Division of Air Quality Micah Brezenskis: The samplers you saw at the visit are in the field at this time. We will update the pictures for the next presentation.

Rep. Muller: You asked a question about Chemours was supposed to put scrubbers in their stacks, and it was a state-of-the art scrubber. Do we have a date to have those implemented?

Asst. Dir. Holman: They currently have the scrubbers installed. What they were talking about were thermal oxidizers. It's my understanding is that it takes about a year to construct the device and another six months to get it in and installed and operational.

Representative Davis thanked Assistant Director Holman for her presentation.

Final Report on Implementation of HB 56

Representative Davis welcomed Cape Fear Public Utility Authority (CFPUA) Director Jim Flechtner to present on the implementation of HB 56. His presentation is included in Attachment 6.

Director Flechtner began by summarizing the points in 2 and 3. He continued by explaining the charts on slides 4, 5, and 6. He then explained the CFPUA's work to study various filter media, as shown on slide 7. Director Flechtner continued to summarize slides 8 through 13. He then welcomed questions from the committee.

Questions

Representative Jimmy Dixon: Referring back to the first page of your letter in your report, the last paragraph on the first page that says "Levels of the compound have remained below the provisional health goal of 140 ppt., set by the North Carolina Department of Health and Human Services." What have you all done to inform the public of that?

Director Flechtner: We send out updates to media and the public once a week, twice a week back then. We have done a letter to all of our customers. We've been to the civic groups and others, and we continue to participate in forums. All of our water quality data is available on our website.

Rep. Dixon: Has your message been that the water is safe?

Dir. Flechtner: The message has been that the water continues to meet all federal and state drinking water standards. The other part of that is that we don't know a lot about other things in the river, and that's what has brought us to do the work we have done.

Rep. Dixon: According to the data, not only have we met it, we are well below are we not?

Dir. Flechtner: For GenX, yes we are.

Rep. Dixon: On page 4 of the report, we aren't even sure that 140 is the right figure, are we?

Dir. Flechtner: I'm relying on DHHS, so that's the number we're using.

Rep. Dixon: We've heard numerous times, that we're not sure that that 140 is correct.

Dir. Flechtner: I wouldn't know one way or another. Certainly relying on the experts.

Rep. Dixon: The Science Advisory Board is trying to find out if the 140 is correct or not, right?

Dir. Flechtner: I believe so, yes.

Rep. Dixon: On the chart on page 28 that you didn't show in the presentation, this is an amazing portrayal. On Jan. 3 of 2018, the raw water was below 100.

Dir. Flechtner: Yes sir.

Rep. Dixon: Why wasn't that chart included in your presentation?

Dir. Flechtner: We were showing the finished water because that's what our consumers were consuming. We certainly included it here because it's relevant, but I can certainly speak to it.

Rep. Dixon: Don't you think that's a very revealing chart?

Dir. Flechtner: It certainly is, and we had included the one with the finished water. The raw and finished water tracked pretty well and parallel.

Rep. Dixon: Doesn't that show that you're trying to fix something that's not broken to start with?

Dir. Flechtner: We're grateful that it's below the 140 absolutely.

Rep. Dixon: And then on page 29, what you didn't show. Again, the raw water, you didn't do anything to it. It's below the 140.

Dir. Flechtner: This is for a different compound for which we don't have a health standard, but you are right.

Rep. Dixon: Coming in and assuming that some members didn't read the full report, why did you choose not to show that and highlight that to the committee?

Dir. Flechtner: We tried to show the full suite of compounds for which there are tests. The intention was to show over time, and this was one, it should have been included with the others.

Rep. Dixon: I believe you said that citizens wanted clarity, and I believe showing them the conditions of the raw water and emphasizing that is a way to clearly express to the citizens what it is. I do agree with your initial statement. You emphasized very emphatically that there is a lot we don't know. In light of that, why did you think it was important to talk about the possibility of a 16% increase in the water bill if we did certain things, if we did that, this that we don't know?

Dir. Flechtner: I was simply trying to provide context for what might be needed to filter the compounds.

Rep. Dixon: If.

Dir. Flechtner: Correct, the final decision hasn't been made.

Rep. Dixon: I think your report was biased in the way you presented it to the committee. I think the message that the public needs to understand is the actual clarity, and I think your presentation made the problem look bigger than it is.

Rep. Scott Stone: The issue with emerging contaminants is on the minds of folks on the Cape Fear River Basin. Is this an issue that is unique to the Cape Fear or is this something that every single utility or river across the country dealing with?

Dir. Flechtner: It's certainly not unique to us. The notion of emerging contaminants and the process that the EPA goes through to set drinking water standards from my understanding, the process doesn't keep up with the changing industries.

Rep. Stone: There is the quarterly toxicity testing that is done by all of the discharges that is required as a part of their permit, which is that, I'm assuming that still goes on, and while that is not testing for specific contaminants, it is an indicator of the general health of the water and aquatic life in the areas around the outfalls, not only for Chemours, but for all dischargers. I'm assuming that is still going, and I don't know if you know of any spikes, not only from Chemours, but from any other discharges in the area?

Dir. Flechtner: I wouldn't know. We do the toxicity testing for our discharges at our wastewater plants, but I don't know what Chemours's results would be.

Rep. Stone: You had indicated that Chemours – had asked Chemours to send a list of chemicals they were discharging. Yet, GenX, which you reasonably say that's coming from Chemours, but you also said that GenX was a relatively small percentage of these contaminants that you're finding. Did you ask any of the other companies that have industrial discharge permits in that area to send their list of chemicals or just Chemours?

Dir. Flechtner: We just asked the Chemours people.

Representative Elmer Floyd: You mentioned that you have 10 that you cannot detect, is that correct?

Dir. Flechtner: We have 10 that have been detected, but we can't accurately measure their levels. So we know they're there, we're just not sure the concentration.

Rep. Floyd: And you mentioned there were five others, so that's a total of 15.

Dir. Flechtner: Correct.

Rep. Floyd: That we have no way to test those.

Dir. Flechtner: We can't accurately measure their concentration, yes.

Rep. Floyd: Given the equipment that DENR has on hand, it seems impossible to do the testing that needs to be done?

Dir. Flechtner: I'd like to defer that question to the UNCW researchers who are coming up and could answer that better than I could.

Rep. Floyd: The problem we are dealing with is that those people who are discharging into our rivers really already know what the cause and effects that it has on humans. It's driven by profit. The consumer is going to pay for it. With the 15 you said that we have, if it's found what they are, the consumer on the other end is going to have to pay the cost to filter these contaminants out?

Dir. Flechtner: That's correct. We have to filter them, and that would be a cost for our rate payers.

Rep. Floyd: What is happening is that the poorest part of our state is going to have to bear a lot of the cost. Those communities that are least able to pay are going to have to.

Representative Pricey Harrison: I'd like to follow up on Representative Floyd's point because I'm concerned about that rate increase on folks who can least afford it. Are you all going to be able to recover some of those costs from Chemours?

Dir. Flechtner: We've taken legal action against Chemours and DuPont, and it still has not been resolved.

Rep. Harrison: I'm looking at the chart that you provided that has all of the perflourinated compounds. On these, do we have a health standards on the others?

Dir. Flechtner: I know we do for GenX and there may be for some of the others, but the point I was trying to make was that all of them together, we don't know. The combined level of these is what we haven't been able to explain to our customers.

Rep. Harrison: I appreciate that point and the work you all are doing.

Rep. Dixon: How many industrial discharge permits from various companies exist upstream from Wilmington?

Dir. Flechtner: I don't know.

Rep. Dixon: Your response to Representative Stone's question about whether or not you asked for that kind of information – don't you think that is important?

Dir. Flechtner: At the time this issue became public, there was a report that identified this as the site of the discharge of these compounds, so that was naturally where our attention was drawn. Certainly understanding all of the contaminants in the river would be a very important thing.

Rep. Dixon: Did you happen to have discussions as to whether to inquire of other discharge permittees as to what they were putting in the water?

Dir. Flechtner: No, I don't recall a conversation such as that.

Rep. Dixon: Mr. Chairman I think your response is legitimate that the focus has been on the Chemours situation, and that would be your first object of inquiry, but Representative Harrison makes two points, one a good one and one a bad one. She followed up on the 16 percent increases if it was a done deal, and we don't even know if bills are going to go up or not. The other falls in line with the question here. We're back to what we don't know, and I'm in concert with Representative Harrison. I find it incredulous that you didn't have the foresight to find out if anybody else was doing what has been focused on Chemours, and I would suggest that you find that out.

Representative Larry Yarborough: I think the subject has been broached, and the question for the most part answered. The timeline does not seem to match on the peaks of the total perflourinated compounds and the events that DEQ has measured at the Chemours facility. So I think there is a lot of strong evidence that there is something else going on here that needs to be looked at.

Representative Harrison: To respond to Representative Dixon, I wasn't actually assuming that there would be a 16 percent rate increase. There's already been a three percent increase, and I just think that the irresponsible polluter should be paying for that.

Representative Davis: As to potential of an increase in rates you referred to, is that not dependent on whether or not the CFPUA board agrees to that additional construction of facilities that you were referring to?

Dir. Flechtner: That's absolutely correct, and if I wasn't clear in that I apologize.

Rep. Davis: And of course those additional facilities would be done to help you as far as your analysis of the water and making sure it is safe for the people to drink.

Dir. Flechtner: That is correct.

Rep. Davis: As far as whether or not the water is safe. When you tested the raw water coming into your facility, was it below the 140 ppt. for GenX?

Dir. Flechtner: Yes, it has stayed well below the 140.

Rep. Davis: And obviously when you released the drinking water and tested that, it also would have been under that threshold?

Dir. Flechtner: Yes, sir.

Rep. Davis: I understand your hesitancy to say the water is safe is based upon the fact that all of these other unknown contaminants that might be in the water and might have some harmful effects, so you can't say with certainty that the water is safe to drink?

Dir. Flechtner: That's right. What we are saying is that we meet all of the drinking water standards and here's the other information that we have about other compounds in the river that we may not have answers to.

Rep. Davis: I know you were talking about unknown contaminants, wouldn't it make life a whole lot easier if the EPA recognized compounds that were dangerous and put some kind of threshold on them as far as a guideline, so that way DEQ would have that to follow and you would have that to follow?

Dir. Flechtner: It would certainly be helpful to us, absolutely.

Rep. Davis: Has Chemours cooperated with you as to anything that has to do with your investigation?

Dir. Flechnter: Not that I can readily think of.

Rep. Davis: I find that very disturbing and wanted to make that clarification.

Representative Davis thanked and excused Director Flechtner.

Representative Dixon: I think this committee might, if it's possible, if these questions are asked of other entities with discharge permits, to see if their response is similar to Chemours's response. Because they do have their trade secrets that are important. So maybe that's a part –

we're misunderstanding why Chemours hasn't done this and maybe we could do the same thing with other entities out there and see whether or not the respond similarly.

Representative Davis: That's a good point, and I would ask DEQ and the CFPUA that if you are checking on other entities if you would please report back to us what they answer and if they answered.

Representative Yarborough: I'd like to add to that request of DEQ to get some clarity of what the EPA is doing nationwide to study the level of these found in rivers all over our nation. So as we get farther into this it appears to me that these might be in every river in every state of our country, and it'd be good to know where we stand relative to the rest of the nation.

Representative Davis: Secretary Holman, are you able to answer that or would you need some additional time?

Asst. Secretary Holman: I can give you a brief update right now. The EPA is very focused on the PFAS family. They are working right now developing reference dosing for perflourinated compounds. There is a leadership summit with the states in DC on May 22nd and 23rd to talk about their work, so I can get more details if you'd like, but EPA is very much focused on this. Several of the compounds have been part of the Unregulated Contaminant Monitoring Rule process, and I think they will continue to look for perflourinated compounds going forward to determine what should be monitored to help with establishing safe drinking water standards.

Representative Davis: Perhaps, Secretary Holman if you will keep up with that you can update us at a later time. I can talk with staff, I would love to have somebody from the EPA to come down here and talk with us about it, but we haven't been able to do that.

Representative Floyd: Does DENR at the present time have the equipment to look at the other 15 contaminants?

Asst. Secretary Holman: We do not have the equipment to do the targeted analysis of the perflourinated compounds, and that is a part of the ask from the department. I would also say for some of the compounds that Mr. Flechtner referred to, there's not actually lab test standards available, so while we can detect that those compounds may be in a water sample, we don't have a way to quantify the actual amount. No one does – not DEQ, not EPA, not the private labs – so it's really two issues, but you are correct in that we do not currently have the equipment to do the analysis for the perflourinated compounds.

UNCW Report on the implementation of HB 56

Representative Davis welcomed Dr. Ralph Mead from the UNCW Chemistry Department and Mark Lanier, UNCW Assistant to the Chancellor. Dr. Mead's presentation is included in Attachment 8.

Dr. Mead began his presentation by explaining the objectives outlined on Slides 2, 3, and 4. He then explained the results highlighted on Slides 5, 6, and 7. Dr. Mead continued to explain the third objective, as outlined on slide 8.

Starting with slide 9, Dr. Mead spoke about other perflourinated substances in sediments in addition to GenX. He explained those results, which are shown on the graph on slide 10. Dr. Mead moved on to slides 11, 12, and 13 which highlight non-point sources that may supply GenX after the discharge pipe is shut off. He shared the results of this research, as shown on slide 14.

Dr. Mead moved on to explain how GenX may get into rainwater, shown on slides 15, 16, and 17. He then continued to explain biosolids and their relationship to GenX using slide 18. Dr. Mead noted that there was a symposium that included major groups working on GenX studies within the state, as explained on slide 19. Dr. Mead welcomed questions about his presentation.

Questions:

Representative Dixon: I have two questions, one relates to the wind deal, where the wind coming off the Atlantic tested at a certain level and then when the wind coming from the other, are you willing to repeat that?

Dr. Mead: So we wanted to – with a rain event we collect the rain for our other NSF research. Now that the semester is done, we're going to jump back on this and continue this research.

Rep. Dixon: When the little white thing is replaced by the little red thing, does that make the big thing more dangerous than it was before it was replaced?

Dr. Mead: So the short is that I don't know. What I wanted to point out was it changes the properties of the molecule itself.

Rep. Dixon: And that would be one of our questions going forward is once this thing is transposed because of being hydrated, we'll try to answer the question of what it was before it was hydrated and what it was after it was hydrated and how does that affect us as far as our water quality.

Dr. Mead: We are not going to do any of the health work, but as the chemistry part of it we can help understand that.

Rep. Yarborough: When it is hydrated, does that mean that it is in water vapor?

Dr. Mead: Yes. The PFA of these compounds is much less than one, so what that means is that ambient rain Ph hydration product exists as an anion.

Rep. Yarborough: On the sediment studies, in looking at the concentrations being basically the same as what was found in the water on the same dates, does that mean that we don't have a buildup other than the sediments?

Dr. Mead: So first off, please do not link the nanograms per gram dry weight of sediment and nanograms per meter. The parts per is different. One is mass to mud, the other is mass to river. This is parts per billion.

Representative Pat McElraft: What is the CAS#2062-98-8? The one we started with before it was hydrolyzed. Is that what's coming out of the stack then?

Dr. Mead: Yes, ma'am.

Rep. McElraft: So it's not GenX when it's coming out, but it becomes GenX when it gets hydrated, is that correct?

Dr. Mead: What we call GenX, yes. From the air emissions that I've seen from DEQ until this point, most or there's a larger abundance in terms of pounds per year of CAS#2062-98-8 compared to the GenX the last 13-6.

Representative Floyd: You said something about capacity, and I got lost.

Dr. Mead: One of the things that we were trying to do at the symposium was to find out what kind of instrumentation, what knowledge base is in the state in regards to emerging contaminants.

Rep. Floyd: So that goes back to whether DENR has the capacity to provide some assistance.

Dr. Mead: I'm not aware of what they have in terms of instrumentation.

Rep. Floyd: I just don't see them having the capacity.

Rep. Yarborough: Is part of your rainwater study, is there any evidence that anybody was looking for these compounds prior to this incident, and have you been in contact with rainwater studies around the nation that might have detected these compounds?

Dr. Mead: The numbers that we showed back in November and December are the first ever to the best of our knowledge of GenX in rain. Of course we shared this in a variety of conference calls with DEQ. In terms of others doing this sort of research, in the US, I am not sure. However, publications in the peer reviewed literature do suggest that there are groups worldwide that are looking at PFAS both dry and wet deposition.

Rep. Yarborough: Is there any evidence that they were looking at it last fall?

Dr. Mead: The older compounds, yes, and by older I mean the C8s, but GenX, no.

Rep. Harrison: While you're still working on the methodology, you conclude that there was GenX present in biosolids. To the CFPUA, what are you doing with the sludge if you know there is GenX in it?

Dir. Flechtner: We continue to land apply the sludge.

Rep. Dixon: Is the same true that there is still a lot of unknowns relative to the level of danger of the GenX in the sludge? We don't know the true characteristic of the danger, is that correct?

Dir. Flechtner: I believe that's correct as far as we know.

UNCW Report on the implementation of HB 56 (Continued)

Representative Davis welcomed Assistant to the Chancellor Mark Lanier to finish the presentation.

Mr. Lanier began by summarizing the information shown on slides 20 and 21 regarding the study of growth, survival, and filtration rates of juvenile oysters. Speaking about slide 22, Mr. Lanier told the Committee about future work on oysters and their exposure to GenX. Mr. Lanier then welcomed questions from the Committee.

Questions

Representative Dixon: Regarding the first slide, what we have here is one of the disconnects between what is actually the situation and maybe what gets reported. It gets reported that we're studying oysters for GenX and the initial study of the growth and survival and filtration rates of the juvenile oysters suggests very high concentrations. And that'll be the statement that gets out to the public. There's nothing there for me as a member of the public to relate to other than the takeaway from that would be certain concentrations there's a problem. You gave an explanation of the definition of high concentrations, and I think that's one of the things I have a problem with. We put some kind of fact out there and we don't properly communicate to the public what that fact is. Based on this, I think the takeaway from here is that there just isn't a problem, and that goes back to the fallacy of the original reduction from 70,000 per to 140 per when they changed it from an infant fed baby for 70 years, which is flawed science. The point I'm trying to make is when you start studying oyster, they won't see that word "may." The takeaway will be that there is a problem, and that's a problem.

Representative Yarborough: The summary should highlight the good news, and the good news I'm really pleased with because I really like oysters.

Representative Muller: Subjecting the oysters to 0, 1, 10, and 100 ppb., if we talk about parts per trillion, we have to take each of those numbers and multiply them by 1000, so we're talking about 1 ppb. is 1000 ppt.

Mr. Lanier: Correct. May I call on one of my colleagues from the Chemistry Department?

Professor Brooks Avery: One part per billion would be 1000 parts per trillion.

Rep. Muller: So when we're talking about 140 ppt. as being a pseudo-safe level, these experiments were done with a much higher level of GenX than 140.

Prof. Avery: The highest level test group, yes. The 100 ppb. Would be 100,000 ppt. as I indicated earlier.

Rep. Dixon: That is flabbergasting. That is absolutely amazing. That we would put that kind of stuff on a slide and not have the full explanation.

Rep. Stone: As a follow-up to this issue is to provide some clarification – if we are testing at levels that are 1000 times greater than the conversion factor, and it's still not bio-accumulating, it's an incredibly conservative study. And when it's still not bio-accumulating, it shows even greater evidence that when you do the conversion, so it is hard for people to keep these separated, but it is also interesting that it's a lot higher in scale that we're not seeing the bioaccumulation, which is from my understanding the whole goal of GenX. The short-chain compounds were less bio-accumulative than the PFOA and PFAS, so they were the replacement chemical, and the benefit of them that they were less bio-accumulative in the tissue, so it's a safer compound was always the theory. I guess it kind of validates the original assumptions of the chemical in the first place.

Prof. Avery: It does, and I have made that statement in earlier conversations about the results, and the science was intended I believe to go on both sides of what has been established as the health standards. So the 100,000 ppt. was intentionally above the 70,000 so that we could determine effects if it were at that level, but the lower volumes were right around the lower levels that are between what is currently established and what had been established earlier. If the slide had summarized that with one additional word, it may have been a much better slide, only at very high levels were those impacts noticeable.

Rep. McElraft: I think the word mortality is what triggers my thought if I saw that summary. So you're saying there is a possibility that we could die from that. But when you look at the levels that were the highest, it was never even quite the level of the 1, much less the 100. So I think to test for the 100 is very misleading, it never will be that high, and then to put mortality on there, I agree with Representative Dixon, I think that summary should never have the word mortality on there.

Mr. Lanier: I think the intent was from a science perspective was to determine what the impacts would be in an initial group at levels that were very far below that and at extremely high levels. And it was only at that extremely high level, where the mortality rate exceeded one to two oysters per group. But the issue was that it was a significant increase, it was 25% of the oysters. I think the issue of testing at very high levels was a scientific decision to show at the extreme levels as well as at the much lower levels.

Rep. McElraft: So that we don't scare the public, why do we go to this 10,000 times what we're talking about? That to me is so extreme that it make it still in the thoughts of the mother giving water to a child – there's a possibility that my child could have a mortality from this if the levels are that high. But they could be pumping GenX directly into the river, and the levels would never be that high, would they?

Mr. Lanier: That would be better answered by somebody in the field of Earth Sciences in terms of the level of water in the Cape Fear.

Prof. Avery: This of course is not my research, we presented ours. I hate to refer, but he's our dean, and you should refer to him. I'm not saying that's his opinion. Very high concentrations are often used in studies. I'm not saying that's right, I'm just saying that's how things are done for something like a worst case scenario.

Rep. Dixon: They had to do that because they had a political agenda. They had to increase it until they got to a point where there would be some mortality. They had to do that. It's political science.

Representative Davis thanked and excused Mr. Lanier.

Before beginning the next portion of the meeting, Representative Davis asked Assistant Secretary Holman if DEQ had requested compensation for the costs incurred by the department from Chemours in their notice of violation.

Asst. Secretary Holman explained the process of recovering the costs of the investigation.

Representative Davis asked Director Flechtner if in the lawsuit that the CFPUA brought against Chemours, the CFPUA requested compensation for the costs incurred.

Dir. Flechtner responded that while the expenses had not been specified, the costs incurred by the rate payers would be included in damages requested.

Rep. Dixon: If the raw water continues to be low, if DEQ properly monitors the situation and the water continues to be clean, will that not alleviate the need for any additional financial penalties to take care of a problem that doesn't exist?

Dir. Flechtner: I think that as the attorneys sort through this, those questions will be talked about, but I'm not sure if I'm in a position to answer.

Rep. Dixon: I think what we've got here is a situation where we're trying to transpose what happened in West Virginia, and I think a lot of it is motivated by lawsuits and attorneys seeking damages and settlements. The raw water is consistently safe. There has to be some other motivation, which I think is the law firms.

Rep. Davis: I would agree with you in your statement that the water is safe when you're looking at GenX, but I understand the hesitancy from the Utility Authority to say that the water is absolutely safe because of unknown compounds. I'd also ask you to take into consideration the costs incurred by DEQ and the CFPUA, which is what they would ask.

Rep. McElraft: Just one follow up. Since we paid for this study from UNCW and before it goes public, and has approval from the Committee, can we ask that it be put in parts per trillion? We've been talking about parts per trillion the whole time in this committee, and it's misleading to the public.

Rep. Davis: Mr. Lanier, has the study already been made public?

Mr. Lanier: This report was submitted at the request of the Environmental Review commission on April 1, but we can make any revisions you may feel would be appropriate.

Rep. Davis: If you could amend each one of your reports if it would make it clear to make it the parts per trillion and not parts per billion. I know a lot of people could get confused and might cause some unjustified concern.

Rep. Stone: Mr. Flechtner, you had in your slides $5 million plant upgrades, impact to water customers 16%, how much it would take to repay, but if the raw water coming into the plant are below the threshold. I'm unsure about why the lawyers are coming in here or why you need to update the plants and spend all of that money.

Dir. Flechtner: If I was unclear I apologize. The numbers I provided were to show a sense of scale for what the community would be facing if the decision is made in the future. If there was confusion about whether the lawsuit would go forward and the upgrades, I apologize.

Approval of the Committee Report

Without objection, Representative Davis brought forward the Committee Report.

Representative Davis entertained comments and questions from the Committee about the Committee Report.

Questions

Rep. Floyd: I was disappointed with the equipment that DENR had to operate. I just want to express that it was very frustrating.

Rep. Davis: I agree, and I just want to say that while the House Bill was passed unanimously out of the House, we are negotiating with the Senate about having that passed in the Short Session.

Rep. Dixon: I support the committee report. Rep. Floyd has referred several times, and I believe it is well taken about the equipment, but I will remind this committee that there are cramped situations over there. We didn't have anything to do with that. We didn't have anything to do with that, but many years ago the powers that be at DEQ and DENR thought that the executives were more important than the equipment testing at other facilities. Big money has been spent on the comfort of the executives instead of equipment to test.

Rep. Harrison: Clarification on the draft legislations that's attached to the back of the report. Is that basically House Bill 189 without the appropriation?

Rep. Davis: This is the recommended legislation that this committee passed back in January.

Jeffery Hudson: I may understand the confusion. If you recall when the committee made the recommendation, the legislation didn't have the appropriation, but the House added the appropriation. So what is in the report is actually what the Committee recommended at the January meeting but not what was passed, so that's why it doesn't look exactly the same as you remember what the House passed.

Rep. Harrison: I just wanted to comment that I am grateful for your leadership, and I'm looking forward to continuing work on this. It's more modest than what I would have liked to recommend, but I realize the political reality. At the proper time I'd like to make a motion for approval of the report.

Rep. Davis: I realize that there are a lot of proposals as far as legislation that might be addressed. I am in the process of talking with the Senate about working during the Short Session. If we can find something we can move on, we will.

Representative Harrison made a motion to approve the Committee Report, which was seconded by Representative Muller. The motion passed unanimously.

Representative Davis noted that Speaker Moore would allow the Committee to continue until December, including the short session to meet and make new recommendations.

Representative Davis opened the floor for closing remarks from the Committee members.

Representative Dixon: In light of your last statement, I brought this up before. The name of this committee is "River Quality." It's much more expansive than that. It's more about water quality, and I would suggest that you may discuss the possibility of putting a better fitting name for the committee.

Rep. Davis: I appreciate your suggestion. Does any member have a recommendation for what we might call the Committee? We have really expanded what we are getting into, so I would welcome any suggestion.

Rep. Harrison: I would say we could call ourselves the House Select Committee on Emerging Contaminants.

Rep. McElraft: I was just going to suggest that it be considered Drinking Water Quality because we should not be in outstanding resource water quality.

There being no further business, the meeting adjourned at 12:11 PM.

Representative Ted Davis
Presiding

Andrew Bowers, Committee Clerk

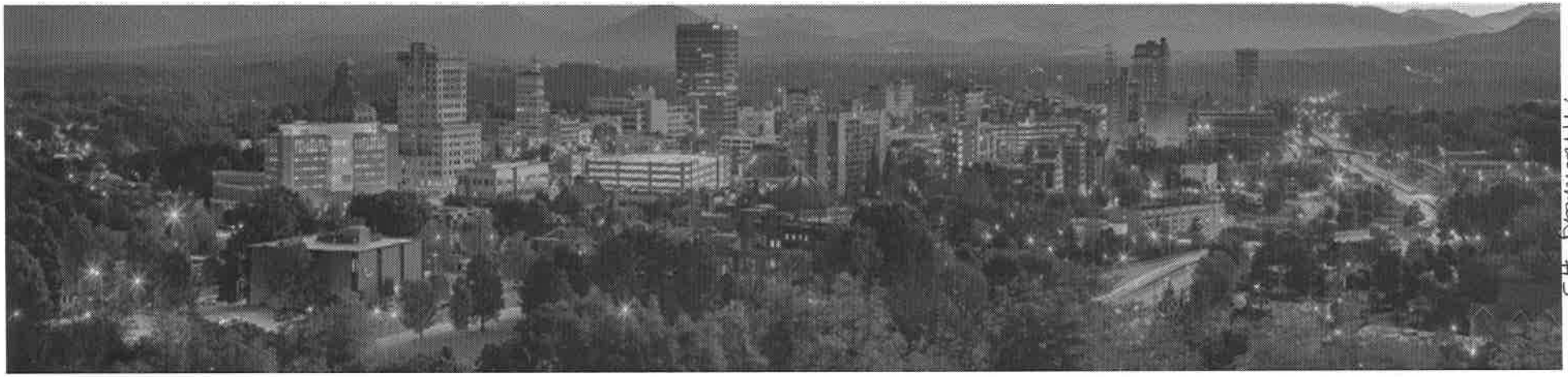


Nothing Compares
NORTH CAROLINA

DEQ GenX Update

House Select Committee on River Water Quality

April 26, 2018

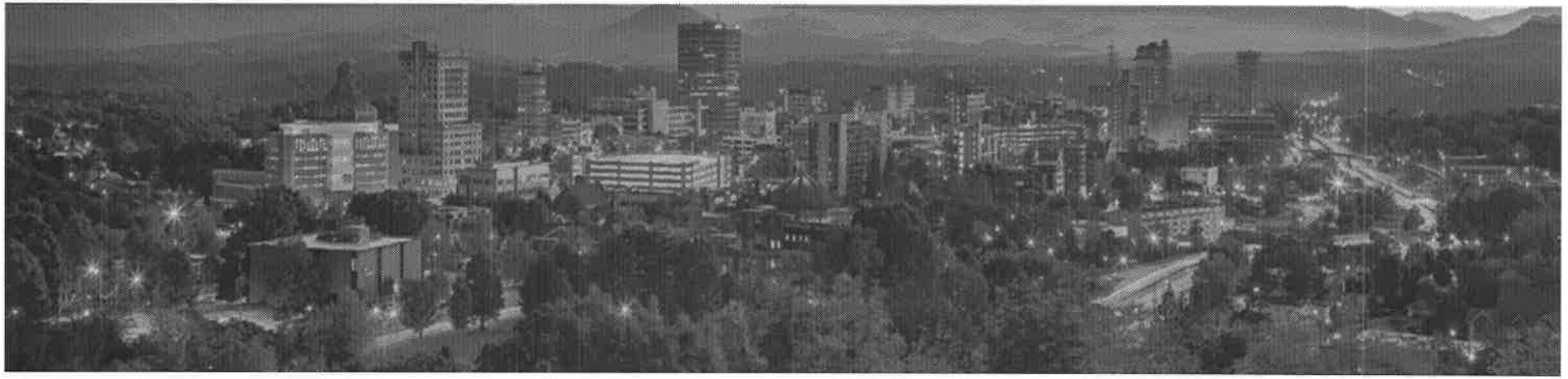


Attachment #5

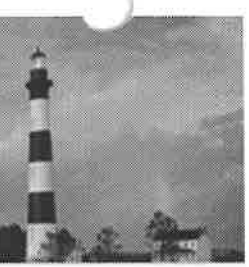


Nothing Compares
NORTH CAROLINA

Division of Water Resources



Current Sampling

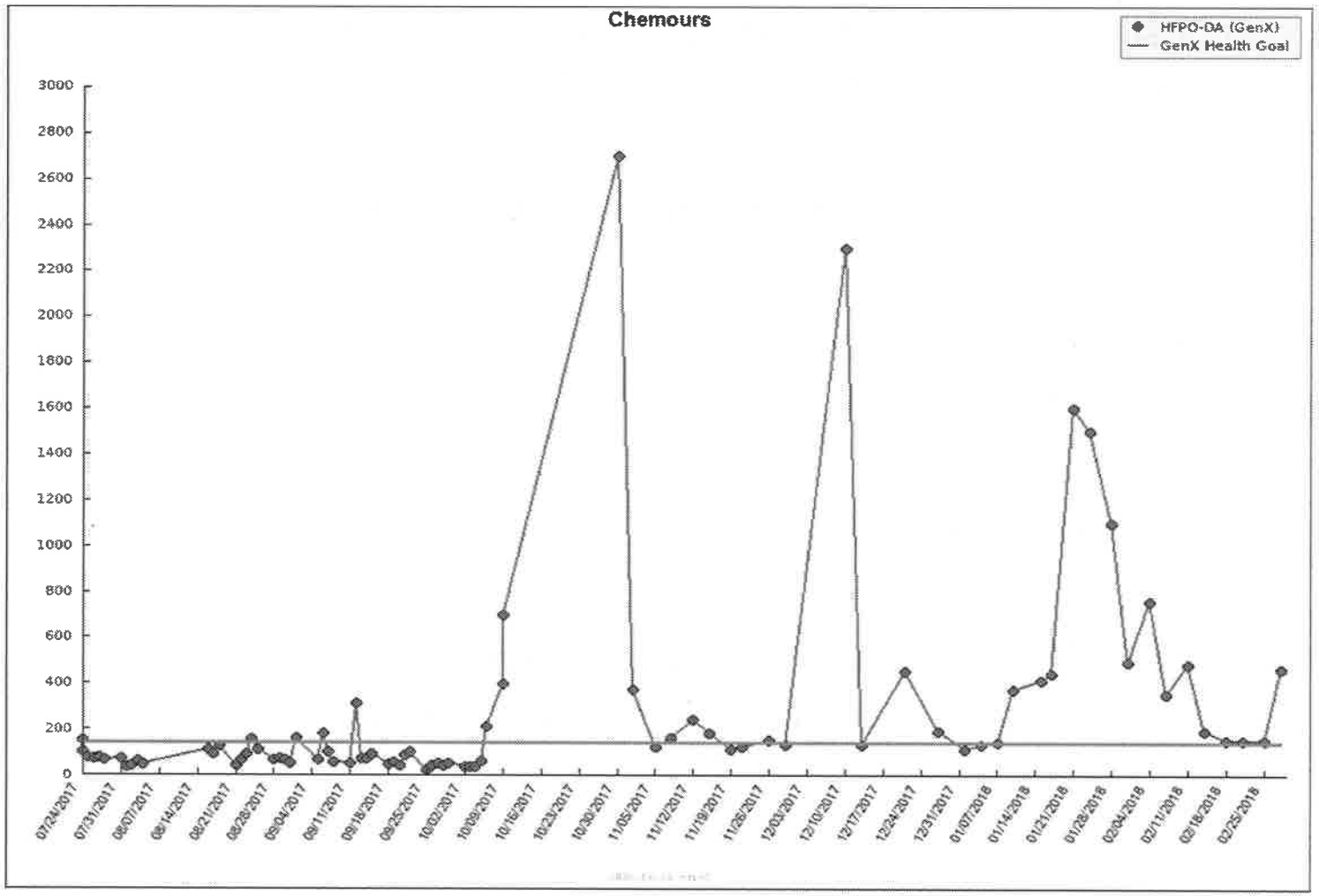


- Two composite samples weekly at Chemours wastewater outfall into the Cape Fear River: Monday - Thursday and Friday - Sunday

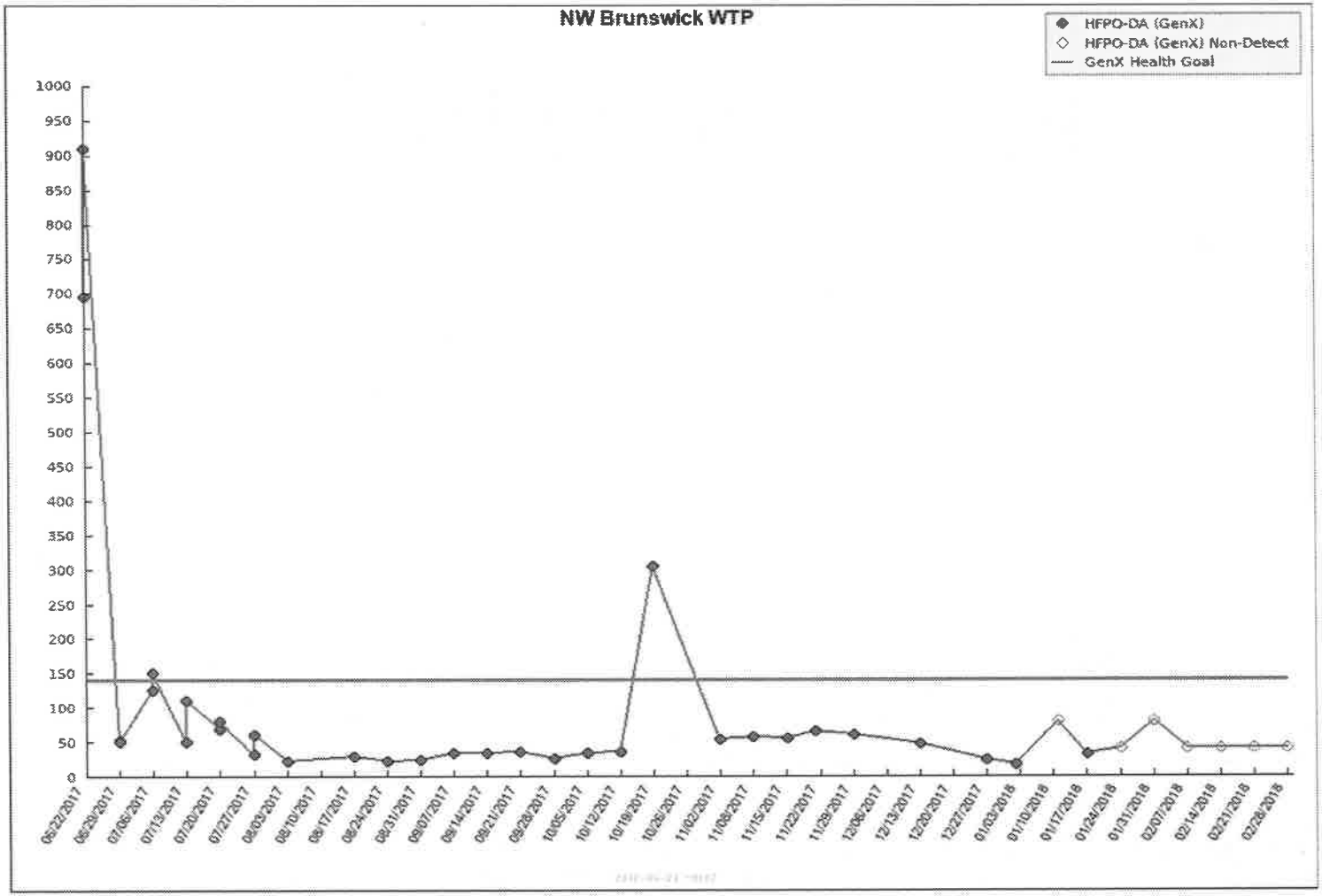
- Drinking water facilities downstream are sampled weekly:
  - Bladen Bluff
  - International Paper
  - NW Brunswick
  - Pender County
  - CFPU Sweeney

- Ambient monitoring for PFAS across North Carolina
  - Jordan Lake watershed monthly Jan – June 2018
  - Cape Fear Reservoirs May – October 2018

Data at Chemours Outfall 002
GenX (parts per trillion)



Data at Drinking Water Facilities
GenX (parts per trillion)

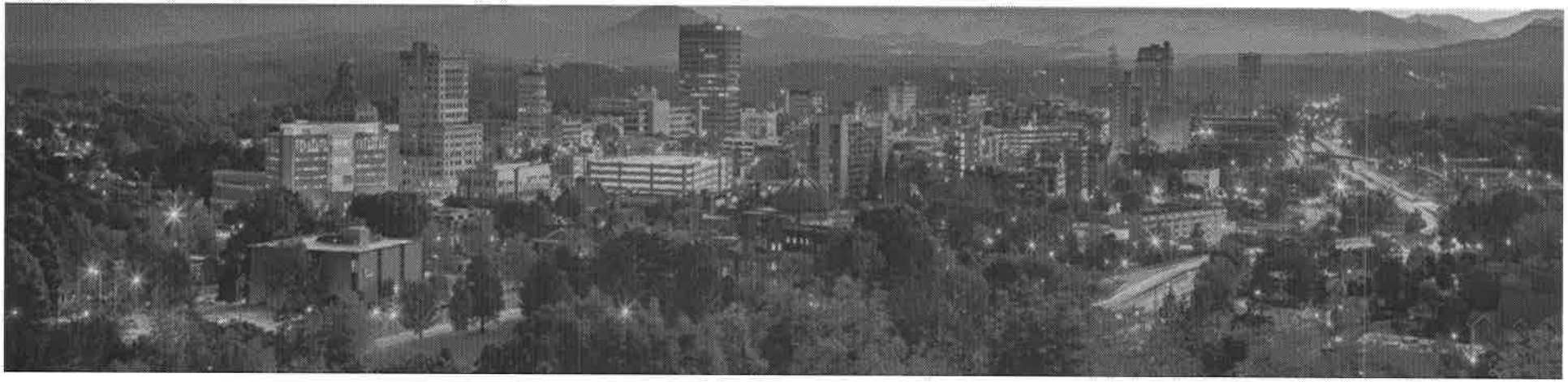




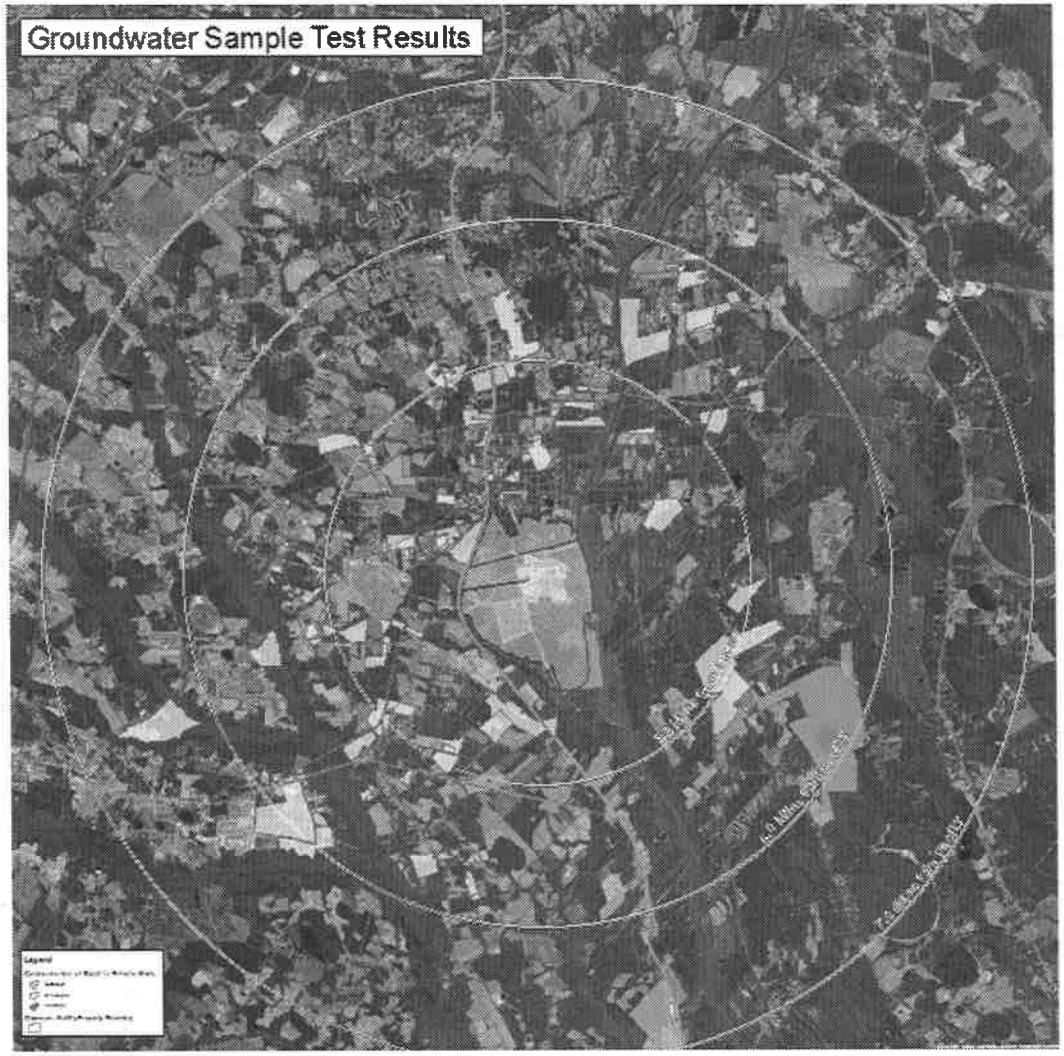
Nothing Compares

NORTH CAROLINA

Division of Waste Management



Division of Waste Management

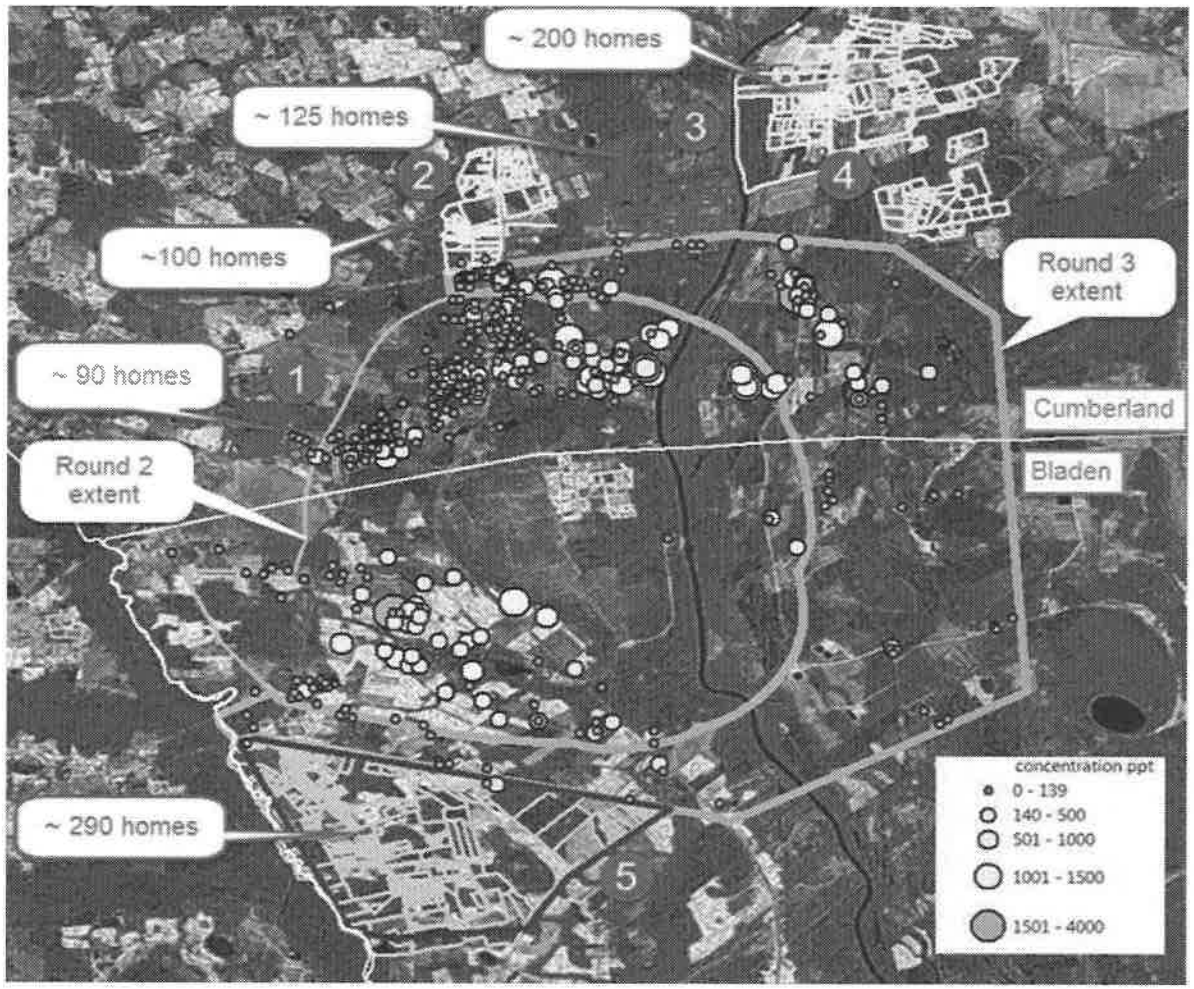


Well Sampling Results
in the Chemours area,
Approximate distances from
facility boundary:
Northeast – 5.5 miles
West – 1.8 miles
Southwest – 3.9 miles
East – 2.6 miles

GenX: NC health goal = 140 ng/l

Red = > 140 ng/l
Yellow= 0-140 ng/l
Green = Non detect

Division of Waste Management



Chemours "Phase 4" sampling plan

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

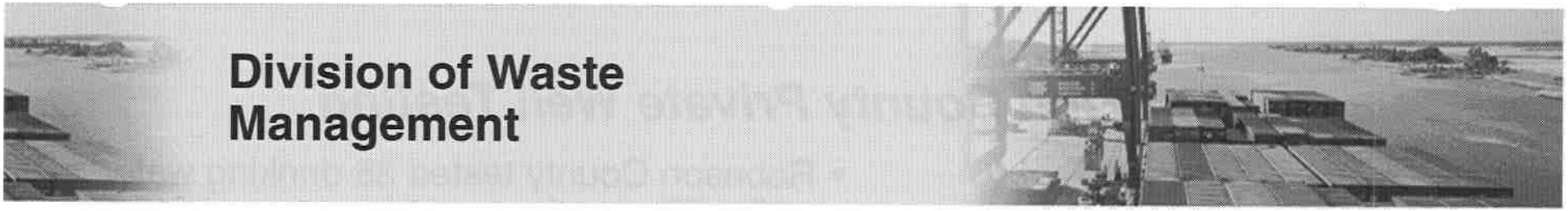
287 residences have been sampled thus far in phase IV

Data is showing a lower percentage of wells above the health goal

Robeson County Private Well Testing



- Robeson County tested 35 drinking water wells. 33 were from residences and 2 were from county-run facilities.
- Sample dates: 1/29/18, 2/13/18 and 3/26/2018
- Results:
  - 1 residence well was reported at 232 ng/L GenX, exceeding the Provisional Health Goal of 140 ng/L.
  - 33 wells had GenX detections, 2 were ND
  - 28 wells had PFOS detections, 26 had PFOA detections, 5 wells were ND for both, and the highest combined detection was 33 ng/L
  - 0 wells exceeded the health goal for PFOS + PFOA (70 ng/L)
  - 3 wells were ND for all three PFAS



Division of Waste Management

Combined Phase I, II, III , IV (partial) Private Well PFAS Data, also Includes Robeson Co. and DEQ-collected Data

Private Well Water GenX Summary	Combined Well Data
Distance from Chemours' border	Up to 5.5 miles
Well Collection Dates	9/6/2017 – 3/26/2018
Number of Wells tested	837
Number of Exceedances of the GenX Provisional Health Goal	207
Number of Not-Detected ("ND") GenX Analyses	178
Number of GenX Detections Less than the Health Goal [a]	450
Maximum Detected GenX Concentration	4000 ng/L

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

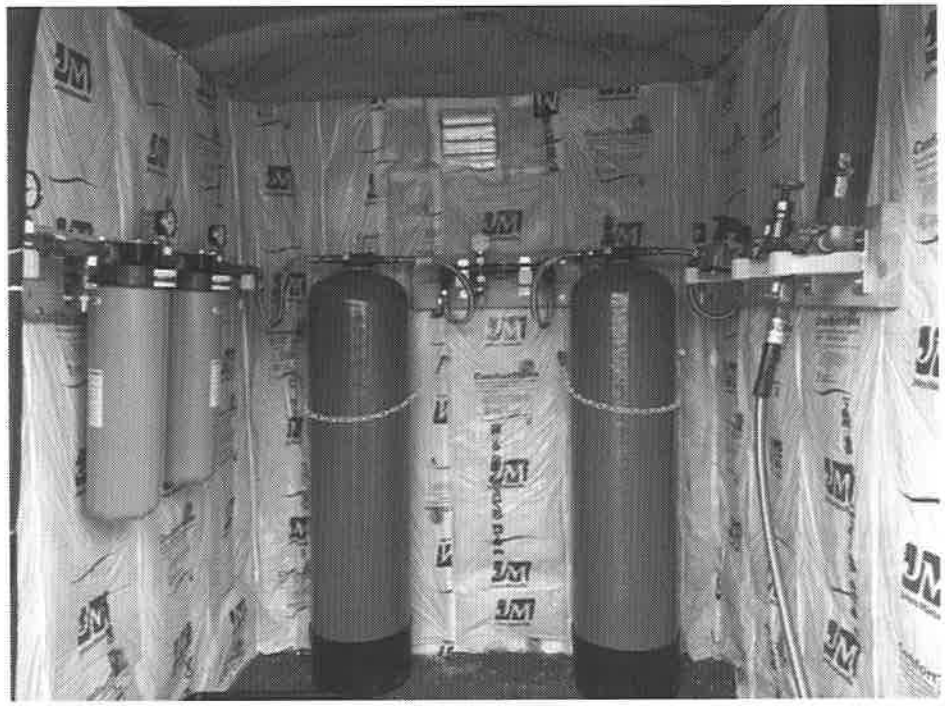
Granular Activated Carbon Point of Use Filtration Systems

- Chemours has submitted to DEQ a proposal to install granular activated carbon filtration systems for residences with Gen X present in the well at or above 140 ppt

- DEQ has provided initial feedback to Chemours to include the requirement to install 5 additional filter systems for sampling.

- The final system was installed on April 20. Both DEQ and Chemours have sampled some of the five units. We are currently waiting for the results.

- Sampling data regarding the effectiveness of the systems will be shared online

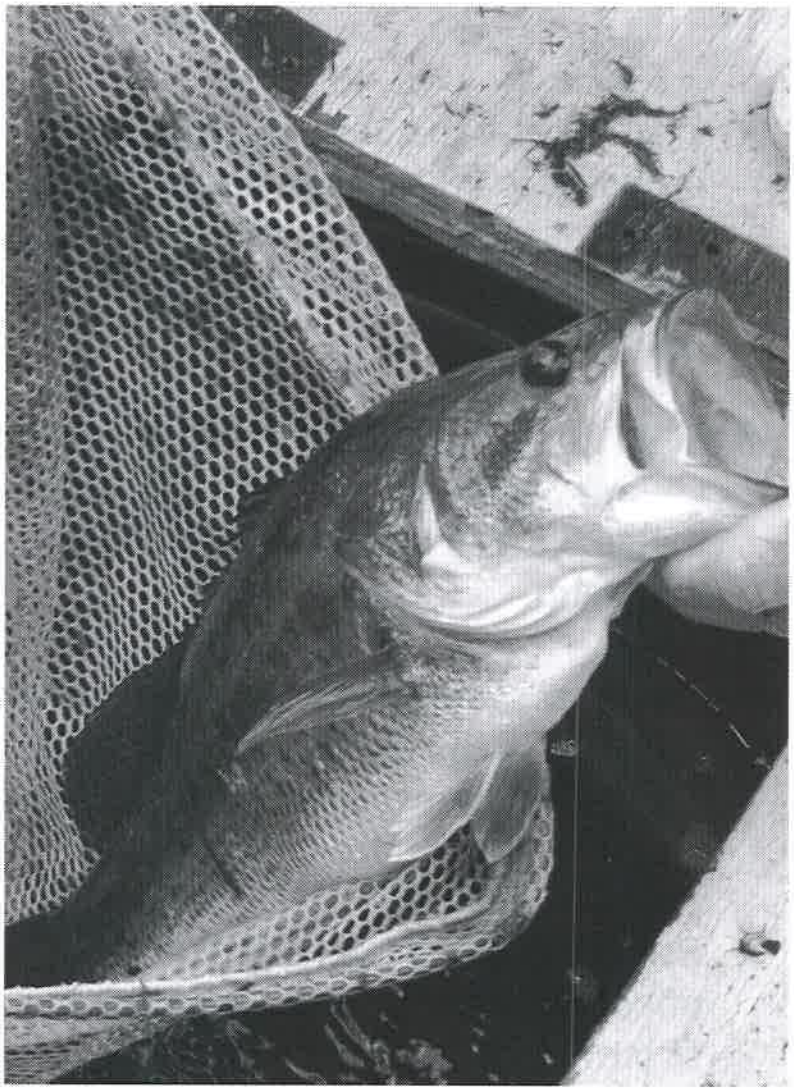


Fish Tissue Testing

Marshwood Lake Testing by DEQ

- DEQ sampled Marshwood Lake on March 14:
  - 2 surface water sample locations
  - 2 composite sediment sample locations
  - 2 Largemouth Bass fillet tissue composites
  - 1 Redear Sunfish fillet tissue composite
- Catfish will be collected in the near future

- A drinking water well onsite at the lake was sampled
- A composite sediment sample was taken from Lock & Dam 3 in the Cape Fear River
- 2 surface water samples were collected at Camp Dixie Lake
- All samples collected will be analyzed using USEPA M537-modified for Full PFAS Suite at GEL Labs
- Surface water will also be tested for Total Organic Carbon, Dissolved Organic Carbon, pH and Total Particulates; Sediment will also be tested for Total Organic Carbon and %Lipids
- Partial data has been received and is under review



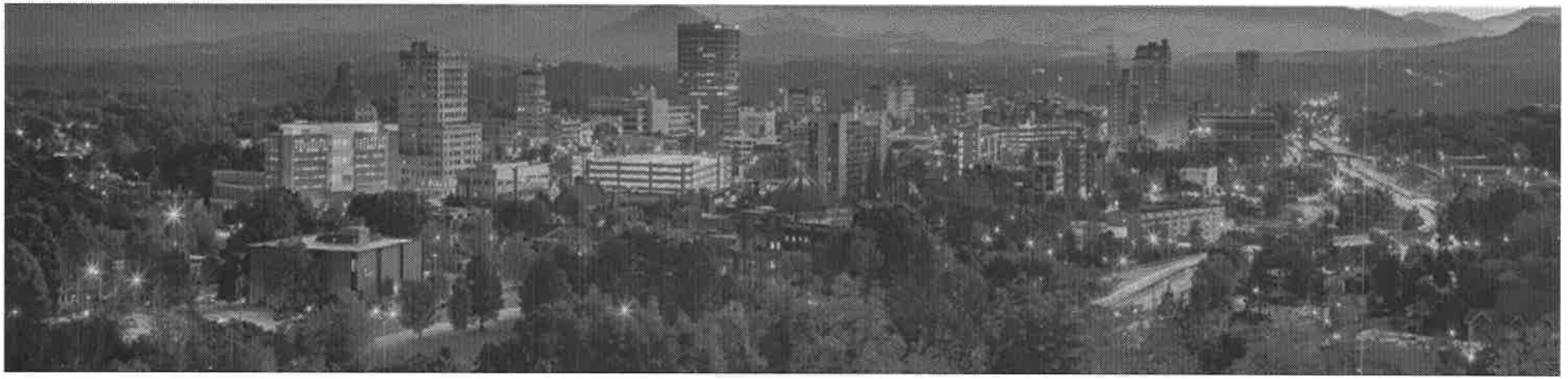
Additional Media Testing

- DEQ continues to coordinate with DHHS and NCDA & CS regarding testing of other media (Garden Crops and Soil)
- Current areas of focus include evaluating if there are other sources of exposure to perfluorinated compounds around the Fayetteville Works Facility
- DEQ and DHHS continue to gather information from other states who have sampled food products for perfluorinated compounds
- DEQ has also been in discussions with different laboratories regarding their ability to test plant tissue for perfluorinated compounds



Nothing Compares
NORTH CAROLINA

Division of Air Quality



Emerging Compounds

DAQ's investigation involving GenX and other PFAS from Chemours

- **GenX emissions data**
  - **Started with only estimates**
  - **Required stack tests**
  - **Method development**
  - **First of its kind measurements**

Chemours 2016 emissions estimates as originally reported to DAQ	Chemours revised 2016 emissions estimates as of October 2017	Latest emissions estimates, including information from January 2018 stack test measurements
66.6 lb/yr	594 lb/yr	2758 lb/yr

Department of Environmental Quality

Emerging Compounds

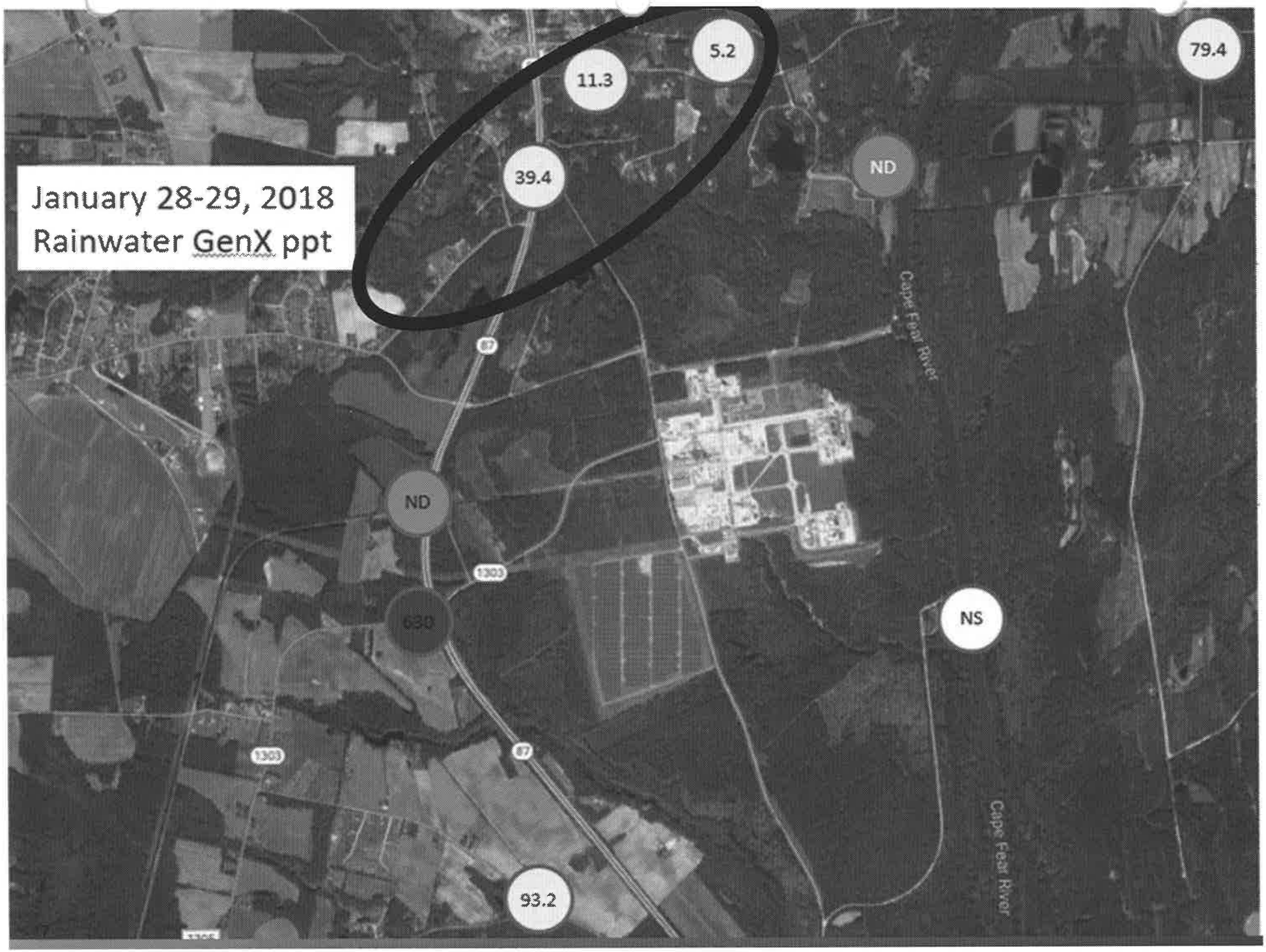
DAQ's investigation involving GenX and other PFAS from Chemours

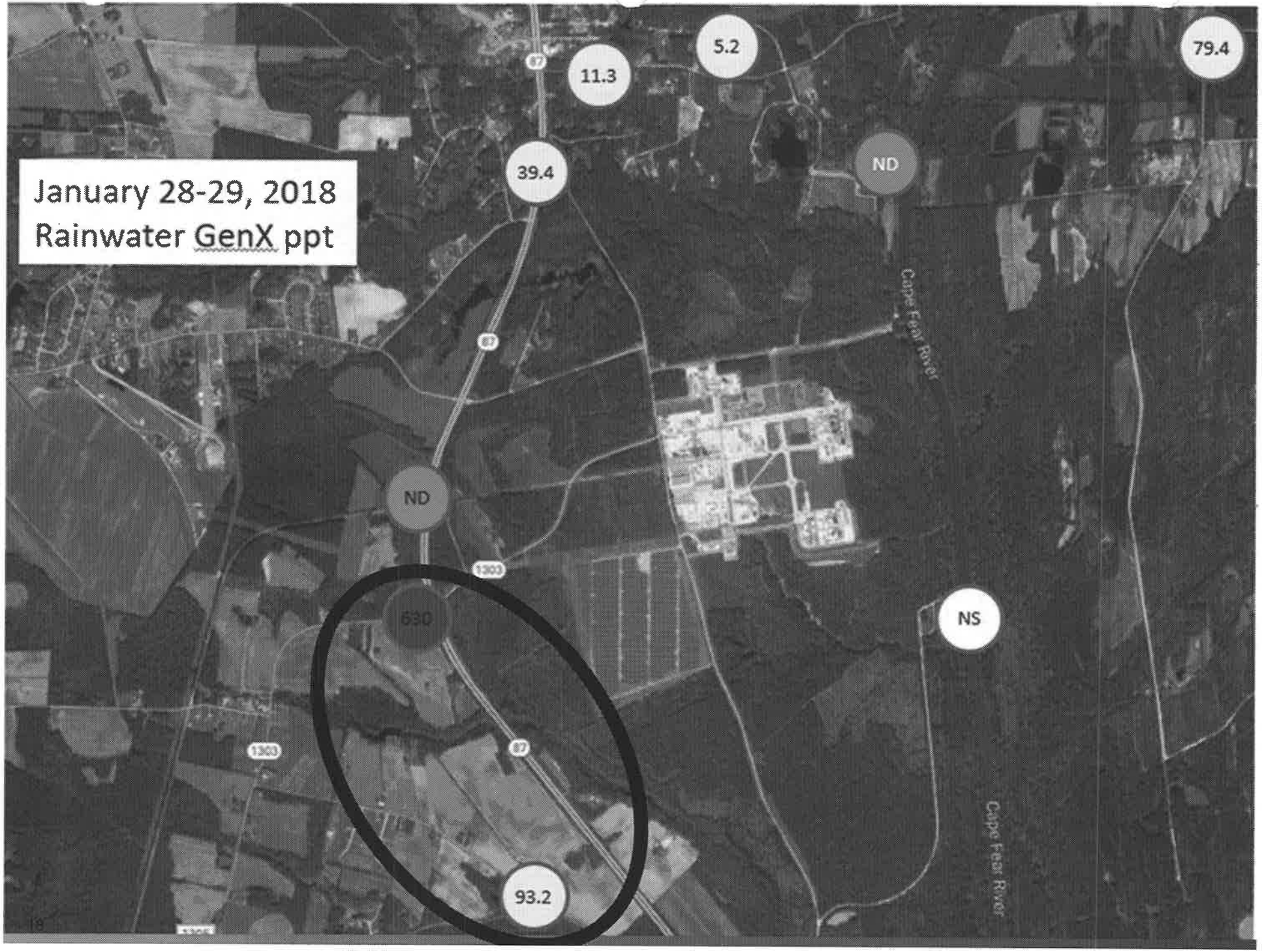
- **GenX ambient air quality data**
  - **Methods?**
  - **Wet deposition data - first of its kind**



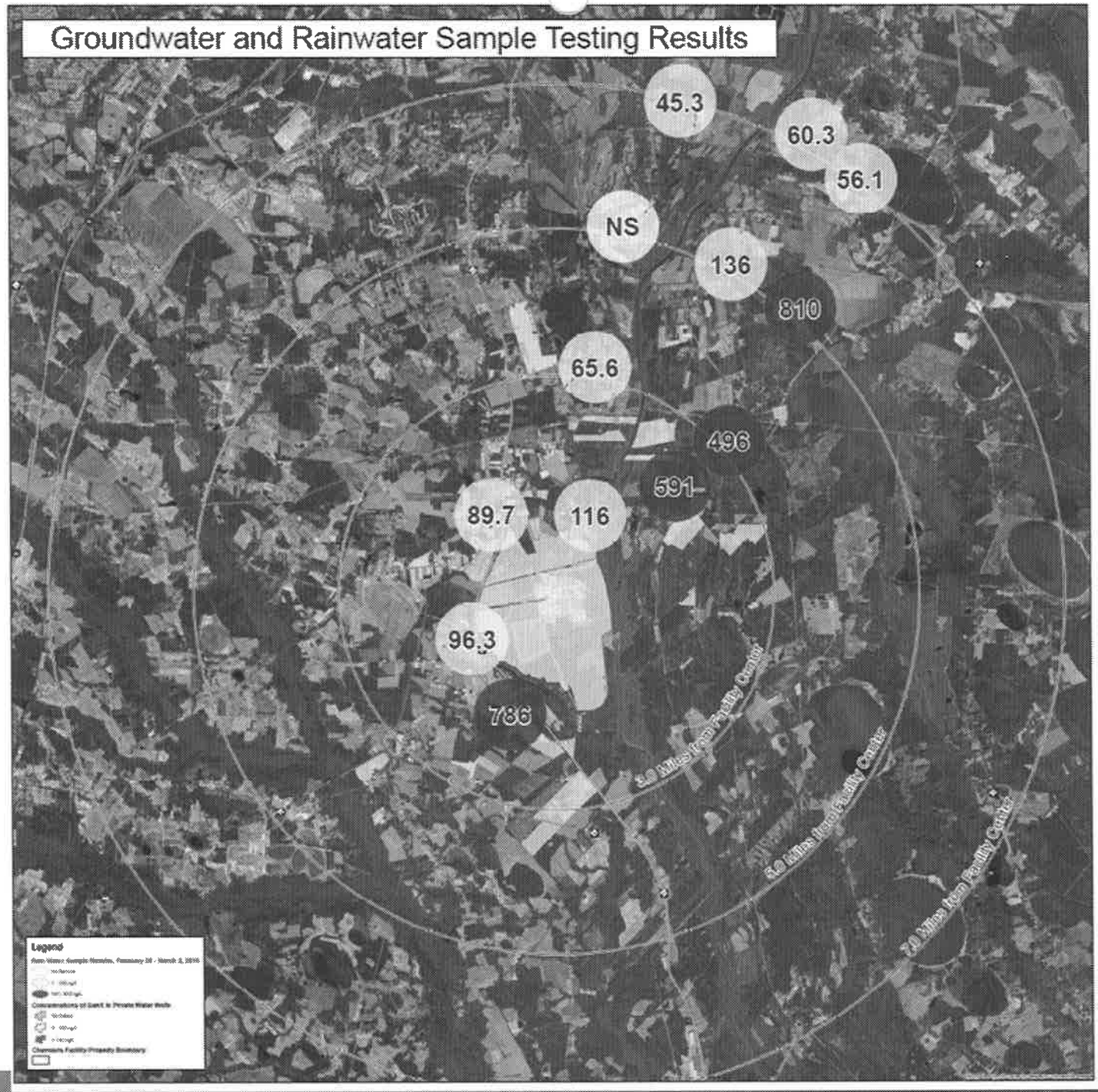


Department of Environmental Quality


January 28-29, 2018
Rainwater GenX ppt
5.2
11.3
79.4
39.4
ND
ND
NS
93.2
Cape Fear River
Cape Fear River
87
87
1303
1303
630


January 28-29, 2018
Rainwater GenX ppt
11.3
5.2
79.4
39.4
ND
ND
NS
93.2
630
87
1300
Cape Fear River
Cape Fear River

Groundwater and Rainwater Sample Testing Results



Emerging Compounds

DAQ's investigation involving GenX and other PFAS from Chemours

- Health impacts – what are the inhalation risks?
  - SAB
- Controls – what's technically feasible?
  - Carbon Adsorber trial approved
  - Thermal Oxidizer

Emerging Compounds

DAQ's investigation involving GenX and other PFAS from Chemours

Summary:

- The measured air emissions of GenX compounds are significantly higher than previously understood and reported.
- The GenX compounds are deposited on the land by rainfall at distances of at least 7 miles from Chemours.
- The evidence of atmospheric deposition of GenX shows a geographic footprint that is similar to the detection of GenX in groundwater samples.

Emerging Compounds

GenX - Recent Actions

April 6, 2018:

- **60 day notice of intent to modify Chemours' air permit:**
  - **Requires demonstration that emissions of GenX compounds do not or will not cause or contribute to violations of groundwater rules.**

The science and data collected to date informed this action.

Emerging Compounds

GenX - Recent Actions

April 9, 2018:

- **Amended complaint and motion for preliminary injunctive relief.**
- **Addresses the air emissions contributions to the groundwater violations.**

Questions ?

Update on Response to Emerging Contaminants

House Select Committee on North Carolina River Quality

Jim Flechtner, PE

Executive Director

April 26, 2018

Cape Fear Public Utility Authority

Stewardship. Sustainability. Service.

Attachment 7

Summary

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Final Report for HB56 submitted on March 23, 2018
- Continue to monitor levels of GenX and other emerging contaminants
- Filter media pilot study at Sweeney Water Treatment Plant in final stage
- Continue to monitor groundwater in the vicinity of ASR site
- Water stations are now open at Ogden Park & Veterans Park

Summary

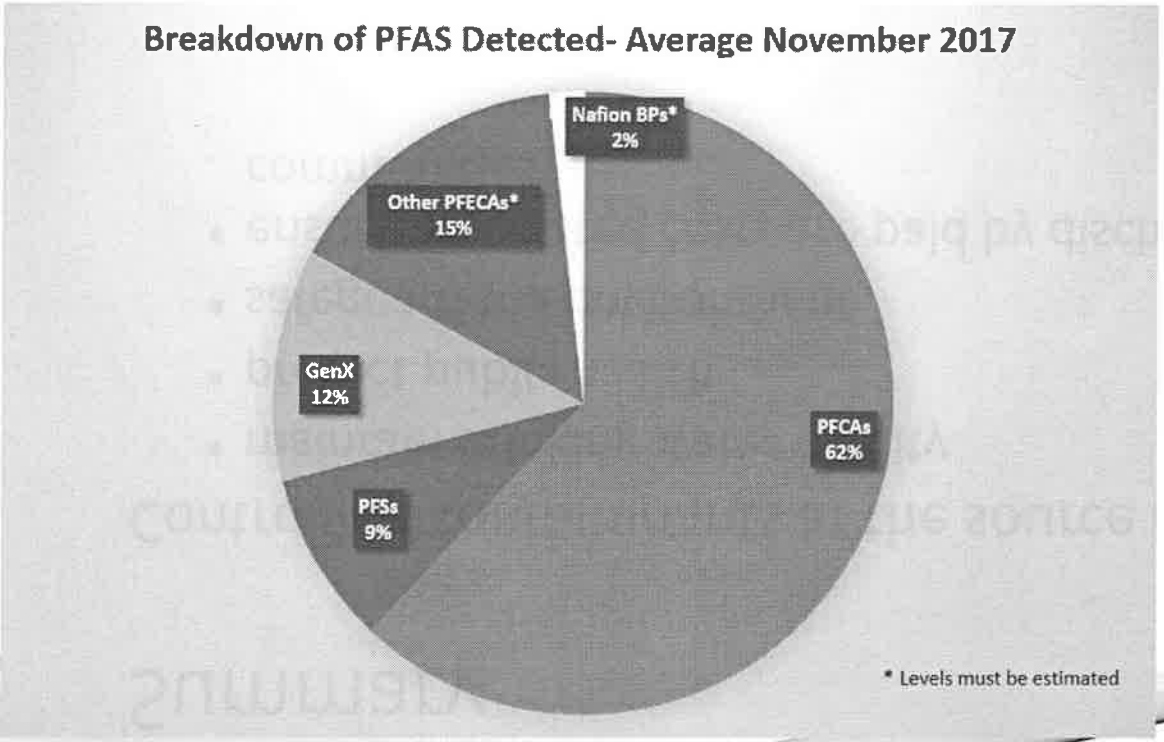
Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

Controlling contaminants at the source remains the only option to:

- maintain drinking water quality
- protect public health
- safeguard the environment
- ensure associated costs are paid by discharger, not downstream communities

Sampling Results of Water at Sweeney

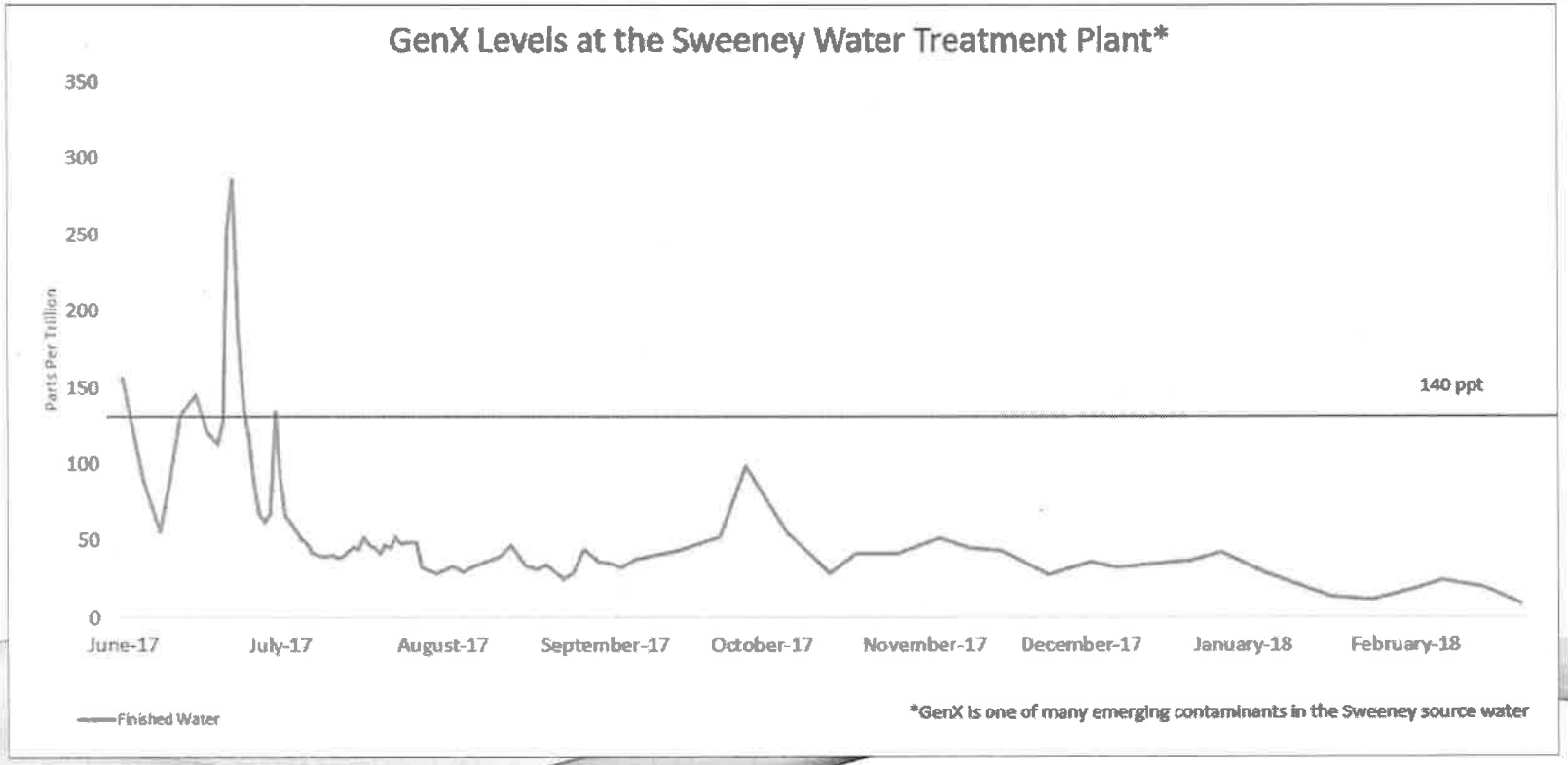
Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.



- We are currently testing for over 30 per-fluorinated compounds.
- Of those, levels of nearly 10 per-fluorinated compounds must be estimated due to the lack of testing standards.
- In June 2017, CFPUA requested DuPont & Chemours provide a list of chemicals being discharged and testing standards—to date they have not been received.
- GenX consistently accounts for a small percentage of the per-fluorinated compounds that can be detected.

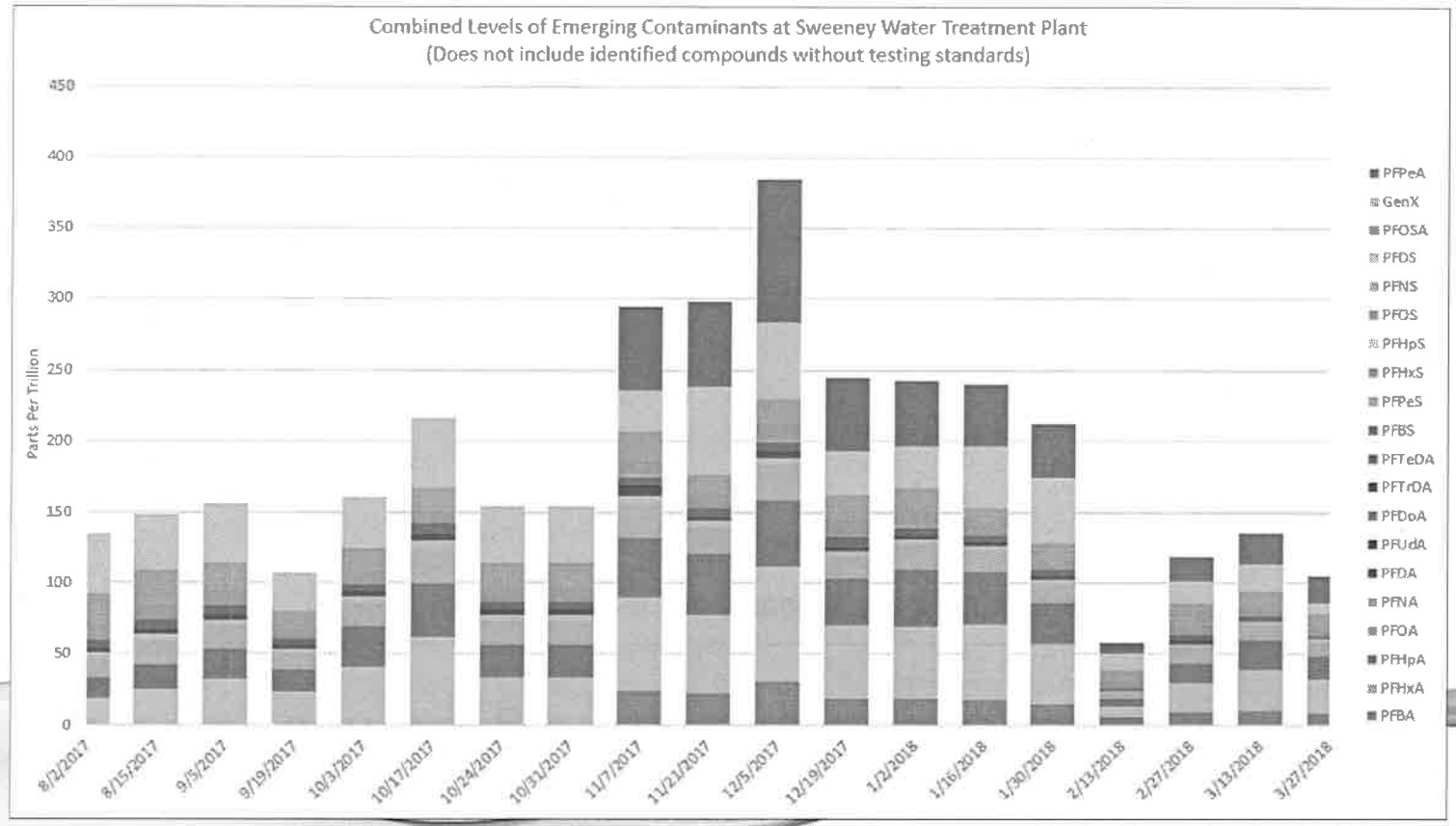
Weekly Sampling of the Finished Water

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.



Combined Levels of Compounds Over Time

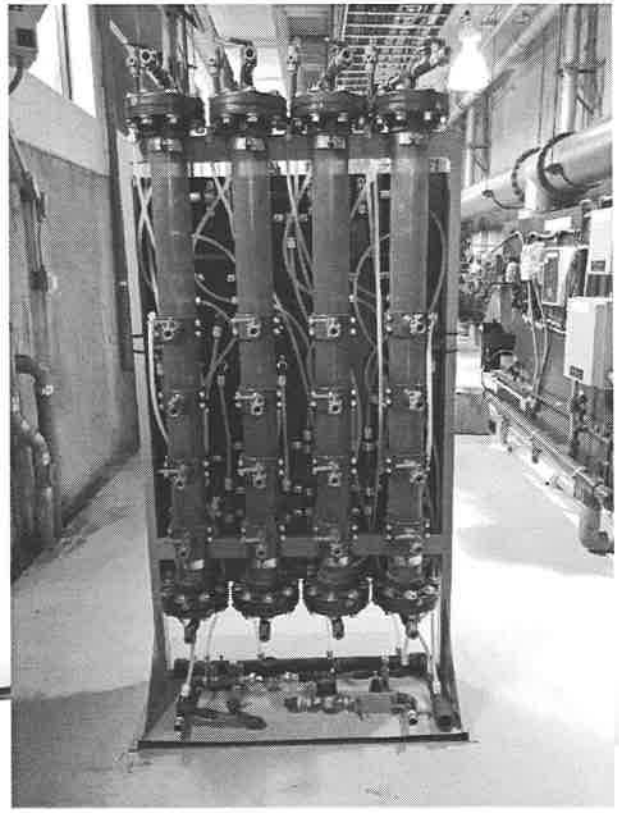
Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.



Filter Media Pilot Study

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Pilot study is in final phase of testing
- Granular Activated Carbon (GAC) and Ion Exchange show effectiveness in reducing per-fluorinated compounds in drinking water
- 100% removal cannot be achieved
- Higher levels of contaminants could overwhelm Plant's capacity to filter them



CFPUA Aquifer Storage and Recovery Well Status

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Approximately 50 million gallons of groundwater removed from ASR Well
  - Pumped from aquifer to sanitary sewer from September 2017 to December 2017
  - ASR site tested 28 ppt GenX in March 2018 (initial level approximately 800 ppt)

- Monitoring of groundwater in the vicinity of ASR and WB #11 continues per NCDEQ Notice
  - All wells below 140 ppt health advisory level
  - Work Plan for additional sampling submitted to NCDEQ for comments
  - NCDEQ requested to establish groundwater interim maximum allowable concentration

Findings from UNCW Work

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Scientists at UNCW sample the raw and finished water at Sweeney Water Treatment Plant weekly
- To date, they have detected five new PFAS compounds not previously reported in the literature
- Final report to CFPUA expected summer 2018



CFPUA Water Stations



- Ogden Park and Veterans Park locations
- Groundwater sources tested free of GenX
- Open every day from 8am to 8pm
- No cost option for concerned customers

Expenses Related to GenX

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Approximately $1.7 million expended to date
- HB 56 provided $185,000 to help offset expenses related to pilot testing and UNCW research
- FY 19 Budget includes $650,000 for related legal fees and water quality testing
- Balance is paid by customers and is driving up rates

  $1 million= 3% water rate increase

We Still Do Not Know:

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Identification of all emerging contaminants
- Health effects of combined levels of all contaminants
- Consequences of environmental accumulation such as in river sediments
- Effects of non-point sources on contaminant levels in the river
  - Air emissions
  - Groundwater
  - Stormwater runoff
- Impacts to commercial and residential markets, and to general economic development

Where We Go From Here

Cape Fear Public Utility Authority
Stewardship. Sustainability. Service.

- Pilot study is in final phase of testing
- CFPUA staff working with consultants to understand results and develop conclusions
- Continue to follow UNCW progress in identifying new compounds
- Plant Upgrade: $50 million (*estimated, subject to Board approval*)
  - Impact to water customers: 16% rate increase
  - CFPUA would issue debt that would be repaid by customers for 25 years
- Recommendation to CFPUA Board: May 9

Attachment 7

James R. Flechtner, PE
Executive Director
235 Government Center Drive
Wilmington, NC 28403
910-332-6625
jim.flechtner@cfpua.org

March 23, 2018

The Honorable Trudy Wade
North Carolina General Assembly
Legislative Building
16 West Jones Street
Raleigh, North Carolina 27601

RE: HB56 GenX Response Measures
Cape Fear Public Utility Authority (CFPUA) Final Report

Dear Senator Wade:

In accordance with House Bill 56 GenX Response Measures requirements, this final report summarizes the efforts to date of Cape Fear Public Utility Authority (CFPUA) to address water quality concerns in our water service area. Each of the progress reports and datasets included in this report has been shared with Pender and Brunswick counties, and we maintain an ongoing dialogue with their County Managers, and Public Utilities and Health departments.

Addressing the issue of emerging contaminants will require collaboration between public health experts, local utilities, water quality researchers and regulatory agencies. We are confident that the work we have done over the past year, aided in part by HB 56, effectively built the structure for such collaboration. We look forward to seeing that work evolve into a permanent network of water quality stakeholders.

Recognizing the complexity of the issue of emerging contaminants, CFPUA is taking a comprehensive approach that addresses both short-term and long-term concerns. It includes regular sampling; our work with researchers at the University of North Carolina Wilmington (UNCW); an ongoing pilot study at our Sweeney Water Treatment Plant to identify effective treatment technologies for emerging contaminants; free water stations available to the public from a groundwater source; and legal action.

As can be seen in Graph I on page four of this report, CFPUA continues to sample the finished water from the Sweeney Water Treatment Plant for GenX on a weekly basis. Levels of the compound have remained below the provisional health goal of 140 parts per trillion (ppt) set by the North Carolina Department of Health and Human Services since July 2017.

We know, however, that GenX is not the only emerging contaminant in the Cape Fear River. CFPUA has tested water samples from the Sweeney Plant for a wide array of unregulated compounds as part of its ongoing pilot study. As Graph II depicts, GenX accounts for only a small percentage of these compounds. Results from a screening of the twenty different per-fluorinated compounds with testing standards shows combined levels consistently above existing health goals for legacy compounds and for GenX (Graph III).

In addition, our ongoing partnership with UNCW has brought the existence of additional compounds to light. Scientists in the Department of Chemistry and Biochemistry at University of North Carolina Wilmington have been collecting raw and finished drinking water samples weekly from the Sweeney Water Treatment Facility since November 2017. To date, there are at least five new perflourinated alkyl substances (PFAS), not reported in the literature, that have been detected in both raw and finished drinking waters.

With this information in mind, CFPUA designed its pilot study to measure the potential of alternative treatment technologies in removing per-fluorinated compounds including, but not limited to, GenX. The most recent results of the pilot study may be seen in the enclosed Black & Veatch progress reports. We expect the pilot study to conclude this spring. CFPUA staff will use those findings to present a recommendation for water treatment enhancements to the Sweeney Water Treatment Plant to our Board.

Should Cape Fear Public Utility Authority choose to install additional treatment technology at the Sweeney Water Treatment Plant, design and construction of those upgrades will take several years. In the meantime, CFPUA has installed two water stations available for concerned customers to obtain water at no cost—both stations distribute groundwater that tested negative for GenX. These two water stations are located at either end of New Hanover County. Graph IV contains a map of their locations and recent water usage.

CFPUA is one of the first utilities in the country to pursue treatment of per-fluorinated compounds such as GenX. While much as been accomplished over the past year—challenges remain and much is still unknown. The absence of effective discharge controls and provisional health goals for many of these compounds adds a degree of difficulty in determining levels of treatment that are protective of public health. While industrial point source discharge is a known source of the compounds, researchers are still investigating the role of other potential sources such as air emissions, groundwater, rain, and storm water runoff.

As CFPUA moves forward in this process, we will continue to rely on State agencies for treatment guidance and public health expertise to ensure that we are providing safe and reliable drinking water to our community. We thank the General Assembly for the assistance it has provided, and for its continued attention to the issue of water quality in the Cape Fear Region.

If you have any questions, please do not hesitate to contact me at (910) 332-6669, or by email at jim.flechtner@cfpua.org.

Sincerely,

James R. Flechtner, P.E.
Executive Director

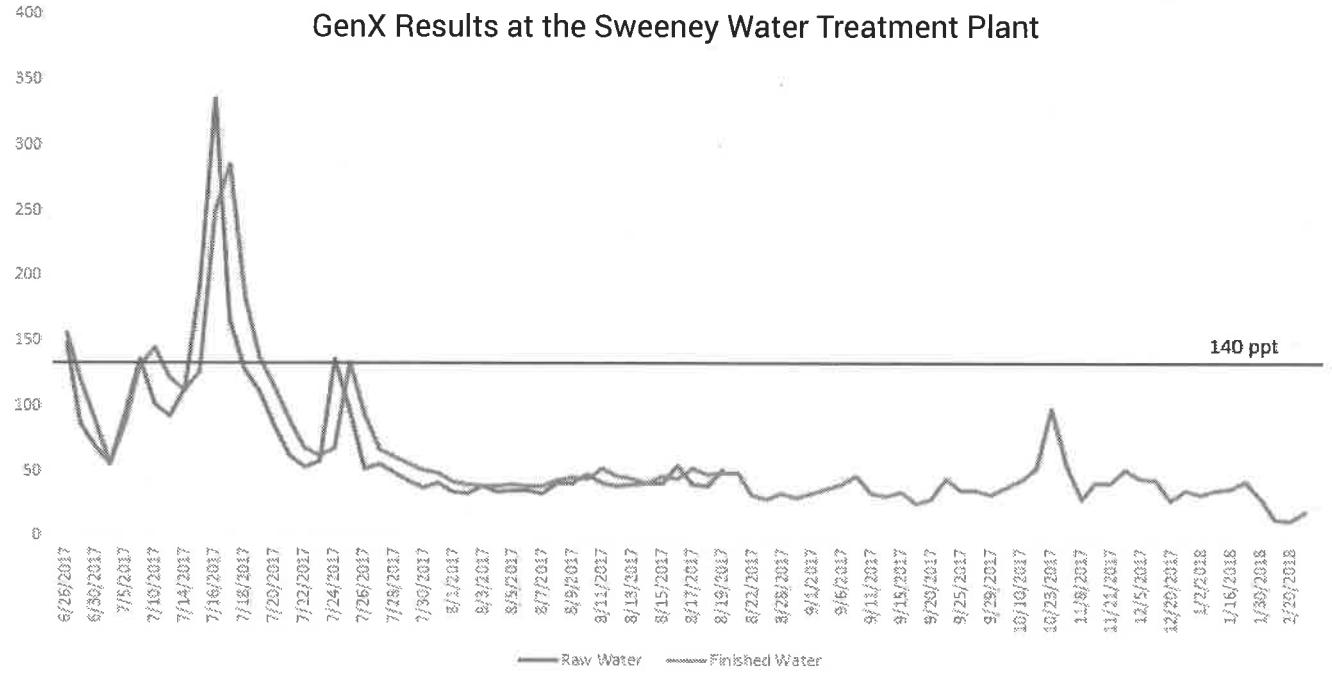
CC: Linda Miles, CFPUA Consulting Attorney
File

Enclosures (7):

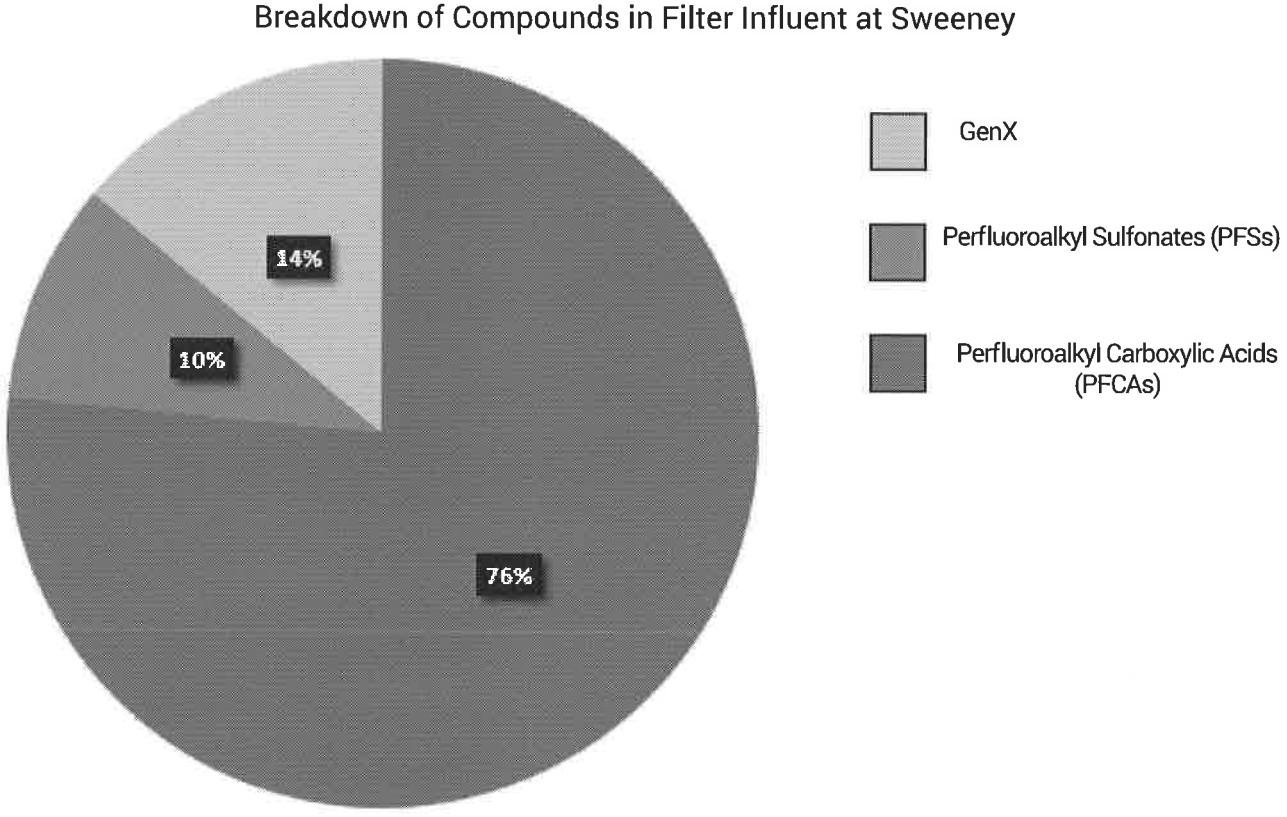
(1) HB 56 GenX Response Measures-Graphs
(2) Black & Veatch Progress Update Number 2
(3) Black & Veatch Progress Update Number 3
(4) Black & Veatch Progress Update Number 4
(5) University of North Carolina Wilmington Progress Update_January 2018
(6) University of North Carolina Wilmington Progress Update_March 2018
(7) University of North Carolina Rain Analysis for November and December 2017

HB56 GenX Response Measures - Graphs

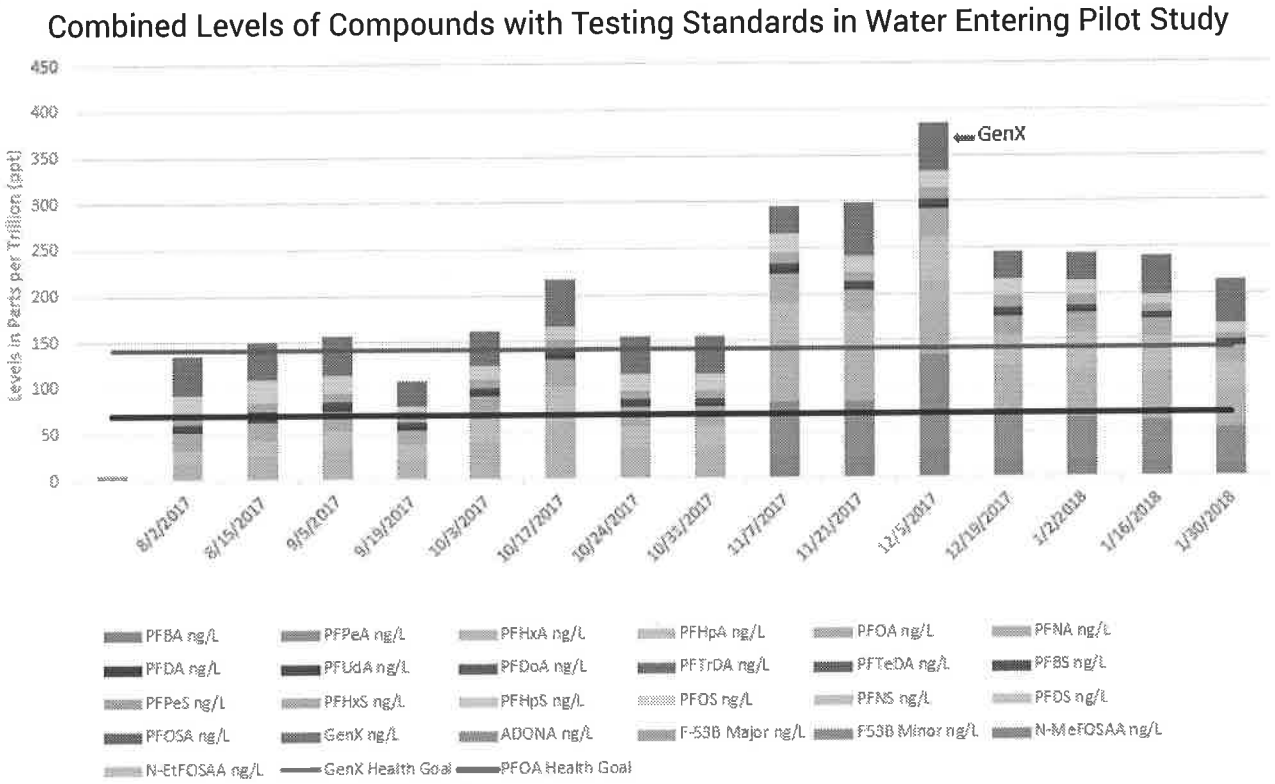
Graph I



Graph II

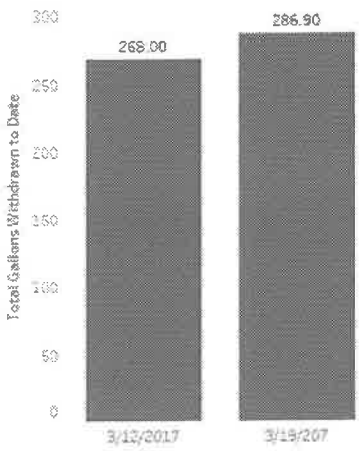


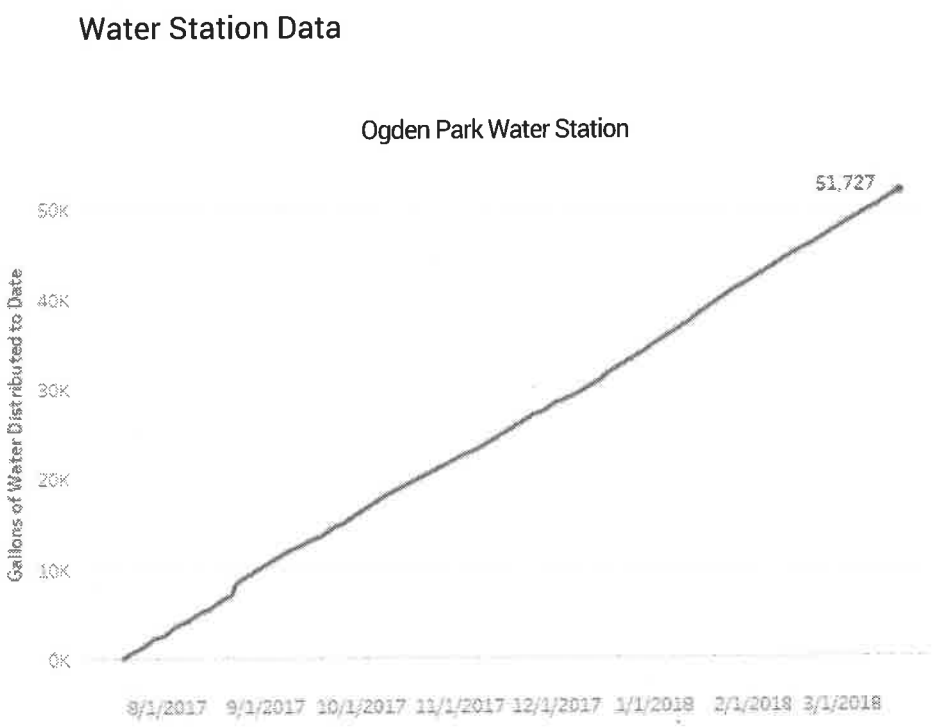
Graph III



Graph IV







PROGRESS UPDATE NO. 2

Emerging Contaminants Treatment Strategy Pilot Study

B&V PROJECT NO. 196369



PREPARED FOR

Cape Fear Public Utility Authority

5 DECEMBER 2017

BLACK & VEATCH

©Black & Veatch Holding Company 2017. All rights reserved

Table of Contents

1.0 Purpose **1**
2.0 Introduction **1**
3.0 Testing and Analysis **1**
3.1 Testing Goals 1
3.2 Means and Methods 1
3.3 GAC Interim Results to Date 1
3.4 IX Interim Results to Date 3
4.0 Discussion **3**
5.0 Conclusions/Recommendations **4**

LIST OF TABLES

Table 3-1 Sampling Results as of November 7, 2017 2

1.0 Purpose

This document presents the status of ongoing bench- and pilot-scale testing to evaluate the performance of several proposed treatment technologies in their removal of perfluoroalkyl substances (PFASs), including perfluoro-2-propoxypropanoic acid (commonly known as GenX).

2.0 Introduction

PFASs have been detected in the Cape Fear River, which is the source of raw water for the Sweeney Water Treatment Plan (WTP). The Sweeney WTP provides drinking water to Cape Fear Public Utility Authority (CFPUA) customers in the city of Wilmington and New Hanover County in North Carolina.

In response to the detection of GenX and other PFASs in the Cape Fear River and because of concern over potential health effects, CFPUA is proactively investigating the feasibility and effectiveness of PFAS removal technologies. CFPUA is one of the first utilities in the United States to pursue treatment to target removal of these compounds. Initial evaluations performed by Black & Veatch were provided in Technical Memoranda 1 and 2. As a result of those evaluations, bench- and pilot-scale testing of granular activated carbon (GAC) filter media and ion exchange (IX) resins was initiated. The details of the bench- and pilot- scale testing are presented herein.

3.0 Testing and Analysis

Granular activated carbon filter media and ion exchange resin were selected for bench- and pilot-scale testing. Reverse osmosis/nanofiltration was excluded because of much higher life-cycle cost and potential challenges related to disposal of the concentrate, but the technology will be considered if testing of GAC and IX fail to meet testing goals. The following sections provide information on the testing.

3.1 TESTING GOALS

The primary goal of the testing is to establish the adsorption characteristics for PFASs and other contaminants of emerging concern (CECs) on GAC media and IX resin. These characteristics will be used to refine the previous study-related evaluations and identify the most advantageous short- and longer-term treatment strategies for removal of PFASs and CECs at the Sweeney WTP. The data will help define a design basis for full-scale implementation of the selected technology. Ancillary benefits are also being identified as part of the study, such as reductions in total organic carbon (TOC), disinfection byproduct (DBP) formation, and inorganic compounds.

3.2 MEANS AND METHODS

Means and methods for the bench- and pilot-scale testing were included in a previous progress report dated Nov. 3, 2017. Refer to the previous report for details.

CFPUA expanded the list of analyzed components to include additional per- and polyfluorinated components beginning with the November 7, 2017 samples. As a result, some additional components are presented herein that were not included in the previous report.

3.3 GAC INTERIM RESULTS TO DATE

Interim results of the ongoing pilot testing are presented in Table 3-1. All data is reported based on equivalent bed volumes of water treated.

Each GAC test column continues to exhibit gradual breakthrough of TOC and PFASs, led by shorter chain per- and polyfluorinated compounds. Each GAC media is exhibiting chromatographic peaking, which is the preferential adsorption of one molecule over another. As a result, shorter carbon chain molecules are being released by the GAC into the effluent contributing to greater than 100 percent breakthrough values. Results also continue to show that shorter carbon chains (PFBA, PFBS, GenX, etc.) are not as strongly adsorbed on the GAC media as the longer carbon chain molecules (PFDA, PFOS).

Table 3-1 Sampling Results as of November 7, 2017

	Column Influent	GAC-1	GAC-2	GAC-3	GAC-4	IX-1	IX-2
Bed Volumes	---	13,500	13,700	14,000	14,100	62,500	62,500
Empty Bed Contact Time (min)	---	10	10	10	10	1.5	1.5
Perfluoroalkyl Carboxylic Acids (PFCAs)	**ng/L**	**Percent Breakthrough**					
PFBA	23-24.3	114	104	114	110	97	91
PFPeA	55.6-58.7	101	102	120	119	70	109
PFHxA	64.5-65.2	83	90	105	110	26	12
PFHpA	42.3-42.6	74	74	98	113	6	ND
PFOA	23.3-23.7	64	70	83	97	ND	ND
PFNA	5.21-6.52	43	49	51	62	ND	ND
PFDA	4.68-5.91	27	31	32	31	ND	ND
PFUdA	ND-0.871	ND	ND	ND	ND	ND	ND
PFDoA	ND	ND	ND	ND	ND	ND	ND
PFTrDA	ND	ND	ND	ND	ND	ND	ND
PFTeDA	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkyl Sulfonates (PFSs)	**ng/L**	**Percent Breakthrough**					
PFBS	5.9-6.31	70	85	95	108	ND	ND
PFPeS	1.32-1.34	68	69	87	90	ND	ND
PFHxS	9.19-9.34	54	59	75	72	ND	ND
PFHpS	ND	ND	ND	ND	ND	ND	ND
PFOS	20.2-21.4	25	27	36	35	ND	ND
PFNS	ND	ND	ND	ND	ND	ND	ND
PFDS	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkyl Sulfonamides (PFSAs)	**ng/L**	**Percent Breakthrough**					
PFOSA	ND	ND	ND	ND	ND	ND	ND

	Column Influent	GAC-1	GAC-2	GAC-3	GAC-4	IX-1	IX-2
Bed Volumes	---	13,500	13,700	14,000	14,100	62,500	62,500
Empty Bed Contact Time (min)	---	10	10	10	10	1.5	1.5
Perfluoroalkyl Ether Carboxylic Acids (PFECAs)	**ng/L**	**Percent Breakthrough**					
PFMOAA*	0.442-0.792	158	126	135	138	148	138
PFMOPrA*	ND	ND	ND	ND	ND	ND	ND
PFO2HxA*	23.8-88.4	106	97	109	120	153	191
PFMOBA*	1.74-2.13	111	110	107	114	75	38
PFO3OA*	12.1-71.7	129	98	123	132	28	30
PFPrOPrA/GenX	28.3-29	113	110	107	114	75	38
PFO4DA*	4.25-32.3	73	75	76	95	2	ND
Other Per- and Polyfluorinated Compounds	**ng/L**	**Percent Breakthrough**					
ADONA	ND	ND	ND	ND	ND	ND	ND
F-53B Major	ND	ND	ND	ND	ND	ND	ND
F-53B Minor	ND	ND	ND	ND	ND	ND	ND
Nafion Byproduct 1*	ND	ND	ND	ND	ND	ND	ND
Nafion Byproduct 2*	4.2-22.6	74	91	75	91	ND	ND
N-MeFOSAA	ND	ND	ND	ND	ND	ND	ND
N-EtFOSAA	ND	ND	ND	ND	ND	ND	ND

* Measurement is considered an estimate as the analytical lab does not have a standard for measurement of this compound.
ND – Not detected

3.4 IX INTERIM RESULTS TO DATE

Interim results of the ongoing pilot testing are presented in Table 3-1. Both ion exchange columns now show breakthrough of several shorter carbon chain molecules before 50,000 bed volumes. Both also appear to show chromatographic peaking for several perfluoroalkyl ether carboxylic acids.

4.0 Discussion

- The bench-scale and pilot testing is ongoing and scheduled to continue through the first quarter of 2018 until testing goals are achieved.
- PFASs are being observed in the pilot GAC media effluent.
  - All columns are exhibiting effluent PFAS concentrations near or above the influent concentration for shorter carbon chain PFASs.
  - Longer carbon chain PFAS molecules continue to be partially removed.
- PFASs are being observed in the pilot IX resin effluent.

- Both columns are exhibiting effluent PFAS concentrations near or above the influent concentration for a few of the shortest carbon chain PFASs.
- Longer carbon chain PFAS molecules have yet to show any breakthrough.

- Testing will evolve as data is received to refine short- and long-term treatment strategies.
- Additional pilot columns are being considered for testing of other GAC and IX adsorbents.

5.0 Conclusions/Recommendations

The following conclusions and recommendations can be developed based on the interim testing results.

- Pilot testing is ongoing and should continue in order to fully characterize the performance of GAC and IX technologies for PFAS removal.
- With breakthrough occurring in the current GAC and IX pilot columns, the next round of pilot testing with additional media and longer empty bed contact time is being developed by the team with execution planned in the next few months.
- Additional piloting will create a competitive bidding environment and provide additional design and operating cost information in regard to EBCT. This information will optimize the design to lower operating cost.

FINAL

PROGRESS UPDATE NO. 3

Emerging Contaminants Treatment Strategy Pilot Study

B&V PROJECT NO. 196369



PREPARED FOR

Cape Fear Public Utility Authority

8 JANUARY 2018

BLACK & VEATCH

©Black & Veatch Holding Company 2017. All rights reserved.

Table of Contents

1.0 Purpose **1**
2.0 Introduction **1**
3.0 Testing and Analysis **1**
3.1 Testing Goals 1
3.2 Means and Methods 1
3.3 GAC Interim Results to Date 1
3.4 IX Interim Results to Date 3
4.0 Discussion **3**
5.0 Conclusions/Recommendations **4**

LIST OF TABLES

Table 3-1 Sampling Results as of December 5, 2017 2

1.0 Purpose

This document presents the status of ongoing bench- and pilot-scale testing to evaluate the performance of several proposed treatment technologies in their removal of perfluoroalkyl substances (PFASs), including perfluoro-2-propoxypropanoic acid (commonly known as GenX).

2.0 Introduction

PFASs have been detected in the Cape Fear River, which is the source of raw water for the Sweeney Water Treatment Plan (WTP). The Sweeney WTP provides drinking water to Cape Fear Public Utility Authority (CFPUA) customers in the City of Wilmington and New Hanover County in North Carolina.

In response to the detection of GenX and other PFASs in the Cape Fear River and because of concern over potential health effects, CFPUA is proactively investigating the feasibility and effectiveness of PFAS removal technologies. CFPUA is one of the first utilities in the United States to pursue treatment to target removal of these compounds. Initial evaluations performed by Black & Veatch were provided in Technical Memoranda 1 and 2. As a result of those evaluations, bench- and pilot-scale testing of granular activated carbon (GAC) filter media and ion exchange (IX) resins was initiated. The details of the bench- and pilot- scale testing are presented herein.

3.0 Testing and Analysis

Granular activated carbon filter media and ion exchange resin were selected for bench- and pilot-scale testing. Reverse osmosis/nanofiltration was excluded because of much higher life-cycle cost and potential challenges related to disposal of the concentrate, but the technology will be considered if testing of GAC and IX fail to meet testing goals. The following sections provide information on the testing.

3.1 TESTING GOALS

The primary goal of the testing is to establish the adsorption characteristics for PFASs and other contaminants of emerging concern (CECs) on GAC media and IX resin. These characteristics will be used to refine the previous study-related evaluations and identify the most advantageous short- and longer-term treatment strategies for removal of PFASs and CECs at the Sweeney WTP. The data will help define a design basis for full-scale implementation of the selected technology. Ancillary benefits are also being identified as part of the study, such as reductions in total organic carbon (TOC), disinfection byproduct (DBP) formation, and inorganic compounds.

3.2 MEANS AND METHODS

Means and methods for the bench- and pilot-scale testing were included in a previous progress report dated Nov. 3, 2017. Refer to the previous report for details.

3.3 GAC INTERIM RESULTS TO DATE

Interim results of the ongoing pilot testing are presented in Table 3-1. All data is reported based on equivalent bed volumes of water treated.

Each GAC test column continues to exhibit gradual breakthrough of TOC and PFASs, led by shorter chain per- and polyfluorinated compounds. Each GAC media is exhibiting chromatographic peaking, which is the preferential adsorption of one molecule over another. As a result, shorter

carbon chain molecules are being released by the GAC into the effluent contributing to greater than 100 percent breakthrough values. Results also continue to show that shorter carbon chains (PFBA, PFBS, GenX, etc.) are not as strongly adsorbed on the GAC media as the longer carbon chain molecules (PFDA, PFOS).

Table 3-1 Sampling Results as of December 5, 2017

	Column Influent	GAC-1	GAC-2	GAC-3	GAC-4	IX-1	IX-2
Bed Volumes	---	17,340	17,640	18,000	18,050	90,900	90,900
Empty Bed Contact Time (min)	---	10	10	10	10	1.5	1.5
Perfluoroalkyl Carboxylic Acids (PFCAs)	**ng/L**	**Percent Breakthrough**					
PFBA	23-24.3	119	126	131	114	105	100
PFPeA	55.6-58.7	150	122	131	120	70	86
PFHxA	64.5-65.2	76	83	135	132	58	57
PFHpA	42.3-42.6	79	89	113	113	37	6
PFOA	23.3-23.7	90	102	105	88	15	ND
PFNA	5.21-6.52	69	80	93	104	ND	ND
PFDA	4.68-5.91	54	65	61	61	ND	ND
PFUdA	ND-0.871	ND	ND	ND	ND	ND	ND
PFDoA	ND	ND	ND	ND	ND	ND	ND
PFTrDA	ND	ND	ND	ND	ND	ND	ND
PFTeDA	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkyl Sulfonates (PFSs)	**ng/L**	**Percent Breakthrough**					
PFBS	5.9-6.31	81	86	105	109	ND	ND
PFPeS	1.32-1.34	69	67	76	85	ND	ND
PFHxS	9.19-9.34	59	66	75	84	ND	ND
PFHpS	ND	ND	ND	ND	ND	ND	ND
PFOS	20.2-21.4	45	53	55	59	ND	ND
PFNS	ND	ND	ND	ND	ND	ND	ND
PFDS	ND	ND	ND	ND	ND	ND	ND
Perfluoroalkyl Sulfonamides (PFSAs)	**ng/L**	**Percent Breakthrough**					
PFOSA	ND	ND	ND	ND	ND	ND	ND

	Column Influent	GAC-1	GAC-2	GAC-3	GAC-4	IX-1	IX-2
Bed Volumes	---	17,340	17,640	18,000	18,050	90,900	90,900
Empty Bed Contact Time (min)	---	10	10	10	10	1.5	1.5
Perfluoroalkyl Ether Carboxylic Acids (PFECAs)	**ng/L**	**Percent Breakthrough**					
PFMOAA*	0.442-0.792	116	115	123	120	112	113
PFMOPrA*	ND	118	115	111	107	104	109
PFO2HxA*	23.8-88.4	108	124	127	128	155	143
PFMOBA*	1.74-2.13	ND	ND	ND	ND	ND	ND
PFO3OA*	12.1-71.7	186	217	136	145	91	175
PFPrOPrA/GenX	28.3-29	98	94	101	95	71	82
PFO4DA*	4.25-32.3	153	169	95	121	30	5
Other Per- and Polyfluorinated Compounds	**ng/L**	**Percent Breakthrough**					
N-MeFOSAA	ND	ND	ND	ND	ND	ND	ND
N-EtFOSAA	ND	ND	ND	ND	ND	ND	ND

* Measurement is considered an estimate as there is currently no known authentic standard for measurement of this compound.
ND – Not detected

3.4 IX INTERIM RESULTS TO DATE

Interim results of the ongoing pilot testing are presented in Table 3-1. Both ion exchange columns now show breakthrough of several shorter carbon chain molecules before 50,000 bed volumes. Both also appear to show chromatographic peaking for nearly all perfluoroalkyl ether carboxylic acids. Perfluoroalkyl sulfonates continue to be completely removed.

4.0 Discussion

- The bench-scale and pilot testing is ongoing and scheduled to continue through the first quarter of 2018 until testing goals are achieved.
- PFASs are being observed in the pilot GAC media effluent.
  - All columns are exhibiting effluent PFAS concentrations near or above the influent concentration for all but the longest carbon chain PFASs.
  - Only the longest chain PFAS molecules continue to be removed.
  - Adsorption curves for each PFAS compound have been characterized for each column.
  - GAC columns 1 through 4 have reached the end of their useful life for the first phase of piloting and will be discontinued.
- PFASs are being observed in the pilot IX resin effluent.
  - Both columns are exhibiting effluent PFAS concentrations near or above the influent concentration for a few of the shortest carbon chain PFASs.

- Only PFASs with carboxylic acid functional groups have shown breakthrough.
- Longer carbon chain PFAS molecules have yet to show any breakthrough.
- PFAS molecules with sulfonate functional groups have yet to show any breakthrough.

- Additional pilot columns were installed for testing of other GAC and IX adsorbents.
  - Four new GAC pilot columns have been installed and will start operation mid-January. The four new pilot columns will be used to evaluate two more GAC media types and the effect of increasing the empty bed contact time on PFAS removal.
  - Three new IX pilot columns have been installed and will start operation mid-January. The three new pilot columns will be used to evaluate two more IX resins and the effect of increasing the empty bed contact time on PFAS removal.
- Testing will evolve as data is received to refine short- and long-term treatment strategies.

5.0 Conclusions/Recommendations

The following conclusions and recommendations can be developed based on the interim testing results.

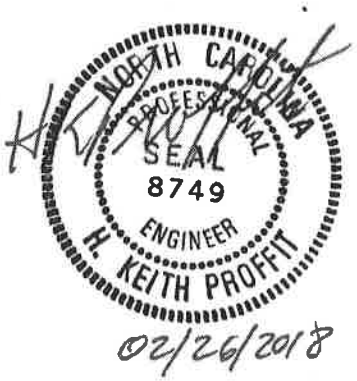
- Pilot testing is ongoing and should continue in order to fully characterize the performance of GAC and IX technologies for PFAS removal.

FINAL

PROGRESS UPDATE NO. 4

Emerging Contaminants Treatment Strategy Pilot Study

B&V PROJECT NO. 196369



PREPARED FOR

Cape Fear Public Utility Authority

26 FEBRUARY 2018

BLACK & VEATCH

©Black & Veatch Holding Company 2017. All rights reserved

Table of Contents

1.0 Purpose **1**
2.0 Introduction **1**
3.0 Testing and Analysis **1**
3.1 Testing Goals 1
3.2 Means and Methods 1
3.3 GAC Interim Results to Date 3
3.4 IX Interim Results to Date 3
4.0 Discussion **4**
5.0 Conclusions/Recommendations **5**

LIST OF TABLES

Table 3-1 Sampling Results as of December 5, 2017 3

1.0 Purpose

This document presents the status of ongoing bench- and pilot-scale testing to evaluate the performance of several proposed treatment technologies in their removal of perfluoroalkyl substances (PFASs), including perfluoro-2-propoxypropanoic acid (commonly known as GenX).

2.0 Introduction

PFASs have been detected in the Cape Fear River, which is the source of raw water for the Sweeney Water Treatment Plan (WTP). The Sweeney WTP provides drinking water to Cape Fear Public Utility Authority (CFPUA) customers in the city of Wilmington and New Hanover County in North Carolina.

In response to the detection of GenX and other PFASs in the Cape Fear River and because of concern over potential health effects, CFPUA is proactively investigating the feasibility and effectiveness of PFAS removal technologies. CFPUA is one of the first utilities in the United States to pursue treatment to target removal of these compounds. Initial evaluations performed by Black & Veatch were provided in Technical Memoranda 1 and 2. As a result of those evaluations, bench- and pilot-scale testing of granular activated carbon (GAC) filter media and ion exchange (IX) resins was initiated. The details of the bench- and pilot- scale testing are presented herein.

3.0 Testing and Analysis

Granular activated carbon filter media and ion exchange resin were selected for bench- and pilot-scale testing. Reverse osmosis/nanofiltration was excluded because of much higher life-cycle cost and potential challenges related to disposal of the concentrate, but the technology will be considered if testing of GAC and IX fail to meet testing goals. The following sections provide information on the testing.

3.1 TESTING GOALS

The primary goal of the testing is to establish the adsorption characteristics for PFASs and other contaminants of emerging concern (CECs) on GAC media and IX resin. These characteristics will be used to refine the previous study-related evaluations and identify the most advantageous short- and longer-term treatment strategies for removal of PFASs and CECs at the Sweeney WTP. The data will help define a design basis for full-scale implementation of the selected technology. Ancillary benefits are also being identified as part of the study, such as reductions in total organic carbon (TOC), disinfection byproduct (DBP) formation, and inorganic compounds.

3.2 MEANS AND METHODS

Means and methods for the bench- and pilot-scale testing were included in a previous progress report dated Nov. 3, 2017. Refer to the previous report for details.

3.3 PILOT MODIFICATIONS

The configuration of the pilot columns was modified for the second phase of testing in mid-January. The second phase of pilot testing is aimed at refining the basis for a full-scale design and to identify configurations with the lowest life-cycle cost. A flow diagram for the new configuration is included in Figure 3-1.

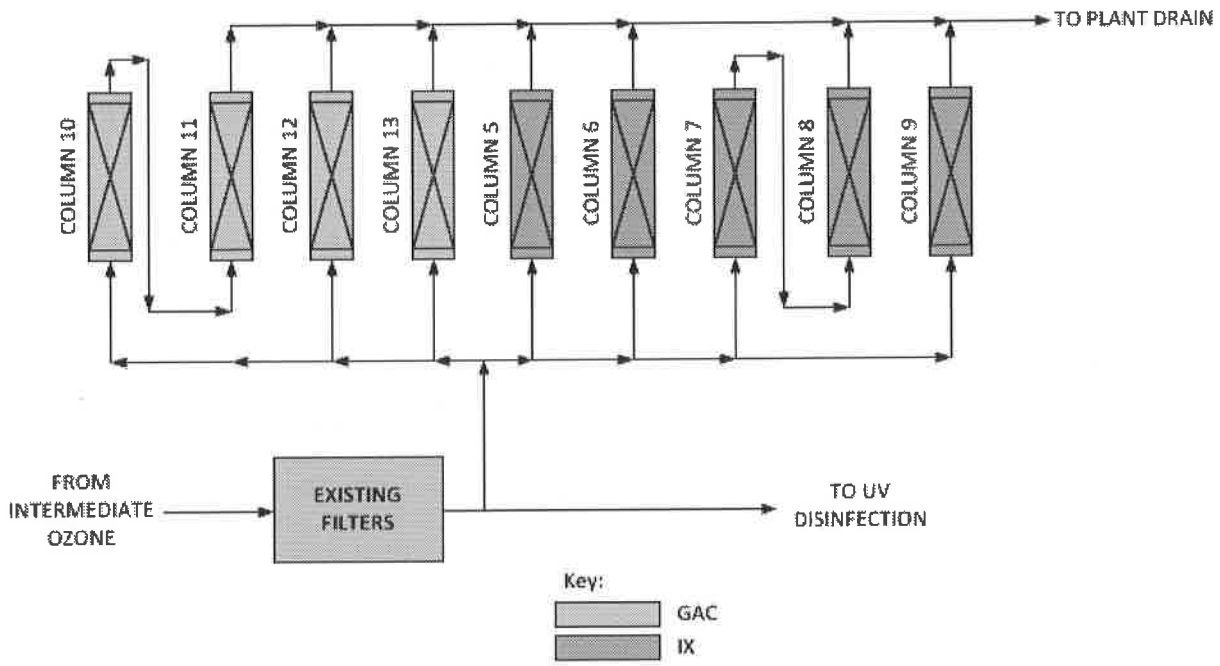


Figure 3-1 Pilot Test Flow Diagram

Columns 10 through 13 include new GAC media. Columns 5 and 6 are the remaining two ion exchange columns from the initial phase of piloting that are still in service. Columns 7 through 9 include new ion exchange resins. The media and resins contained in each pilot column are shown in Table 3-1 and Table 3-2.

Columns 10 and 11 are operated in series to evaluate the effects of a longer empty bed contact time (EBCT) on adsorption characteristics of GAC. Columns 7 and 8 are also operated in series in the same manner for ion exchange resins.

Table 3-1 Pilot Modifications – GAC Media

Column No.	10	11	12	13
EBCT, min	10	10	10	10
Supplier	Calgon	Calgon	Cabot	Cabot
Media/Resin	Filtrasorb 400	Filtrasorb 400	Hydrodarco 4000	GAC 400

Table 3-2 Pilot Modifications – IX Resins

Column No.	5	6	7	8	9
EBCT, min	1.5	1.5	1.5	1.5	1.5
Supplier	Evoqua	Calgon	Purolite	Purolite	Calgon
Media/Resin	DOWEX PSR-2 Plus	CalRes 2304	Purofine PFA694E	Purofine PFA694E	CalRes 2301

3.4 GAC INTERIM RESULTS TO DATE

The initial phase of piloting for GAC consisted of four pilot columns that all began operation on Aug. 2, 2017. Operation of those columns was terminated in December and final results were reported in Progress Update No. 3, dated Jan. 8, 2018.

The second phase of piloting for GAC consists of four new pilot columns that will test some new GAC media as well longer empty bed contact times. Operation of the second phase of piloting for GAC began on Jan. 16, 2018. Testing results for these pilot columns have not yet been received as of the date of this report.

3.5 IX INTERIM RESULTS TO DATE

Interim results of the ongoing pilot testing are presented in Table 3-3. Breakthrough of perfluoroalkyl carboxylic acids appears to be consistently expanding to include the longer chain molecules. Perfluoroalkyl sulfonates continue to be completely removed. The capacity of each ion exchange resin to adsorb PFPrOPrA/GenX has been exhausted. The performance of each resin for removal of other PFECAs and Nafion byproducts is unknown at this time as the estimated results for such compounds, which have no known authentic standard, are inconsistent with previous testing results.

Table 3-3 Sampling Results as of January 16, 2017

	Column Influent	IX-1	IX-2
Bed Volumes	---	133,400	133,400
Empty Bed Contact Time (min)	---	1.5	1.5
Perfluoroalkyl Carboxylic Acids (PFCAs)	**ng/L**	**Percent Breakthrough**	
PFBA	18	119	113
PFPeA	43	110	144
PFHxA	53	78	106
PFHpA	37	62	27
PFOA	16	53	ND
PFNA	3	ND	ND
PFDA	2.4	ND	ND
PFUdA	ND	ND	ND
PFDoA	ND	ND	ND
PFTrDA	ND	ND	ND
PFTeDA	ND	ND	ND

	Column Influent	IX-1	IX-2
Bed Volumes	---	133,400	133,400
Empty Bed Contact Time (min)	---	1.5	1.5
Perfluoroalkyl Sulfonates (PFSs)	**ng/L**	**Percent Breakthrough**	
PFBS	4.9	ND	ND
PFPeS	ND	ND	ND
PFHxS	7.8	ND	ND
PFHpS	ND	ND	ND
PFOS	11	ND	ND
PFNS	ND	ND	ND
PFDS	ND	ND	ND
Perfluoroalkyl Sulfonamides (PFSAs)	**ng/L**	**Percent Breakthrough**	
PFOSA	ND	ND	ND
Perfluoroalkyl Ether Carboxylic Acids (PFECAs)	**ng/L**	**Percent Breakthrough**	
PFMOAA*	2900 (Est.)	100	100
PFMOPrA*	ND	ND	ND
PFO2HxA*	98 (Est.)	184	163
PFMOBA*	ND	ND	ND
PFO3OA*	22 (Est.)	191	500
PFPrOPrA/GenX	44	86	100
PFO4DA*	7.9 (Est.)	124	67
Other Per- and Polyfluorinated Compounds	**ng/L**	**Percent Breakthrough**	
ADONA	ND	ND	ND
F-53B Major	ND	ND	ND
F-53B Minor	ND	ND	ND
Nafion Byproduct 1*	ND	ND	ND
Nafion Byproduct 2*	20 (Est.)	ND	ND
N-MeFOSAA	ND	ND	ND
N-EtFOSAA	ND	ND	ND

* Measurement is considered an estimate as there is currently no known authentic standard for measurement of this compound.

ND – Not detected

Est. – Estimated

4.0 Discussion

- The bench-scale and pilot testing is ongoing and scheduled to continue through the first quarter of 2018 until testing goals are achieved.

- The first phase of piloting of GAC media (columns 1 through 4) has been completed.
- PFASs are being observed in the pilot IX resin effluent.
  - Both columns are exhibiting effluent PFAS concentrations near or above the influent concentration for the shortest carbon chain PFASs.
  - Only PFASs with carboxylic acid functional groups have shown breakthrough.
  - Longer carbon chain PFAS molecules have yet to show any breakthrough.
  - PFAS molecules with sulfonate functional groups have yet to show any breakthrough.
  - The capacity of both ion exchange resins for adsorption of GenX has now been exhausted.
- Additional pilot columns were installed for testing of other GAC and IX adsorbents.
  - Four new GAC pilot columns have been installed and started operation on Jan. 16, 2018. The four new pilot columns will be used to evaluate two more GAC media types and the effect of increasing the empty bed contact time on PFAS removal. Results from these new columns have not yet been received.
  - Three new IX pilot columns have been installed. Column 9 was started on Jan. 16, 2018. Columns 7 and 8 were started on Jan. 17, 2018. The three new pilot columns will be used to evaluate two more IX resins and the effect of increasing the empty bed contact time on PFAS removal. Results from these new columns have not yet been received.
- The most recent testing results for compounds which have no currently known authentic standard are inconsistent with past results. This includes the testing results for most of the listed PFECAs and both Nafion byproducts. The project changed analytical labs prior to the most recent testing, which is likely a contributing factor to the observed differences. Test methods will be reviewed to clarify observed differences.
- Testing will evolve as data is received to refine short- and long-term treatment strategies.

5.0 Conclusions/Recommendations

The following conclusions and recommendations can be developed based on the interim testing results.

- Pilot testing is ongoing and should continue in order to fully characterize the performance of GAC and IX technologies for PFAS removal.

Cape Fear Public Utility Authority

Project update for the period covering December 1, 2017 through January 18, 2018

Notice:

Where an authentic standard is not available the concentrations must be considered semi-quantitative. When interpreting the molecular formulas generated by high resolution mass spectrometry, caution is advised when considering health impacts, if any, until a complete structural elucidation and appropriate health studies are performed.

Weekly sampling of raw and finished waters began November 15, 2017 and has continued through the week of January 15th, 2018. Targeted quantification of perfluoroalkyl substances (PFAS) are presented in table 1 where authentic standards are available for each of the compounds. The concentration of GenX varied in the finished water samples collected. All but one (12/21/17) were below the health advisory goal of 140 ppt. We are currently analyzing the duplicate sample that was collected and will report that analysis when it is complete. The raw water in several of the samples was elevated in concentration compared to the finished drinking water. There appeared to be a spike in the concentration of GenX in the sample collected 11/28/17 and a decrease over the following two weeks. The raw water collected 1/3/18 appears to be increasing in concentration as well.

There were also other PFAS compounds detected in both the raw and finished waters that have been reported previously. The concentrations of these non-targeted compounds should be considered semi-quantitative since no authentic standards are available. This is an important consideration given the different response factors for the unknown compounds relative to

GenX. The concentrations reported were determined using equation number 1 (EPA report to NC DEQ 2017) :

Equation 1: $$[Unknown] = [GenX] * \frac{Unknown\ peak\ area}{GenX\ peak\ area}$$

where:

[Unknown] is the concentration of non-targeted analyte in ng/L
[GenX] is the concentration of GenX in ng/L

Figures 2 through 6 compare the concentrations of the individual non-targeted compounds in the raw and finished drinking water. The compound concentrations were variable in the raw and finished waters over the time frame collected so far. Caution, however, is advised in that the raw and finished water samples may not represent the exact same water mass as it moves through the facility.

No PFAS were detected in the field and laboratory blanks illustrating no contamination took place for each sampling event. Sample processing and QA/QC procedures were followed as described in Nakyama et al. (2010)[1] and Strynar et al. (2015)[2]. Briefly, external calibration curves using authentic standards, when available, were used to quantify each analyte by LC-MS/MS. Each sample was spiked with a recovery surrogate standard; recoveries ranged from 65 to 111%.

Table 1: Concentrations of targeted PFAS compounds in raw (RW) and finished (FW) waters collected at the Sweeney Water Treatment Plant. Structures for each of the compounds can be found in the appendix. The date refers to when the sample was collected and bdl is below detection limit.

	11/15/17		11/28/17		12/6/17		12/13/17		12/21/17		12/27/17		1/3/18	
ng/L	RW1	FW2	RW3	FW4	RW4	FW5	RW5	FW7	RW6	FW9	RW7	FW11	RW8	FW13
PFMOBA	bdl	bdl	0.6	0.9	0.2	5.2	5.3	3.8	5.6	bdl	bdl	5.8	4.9	6.3
PFPrOPrA	8	41	999	52	94	83	606	17	62	253	110	66	363	137
PFOA	bdl	1	40	40	28	11	72	7	21	103	38	bdl	10	27
PFOS	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl

Figure 1: The concentration of PFPrOPrA (GenX) in raw and finished water collected at Sweeney Water Treatment Plant.

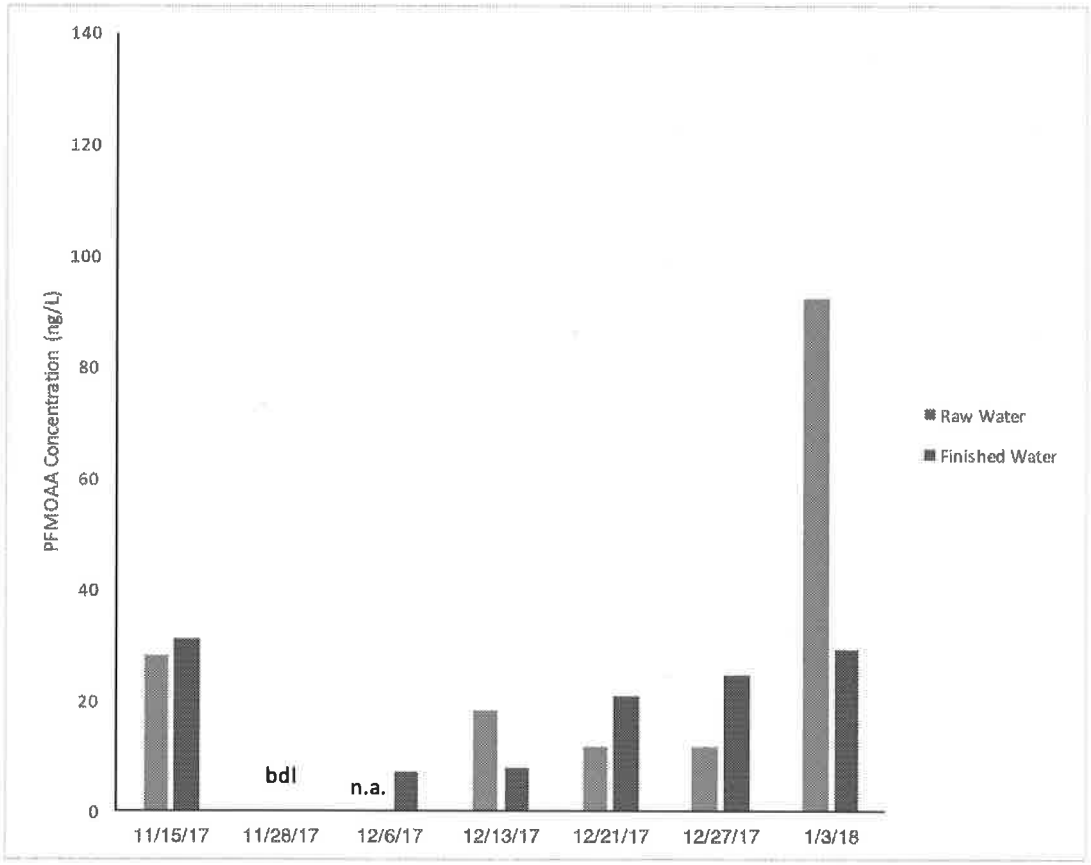


Figure 2: Semi-quantitative concentrations of other non-targeted perfluorinated compounds detected in raw and finished waters collected at Sweeney Water Treatment Plant. (bdl= below detection limit and n.a. is not analyzed)

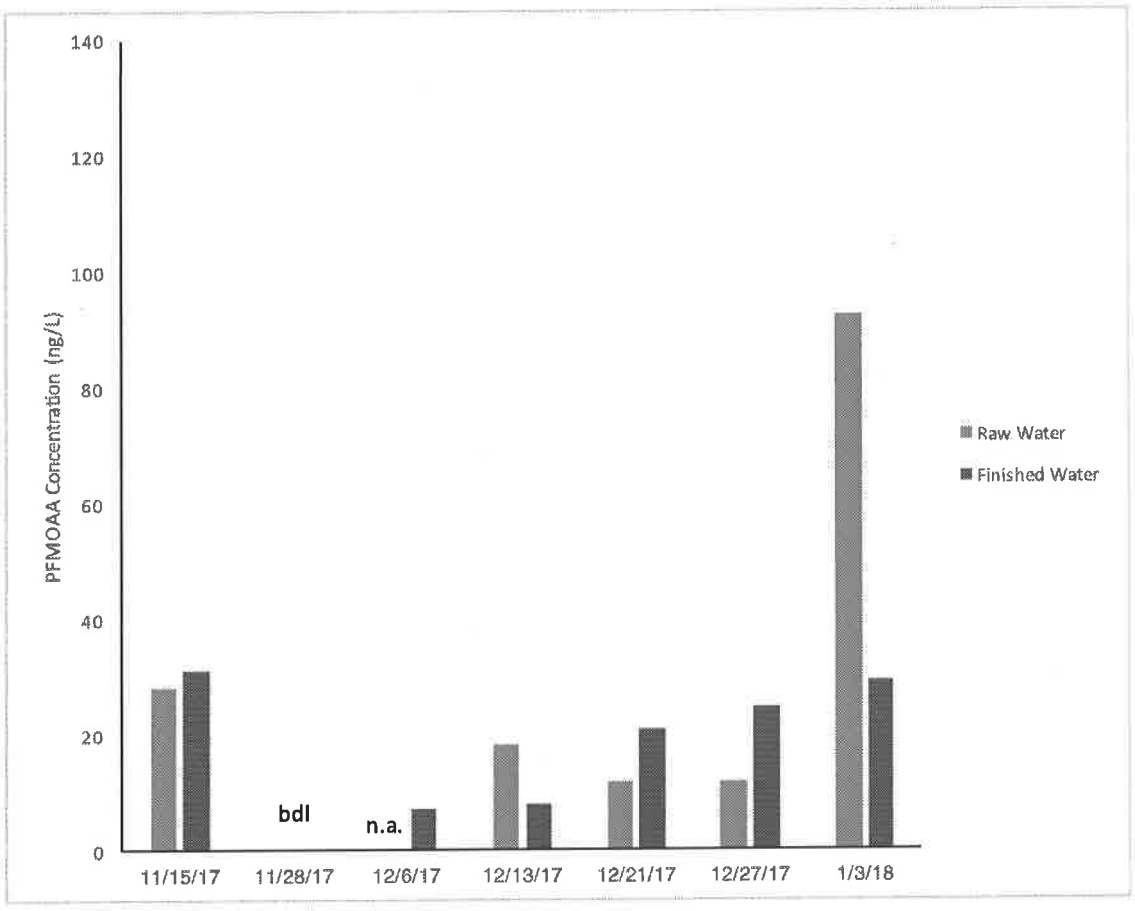


Figure 3: Semi-quantitative concentrations of other non-targeted perfluorinated compounds detected in raw and finished waters collected at Sweeney Water Treatment Plant. (bdl= below detection limit and n.a. is not analyzed)

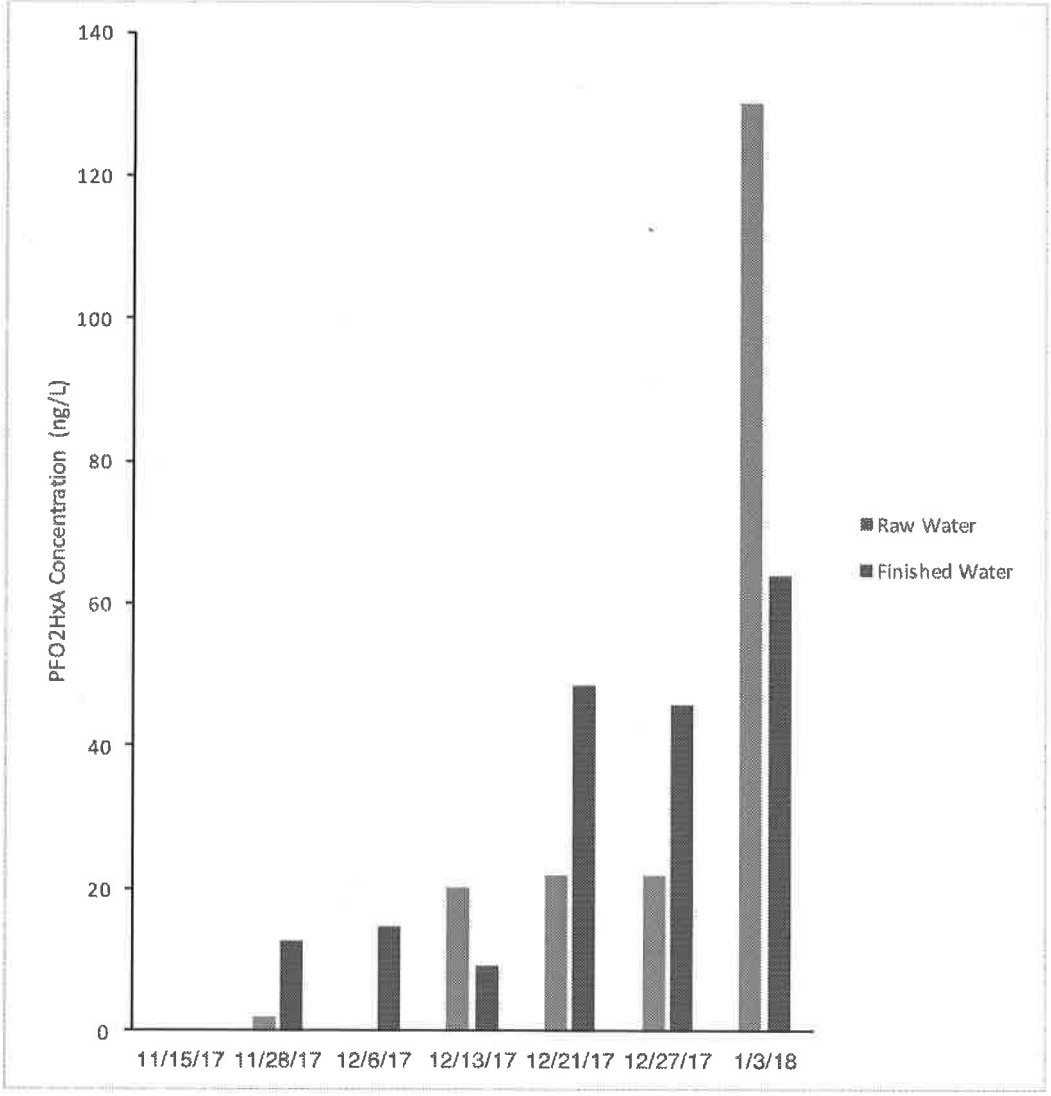


Figure 4: Semi-quantitative concentrations of other non-targeted perfluorinated compounds detected in raw and finished waters collected at Sweeney Water Treatment Plant. (bdl= below detection limit and n.a. is not analyzed)

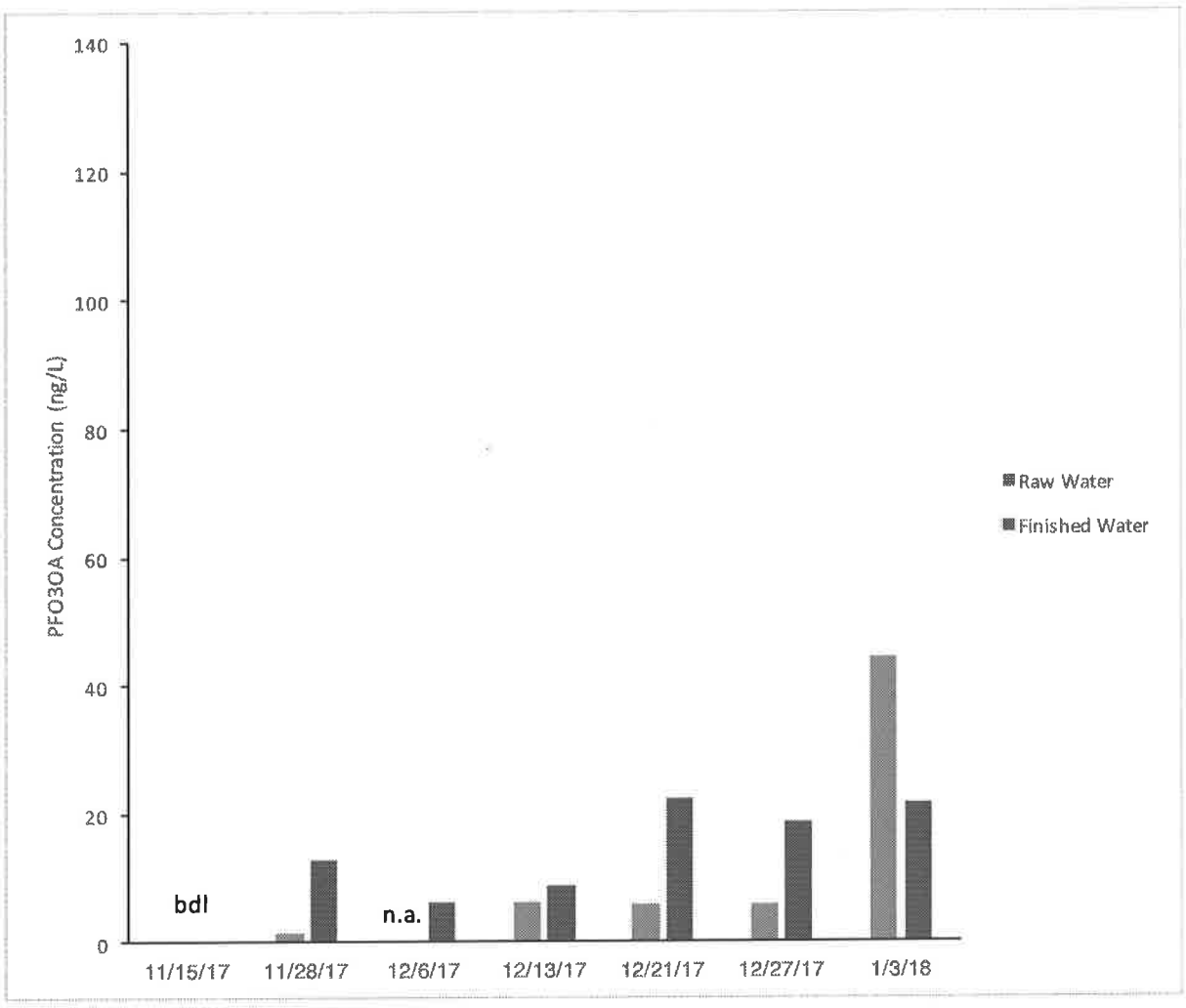


Figure 5: Semi-quantitative concentrations of other non-targeted perfluorinated compounds detected in raw and finished waters collected at Sweeney Water Treatment Plant. (n.a. is not analyzed)

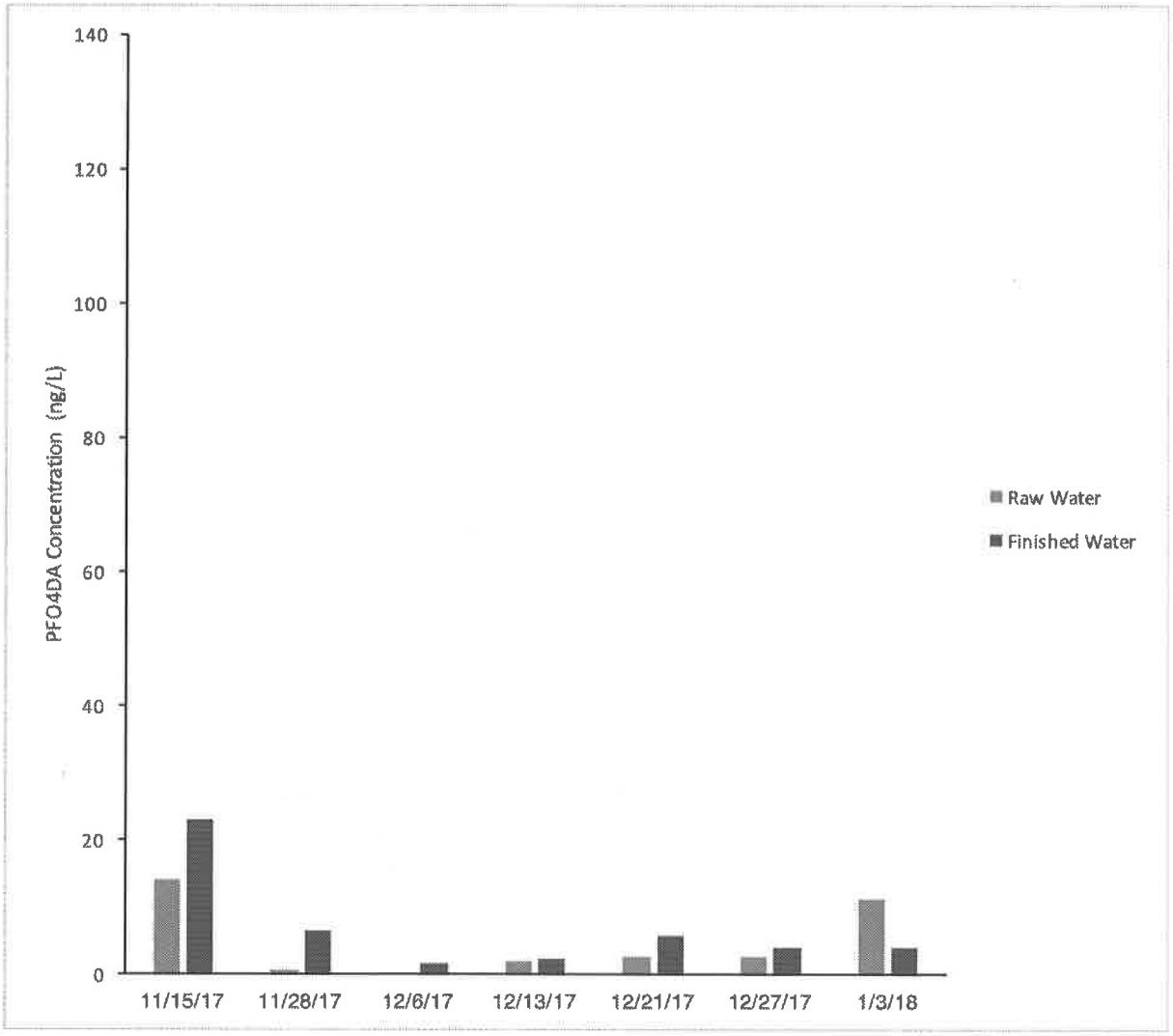
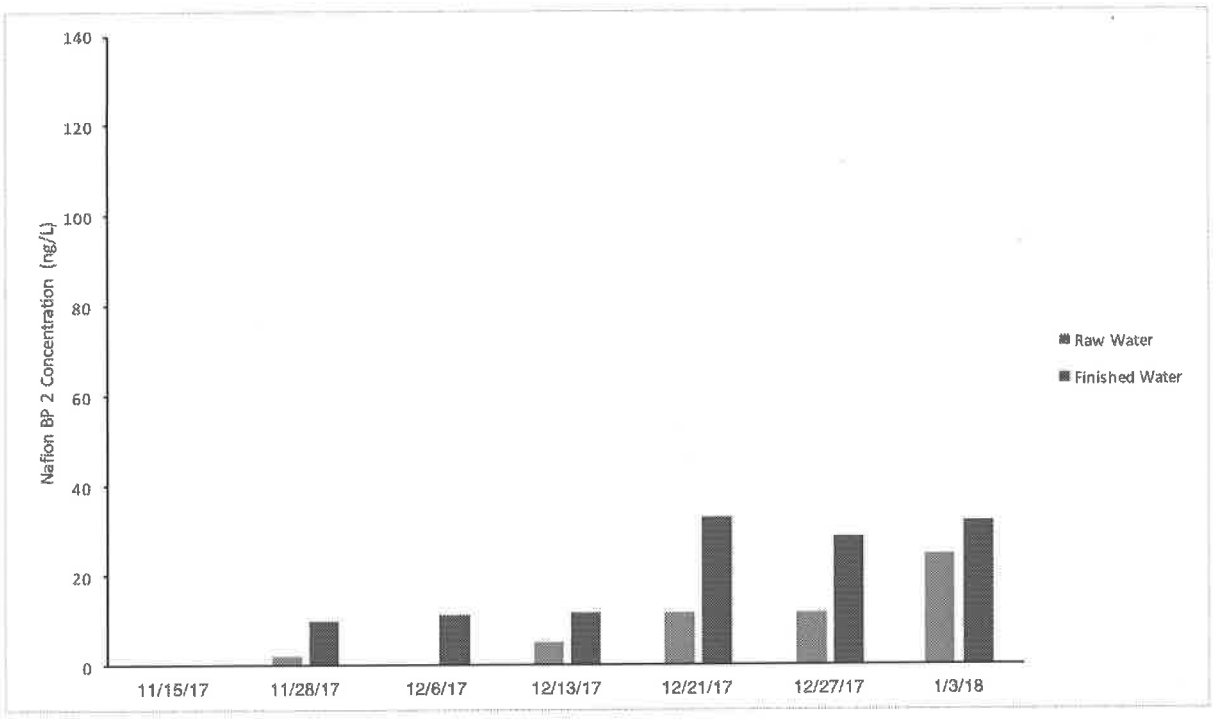
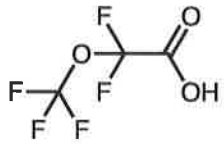


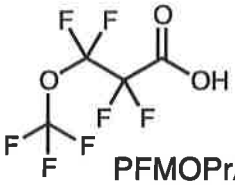
Figure 6: Semi-quantitative concentrations of other non-targeted perfluorinated compounds detected in raw and finished waters collected at Sweeney Water Treatment Plant. (bdl= below detection limit and n.a. is not analyzed)



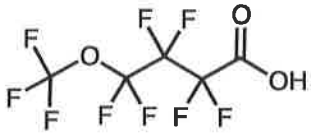
Appendix:



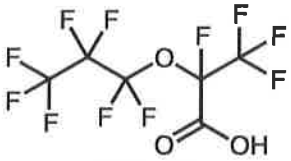
PFMOAA



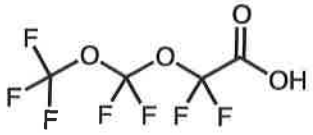
PFMOPrA



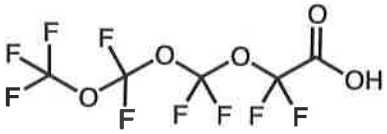
PFMOBA



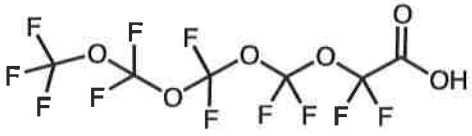
PFPrOPrA



PFO2HxA



PFO3OA



PFO4DA

Cape Fear Public Utility Authority

Project Report

1.0 Introduction:

The focus of this report is to present and describe, to date, the non-targeted screening of perfluorinated alkyl substances (PFAS) in raw and finished water collected on a weekly basis from the Sweeney Water Treatment facility. The workflow involves isolating PFAS from water samples with subsequent analysis by LC/QTOF. The chromatogram is explored for non-targeted compounds by hand as well as statistically to identify new compounds.

2.0 Methods:

Water samples are collected in HDPE containers that are pre-rinsed with methanol prior to filling. Sample processing and QA/QC procedures were followed as described in Nakyama et al. (2010)[1] and Styrnar et al. (2015)[2]. No PFAS compounds were detected in field blanks and laboratory blanks indicating that no contamination took place.

2.1 High Resolution Mass Spectrometric Analysis:

Non-targeted analysis of each sample was carried out using an Agilent 1290 LC coupled to a Bruker quadrupole time of flight high resolution mass spectrometer. An electrospray ionization source operated in the negative mode was used for all analysis. During each analysis the mass axis was calibrated using the Agilent low tune mix. Molecular formulas were generated after calibration using Bruker Data Analysis package 4.2 with general elemental composition limits of: carbon 1-60, hydrogen 0-60, fluorine 0-100, oxygen 0-15, nitrogen 0-1, sulfur 0-1 and Na 0-1. These were refined depending on several observations such as isotope patterns. One atom of Cl would be included in the formula generation if the isotope pattern of 3:1 was observed for the $[M+]^-$ and $[M+2]^-$.

3.0 Results and Discussion:

Table 1 presents the non-targeted PFAS compounds that have been reported in previous updates to CFPUA. These compounds have been detected and described elsewhere[2]. Perfluoro-2-methoxyacetic acid has been successfully synthesized; therefore, we currently have a standard for quantification and structure confirmation. This standard has been shared with Dr. Mark Strynar at EPA. We have also obtained from Dr. Strynar standards for Nafion byproducts 1 and 2. All of these authentic standards are important for accurate identification and quantification.

Additional non-targeted compounds have been detected and are presented in Table 2. These compounds are unreported to the best of our knowledge in the literature. The molecular

formula generated was used to search databases for possible matches. Compounds 1 and 2 have CAS numbers whereas compound 3 does not. It is important not to assume the structure given by the CAS number matches what was observed in the samples until further experiments are performed. Structure elucidation is ongoing and standards are being purchased, when available, to aid in identification.

To guide the non-targeted screening in raw and finished drinking water, the seven raw and seven finished waters were treated statistically to construct a volcano plot (Figure 1). The volcano plot is a type of scatter plot used to aid in the identification of changes in large data sets composed of replicate measurements. The replicates in this case are the weekly sampling of raw and finished waters. The assumptions are that the raw source waters do not change and finished water is treated consistently. The data are then plotted with the factor of change on the x-axis versus the statistical significance (probability, p) on the y-axis. A volcano plot combines the statistical t-test with the magnitude of the change enabling visual identification of points that show large magnitude changes that are statistically significant. The negative log of the p-value on the y-axis (base 10) is plotted resulting in low p values (high significance) towards the top of the plot. The x-axis is the log of the fold change of the two conditions, in this case raw and finished drinking water. By using the log fold change, data points that are in both directions appear equidistant from the center. Therefore, two regions of interest appear: those points that are found toward the top of the plot that are far to either right or left hand side (orange color-coded on the plot). These represent data points that display large magnitude fold change (i.e. left or right of center) as well as high statistical significance (towards the top of the plot).

The high resolution mass spectrometric data used to generate Figure 1 consisted of 75,466 individual time and m/z steps of which 14,025 are significant ($p<0.05$). The significance arises from differences in organic compounds detected by the LC/QTOF raw and finished waters that were analyzed exactly the same way. This post treatment of data will help guide further study of these compounds. An important consideration is that not all these significant compounds will be related to PFAS or contain a fluorine atom but post treatment allows for quickly visualizing the data and guidance.

4.0 Future Directions:

Our current analytical workup focuses on the retention of fluorinated compounds that contain an acidic functional group. We will be opening the analytical window to other organic fluorine molecules with functional groups other than acids. We will focus on using a fluorine specific solid phase extraction procedure that selectively extracts fluorine-containing organic compounds. This procedure will preconcentrate analytes prior to analysis and will be selective to organic compounds that contain at least one fluorine atom.

We will also use a reverse phase solid phase extraction procedure to isolate more non-polar organic compounds from water and analyze by GC/MS. This will allow us to investigate less polar compounds that might be present in the water and not amenable to (-) ESI source. These

additional screening methodologies are significant because they may identify additional fluorinated compounds not detected with current techniques widely used in the analysis of fluorine compounds in drinking water.

1. Nakayama, S. F.; Strynar, M. J.; Reiner, J. L.; Delinsky, A. D.; Lindstrom, A. B., *Environ. Sci. Technol.* **2010,** *44*, 4103.
2. Strynar, M.; Dagnino, S.; McMahen, R.; Liang, S.; Lindstrom, A.; Andersen, E.; McMillan, L.; Thurman, M.; Ferrer, I.; Ball, C., Identification of Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs) in Natural Waters Using Accurate Mass Time-of-Flight Mass Spectrometry (TOFMS). *Environmental Science & Technology* **2015,** *49* (19), 11622-11630.

Table 1: Non-targeted compounds detected in raw and finished water collected to date. We have recently obtained authentic standards for CAS numbers 674-13-5,29311-67-9 and 749836-20-2. There is not an authentic standard for the remaining compounds.

Compound	Molecular Formula	M	[M-H]- m/z	CAS Number	Reference
Ether compounds					
perfluoro-2-methoxyacetic acid	C3HF5O3	179.9845	178.9767	674-13-5	Strynar et al., 2015;Sun et al. 2016
perfluoro(3,5-dioxahexanoic)acid	C4HF7O4	245.9762	244.9684	39492-88-1	Strynar et al., 2015;Sun et al. 2016
perfluoro(3,5,7-trioctanoic)acid	C5HF9O5	311.9679	310.9601	39492-89-2	Strynar et al., 2015;Sun et al. 2016
perfluoro(3,5,7,9-tetradecanoic)acid	C6HF11O6	377.9596	376.9518	39492-90-5	Strynar et al., 2015;Sun et al. 2016
Perfluorosulfonic acids					
PFESA Byproduct I	C7HF13O5S	443.9337	442.9264	29311-67-9	Strynar et al., 2015
PFESA Byproduct II	C7H2F14O5S	463.9399	462.9326	749836-20-2	Strynar et al., 2015

Table 2: Non-targeted compounds detected in raw and finished water collected to date. The formula and associated error is for the deprotonated species. Until the structure is elucidated these are considered tentative.

Compound Number	[M-H]- m/z	Formula	err [ppm]	err [mDa]	Example CAS Number	Commercial Vendor
1	362.96972	C 7 F 13 O 2	-0.3	-0.1	15899-29-3	Yes
2	506.95306	C 10 F 17 O 4	0.1	0.9	87944-97-6	No
3	698.91672	C 13 H 3 Cl F 19 O 9	0.1	0.05		

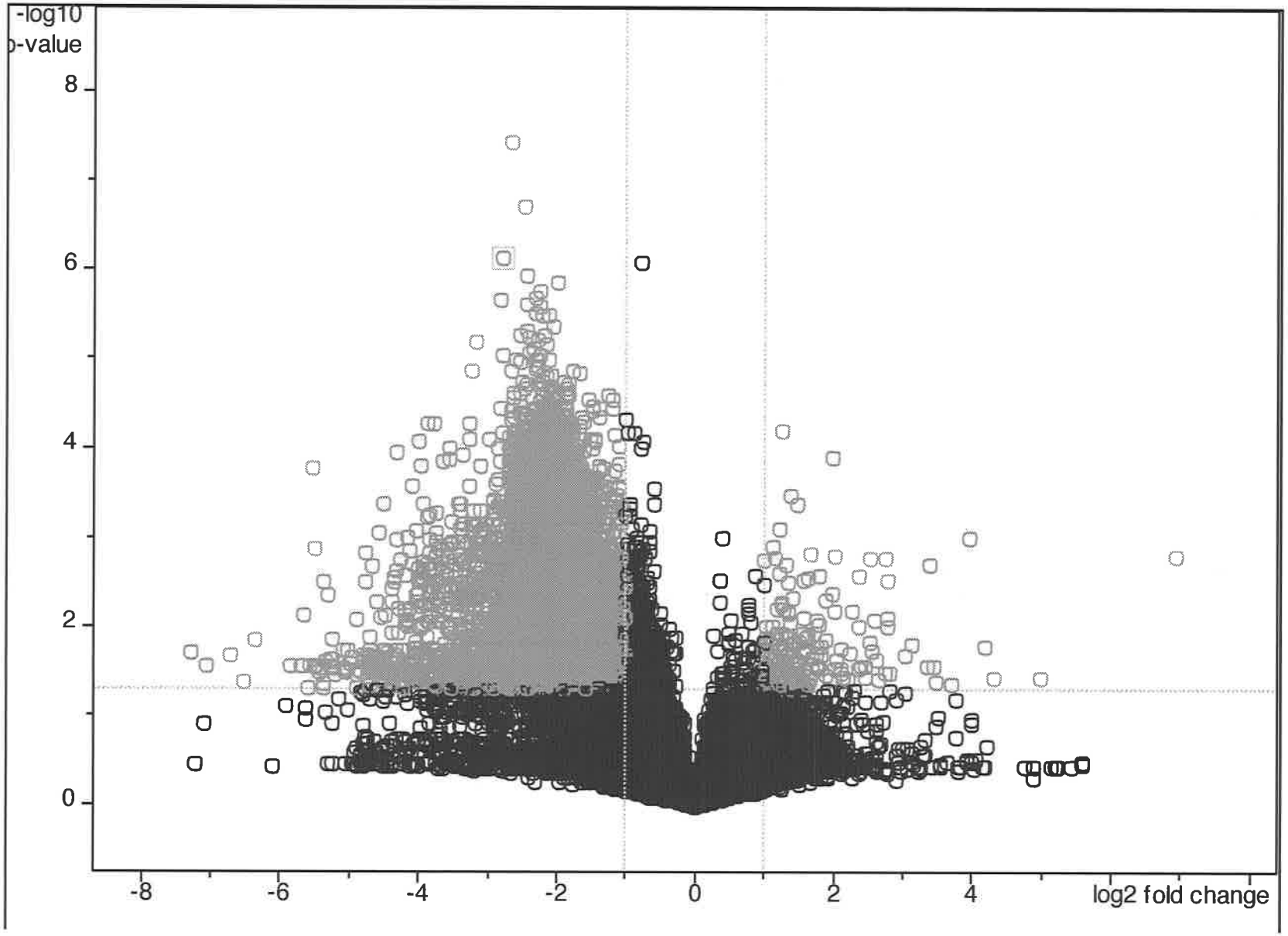
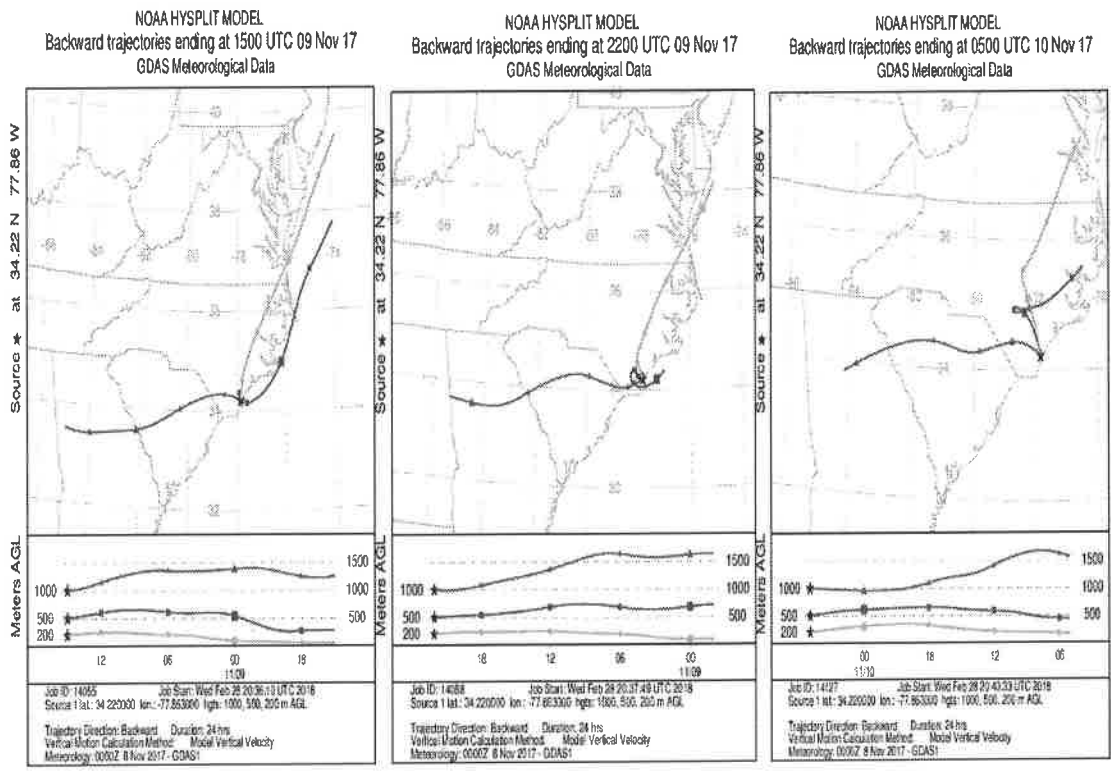
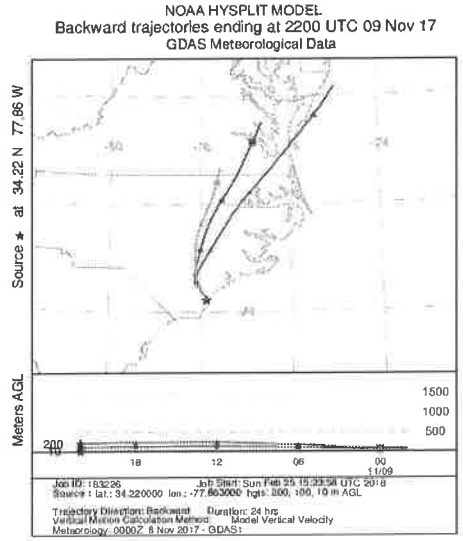


Figure 1: LC/QTOF data from seven raw and seven finished waters presented in a volcano plot. The higher the points on the y-axis the more significant the difference between the samples.



E1775 Storm November 9, 2017. NOAA HYSPLIT 24 hour air mass back trajectories for the beginning, middle and end of the rain event. Heights are 200m (green), 500m (blue) and 1000m (red) above ground level. Times are Coordinated Universal Time (UTC) which is equivalent to GMT, currently 5 hours ahead of Wilmington, NC.

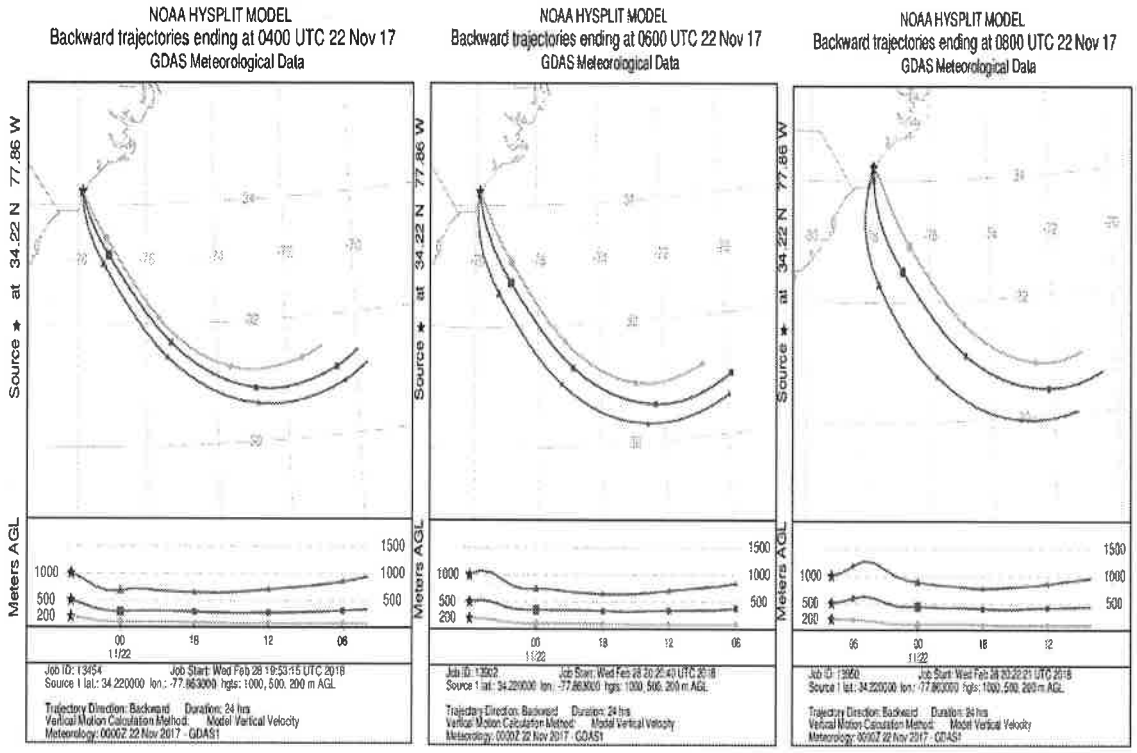
Rain Event 1775 had 24 ppt GenX (24 ng/L). UNCW received 0.78 inches of rain. The pH was 5.24.



Low level air mass back trajectories for the middle of rain event E 1775. Heights are 10m (green), 100m (blue) and 200m (red) above ground level.

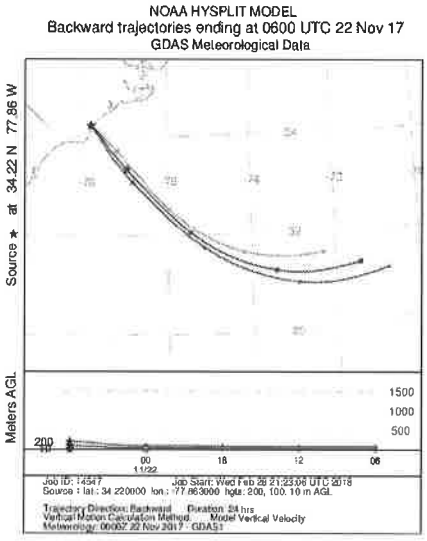
Joan D. Willey, Robert J. Kieber, Ralph N. Mead, G. Brooks Avery and Stephen A. Skrabal, Department of Chemistry and Biochemistry, University of North Carolina Wilmington

Draxler, R.R., Rolph, G.D., 2013. HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website. NOAA Air Resources Laboratory, College Park, MD. https://ready.arl.noaa.gov/HYSPLIT_traj.php



E1778 Marine Storm November 21 - 22, 2017. NOAA HYSPLIT 24 hour air mass back trajectories for the beginning, middle and end of the rain event. Heights are 200m (green), 500m (blue) and 1000m (red) above ground level. Times are Coordinated Universal Time (UTC) which is equivalent to GMT, currently 5 hours ahead of Wilmington, NC.

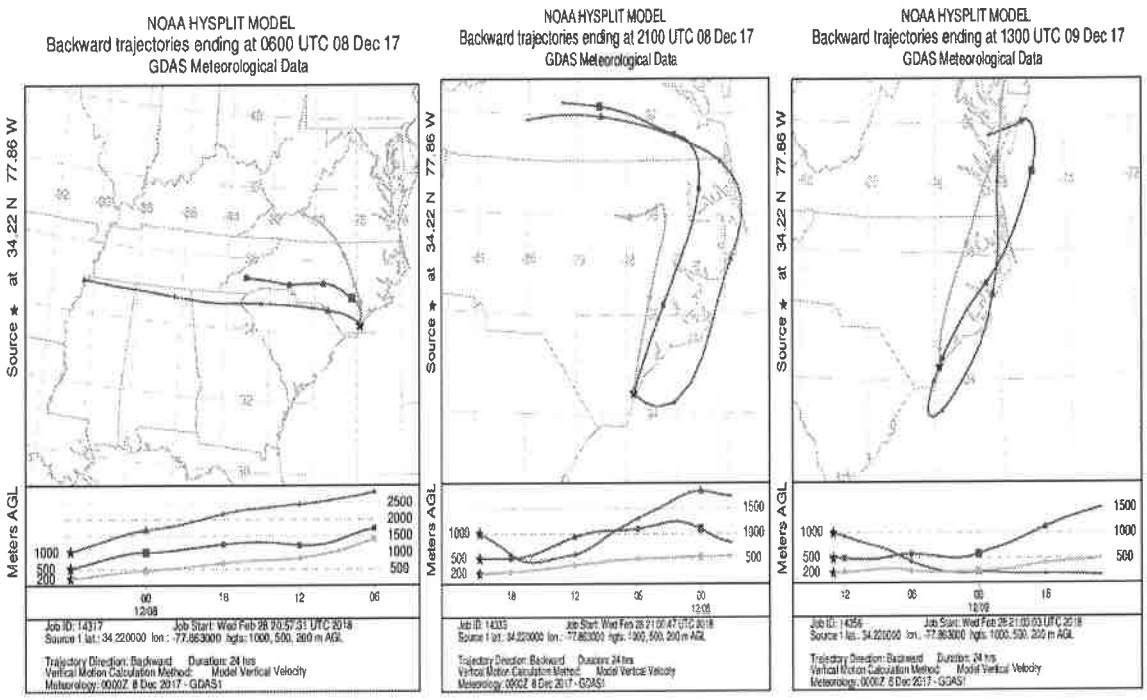
Rain Event 1778 had none detectable GenX (< 3 ppt, less than 3 ng/L). UNCW received 0.26 inches of rain. The pH was not analyzed.



Low level air mass back trajectories for the middle time of rain event E1778. Heights are 10m (green), 100m (blue) and 200m (red) above ground level.

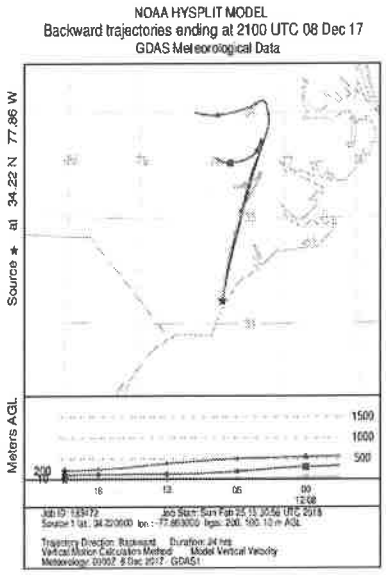
Joan D. Willey, Robert J. Kieber, Ralph N. Mead, G. Brooks Avery and Stephen A. Skrabal, Department of Chemistry and Biochemistry, University of North Carolina Wilmington

Draxler, R.R., Rolph, G.D., 2013. HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website. NOAA Air Resources Laboratory, College Park, MD. https://ready.arl.noaa.gov/HYSPLIT_traj.php



E1781 Storm December 8 – 9, 2017. NOAA HYSPLIT 24 hour air mass back trajectories for the beginning, middle and end of the rain event. Heights are 200m (green), 500m (blue) and 1000m (red) above ground level. Times are Coordinated Universal Time (UTC) which is equivalent to GMT, currently 5 hours ahead of Wilmington, NC.

Rain Event 1781 had > 500 ppt GenX (greater than 500 ng/L). This concentration was above the highest standard in the calibration curve used on the day of analysis. UNCW received 1.80 inches of rain. The pH was 4.68.



Low level air mass back trajectories for the middle time of rain event E1781. Heights are 10m (green), 100m (blue) and 200m (red) above ground level.

Joan D. Willey, Robert J. Kieber, Ralph N. Mead, G. Brooks Avery and Stephen A. Skrabal, Department of Chemistry and Biochemistry, University of North Carolina Wilmington

Draxler, R.R., Rolph, G.D., 2013. HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website. NOAA Air Resources Laboratory, College Park, MD. https://ready.arl.noaa.gov/HYSPLIT_traj.php

Report from The University of North Carolina at Wilmington Regarding the Implementation of Section 20.(a)(2) of House Bill 56 (S.L. 2017-209)

Attachment 8

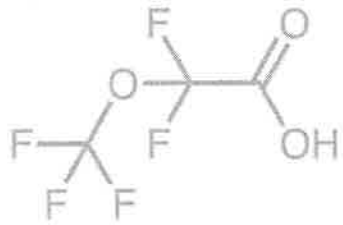
Work conducted by UNCW included the following personnel:

Water and Sediments (Objectives 1-3 and additional products)	Oysters (Objective 4)
Drs. Ralph N. Mead, G. Brooks Avery, Robert J. Kieber, Megumi Shimizu, Stephen A. Skrabal	Drs. Aswani Volety, Andrea Bourdelais, and Ai Ning Loh

Objective 1: Quantification and identification of perfluorinated alkyl substances (PFAS) in raw and finished drinking water collected at the Sweeney Water Treatment Plant

- Status:
  - Weekly sampling of raw and finished drinking water from Sweeney Water Treatment Facility since November 2017

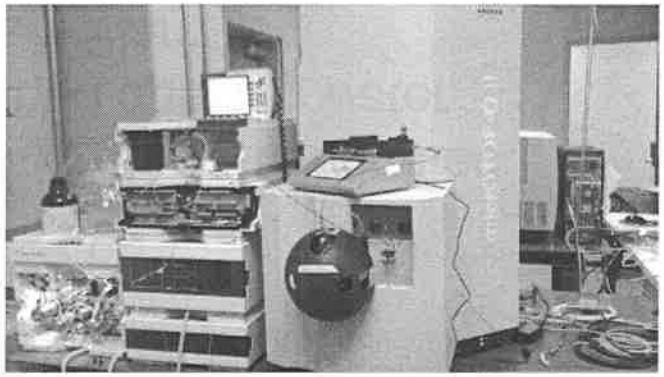
- To date, characterization and structural elucidation of potentially new PFAS compounds is on-going.



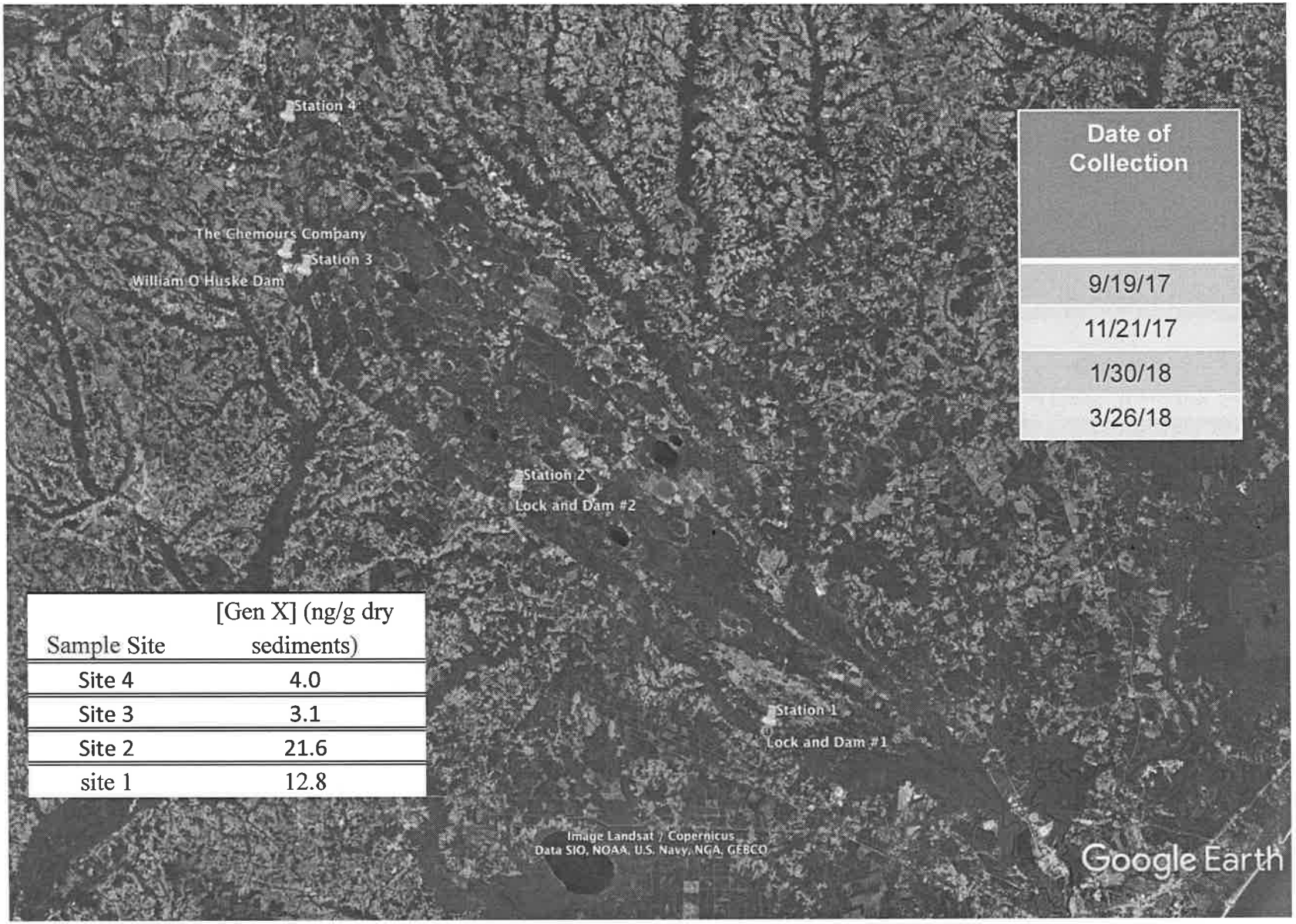
- We positively identified PFMOAA (CAS# 674-13-5) through custom synthesis of an authentic standard. The standard has been shared with EPA.

Objective 2: Develop a method to quantify GenX in sediments collected along the Cape Fear River

- Status:
  - Method has been developed (surrogate recoveries average 110% n= 18)
  - Several sampling trips along upper and lower Cape Fear River have been conducted. Sediment and overlying water has been collected each trip



Middle Cape Fear River



Date of Collection
9/19/17
11/21/17
1/30/18
3/26/18

Sample Site	[Gen X] (ng/g dry sediments)
Site 4	4.0
Site 3	3.1
Site 2	21.6
site 1	12.8

Lower Cape Fear River



Significance of Preliminary Sediment Results

- GenX (CAS # 1325-13-6) detected in all sediments analyzed to date
- This data along with additional measurements will be used to determine any trends or controlling factors on the distribution of GenX in sediments

Objective 3: Conduct GenX Biodegradation Studies in Sediments

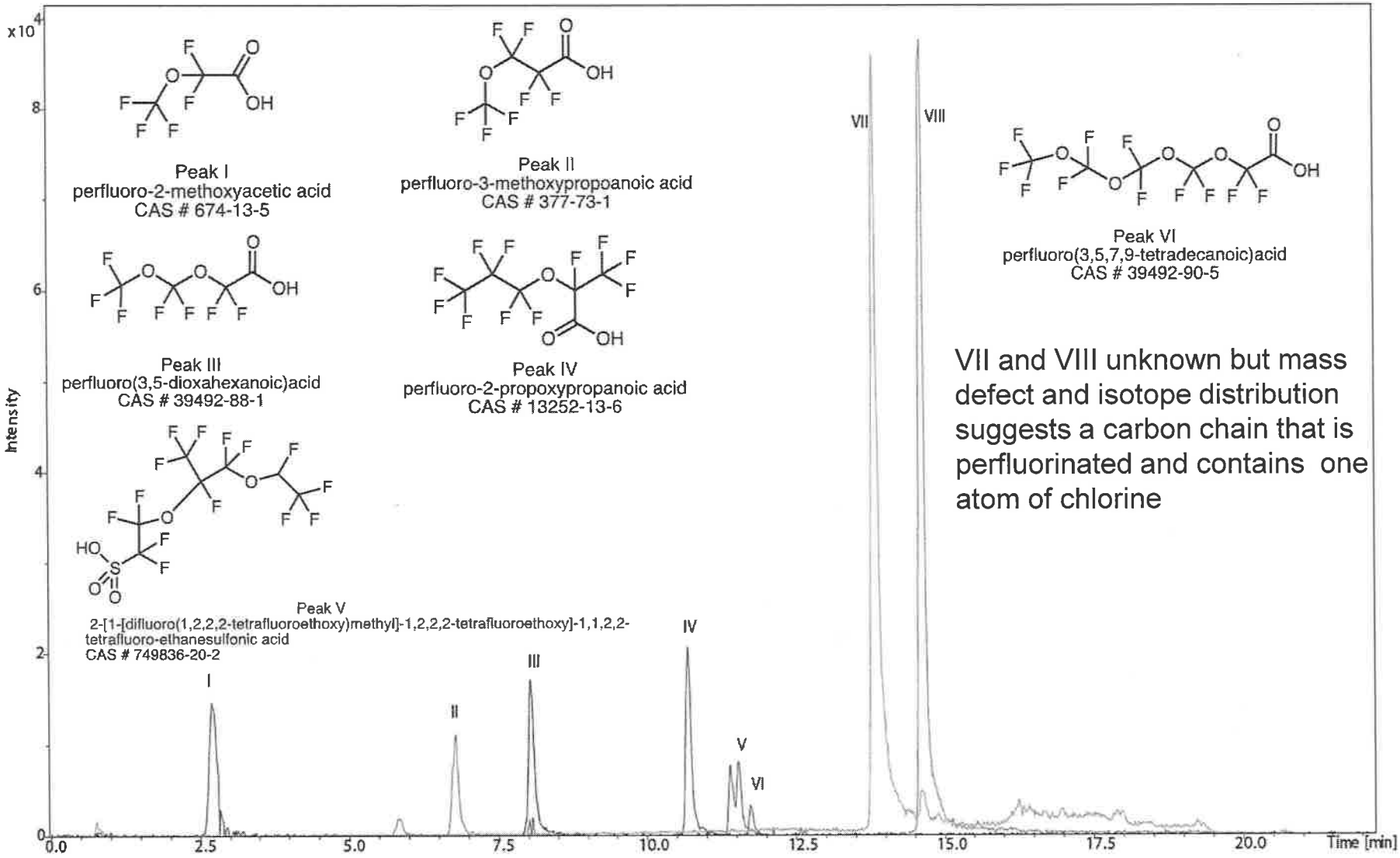
- Status:
  - Long term incubation (1 year) will begin in May 2018
  - Sediment data are being used to select sediments used in biodegradation experiment (creek)

Other Products

UNCW

Can we identify other perfluorinated substances in sediments in addition to GenX (CAS # 1325-13-6) ?

Sedimentary Occurrence of PFAS
M61 Extracted Ion Chromatogram from LC/QTOF



What non-point sources may supply GenX after the pipe is shut off?

GenX in Rainwater Collected at UNCW Site

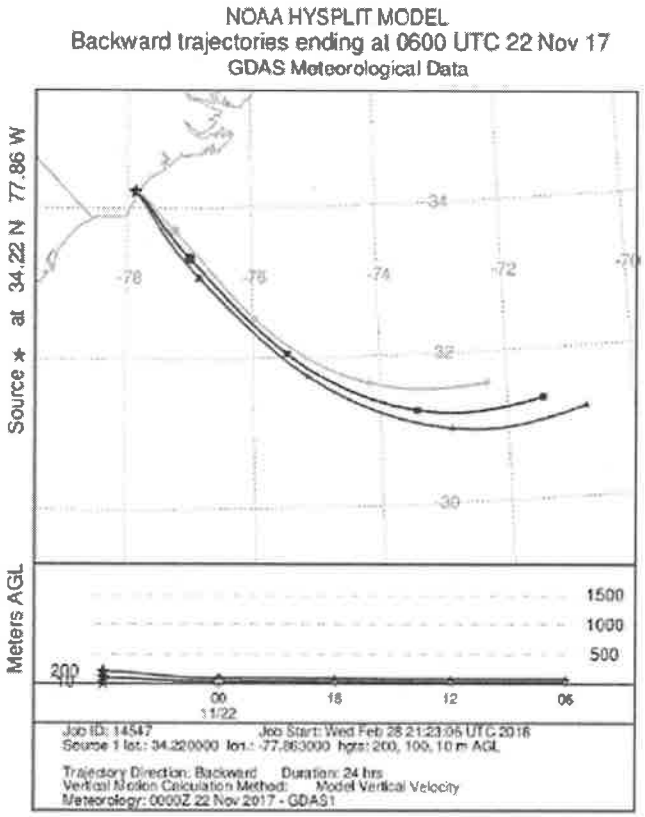
Rainwater:

- Our group has been conducting National Science Foundation-funded rainwater research for over two decades resulting in one of the most comprehensive long-term data sets in the world.

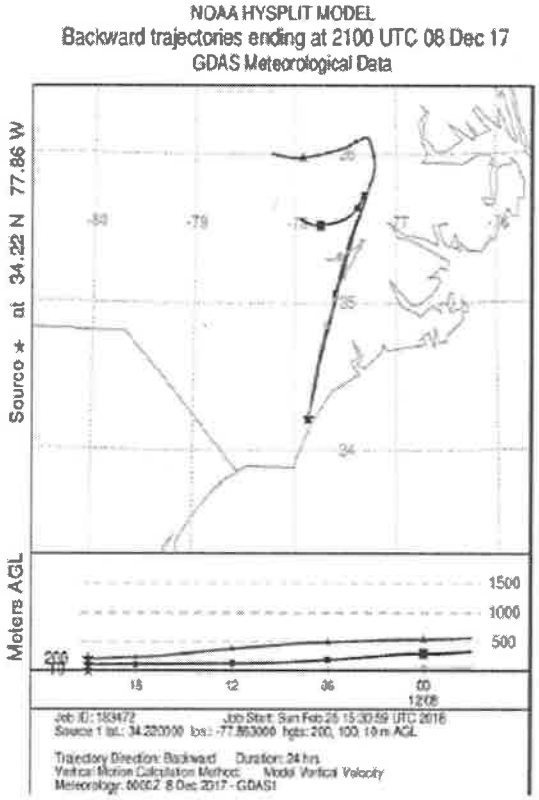
- Using our rain collection facilities we collected and analyzed rain samples for GenX.

- Based on these results we informed NCDAQ that GenX was indeed present in some rain samples leading to their current rainwater study of atmospheric transport of this compound.

How does wind direction impact GenX (CAS # 1325-13-6) concentration?



E 1775
11/21-22/17
GenX <3 ppt (ng/L)
0.26 inches received at UNCW site
pH not analyzed



E 1781
12/8-9/17
GenX >500 ppt (ng/L)
1.8 inches received at UNCW site
pH4.68

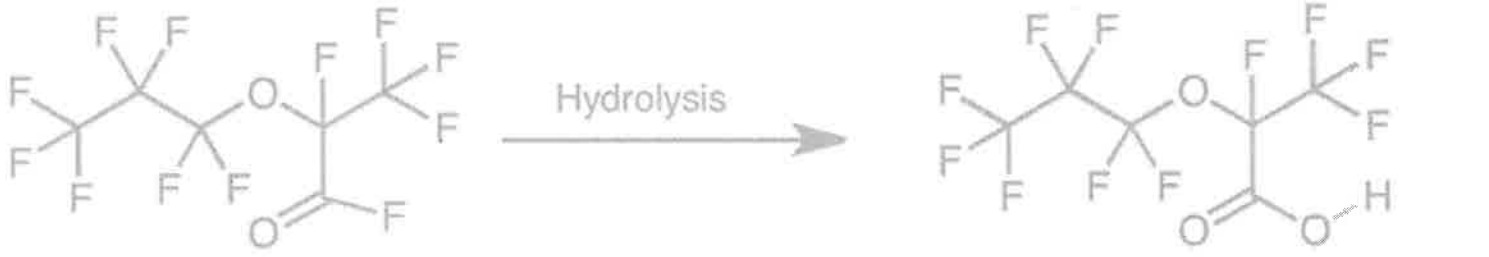
So what is the take home message from these two back trajectories?

- Long range atmospheric transport of GenX (other PFAS?) is possible based upon our data.
- For example: GenX is present in locations that are not near Chemours plant
- Concentration of Genx (other PFAS?) at specific locations are impacted by origin of the air mass (Air mass back trajectories)

How does GenX get into rain?

- Evidence suggests the air emission of a precursor is responsible for GenX in rain

Hydrolysis Reaction



hexafluoropropylene dimer acid fluoride
(CAS 2062-98-8)

perfluoro-2-propoxypropanoic acid
(CAS 13252-13-6)

Experiments performed in our laboratory showed the hydration (adding water) to the corresponding carboxylic acid known as GenX (CAS 13252-13-6) occurs in less than 10 minutes. The latter compound is what is detected in drinking water and other matrices.

The take home message from this experiment is that the dimer acid fluoride emitted into the atmosphere can rapidly turn into GenX when it encounters water (i.e. rain) and be transported potentially long distances from where it was emitted

Biosolids

Biosolids: (organic matter recycled from sewage, used in agriculute) After discussions with CFPUA about the biosolid collection from the water treatment process we offered to analyze this material for GenX. Although our sediment methodology was still in the development phase, we were able to conclude that GenX was present in biosolids from CFPUA. This resulted in the current measurements and study of GenX in biosolids being conducted by private laboratories by CFPUA.

Statewide Emerging Contaminant Symposium

Our group organized and hosted a symposium on December 10, 2017 that included all major groups working on GenX studies within the state. This included university researchers (e.g., UNCW, NCSU, Duke, ECU), state agencies (e.g., DEQ and DAQ), water treatment facility representatives from CFPUA and Brunswick County, and non-profits (e.g., NC River Watch, Southern Environmental Law Center, NC Coastal Federation). Presentations updated all parties involved on the state of the GenX issue as well as the research challenges relevant to addressing this state-wide problem. Collaborations were established between the variety of groups and organizations to leverage current resources to answer important questions related to GenX.

Summary of Findings, Objective 4:

An initial study of the effects of exposure to GenX on the growth, survival, and filtration rates of juvenile oysters suggests that very high concentrations may decrease filtration and increase mortality rates, yet there was little bioaccumulation of GenX in oyster tissues.

Effects on Juvenile Oysters of Exposure to GenX

- Juvenile oysters were obtained from UNCW's Shellfish Hatchery
- Three groups were exposed to GenX (1, 10, and 100 ppb), three times per week for four weeks; there also was a control group
- Mortality rates were low (1 to 2 per group) with the exception of the 100 ppb treatment group, where mortality was 25%
- Decreased filtration rates also were documented primarily in the 100 ppb treatment group
- There was limited bioaccumulation of GenX in oyster tissues

Ongoing and Future Oyster Work:

- Bioaccumulation studies using adult oysters and lower maximum exposures to GenX are underway
- Collection of wild oysters from the Cape Fear River at various locations for tissue concentration analyses
- Analysis of how quickly oysters rid themselves of GenX

QUESTIONS?

THANK YOU!

Attachment 9

Report to the Environmental Review Commission from The University of North Carolina at Wilmington Regarding the Implementation of Section 20.(a)(2) of House Bill 56 (S.L. 2017-209)

Executive Summary

The following report contains detailed scientific information regarding the work conducted, completed, still in progress, or planned by various researchers and organizational units at UNCW. It is organized based on the four primary objectives, similar to the organization of the scope of work document and the interim report previously provided. Highlights of findings to date and initial conclusions under each objective include the following:

--Objective 1: Based on weekly collection and non-targeted screening through mass spectrometry of raw and finished drinking water at the Sweeney Water Treatment Facility operated by the Cape Fear Public Utility Authority (CFPUA), several new PFAS compounds, not previously reported in the scientific literature, have been tentatively identified.
--Objective 2: Analyses of sediment samples collected from multiple locations indicate that: 1) GenX is present, with significant variability between sites; 2) both point and non-point sources are likely contributors; and 3) sediments appear to be acting as a repository of GenX that may be released into the overlying water column.
--Objective 3: Studies of biodegradation of GenX in sediments will require longer-term incubation experiments, including attention to seasonal and spatial effects.
--Objective 4: An initial study of the effects of exposure to GenX on the growth, survival, and filtration rates of juvenile oysters suggests that very high concentrations may decrease filtration and increase mortality rates, yet there was little bioaccumulation of GenX in oyster tissues.

Going beyond the objectives specifically outlined in HB56, UNCW researchers also:

1) analyzed sediment samples for compounds other than GenX and detected an additional seven PFAS compounds;
2) collected and analyzed several rain samples in which the presence of GenX was confirmed, possibly as the result of emission of a precursor compound (hexafluoropropylene dimer acid fluoride) and subsequent hydration;
3) documented the presence of GenX in biosolids from the CFPUA water treatment process; and
4) organized and hosted a symposium that included the major groups from across North Carolina working on GenX studies, leading to continuing collaborations.

UNCW remains appreciative of the opportunity to provide its expertise in service to the state in regard to these important issues.

Objective 1: Quantification and identification of perfluorinated alkyl substances (PFAS) in raw and finished drinking water collected at the Sweeney Water Treatment Plant

Personnel Involved: Four senior faculty, one post-doctoral associate, one graduate student, and two undergraduate students.

Status: Scientists in the Department of Chemistry and Biochemistry at University of North Carolina Wilmington have been collecting weekly raw and finished drinking water since November 2017 from the Sweeney Water Treatment Facility operated by the Cape Fear Public Utility Authority (CFPUA). Water samples are processed and analyzed using non-targeted screening methods which rely on data generated by liquid chromatography/high resolution mass spectrometry. To date, we have identified several new PFAS in both raw and finished drinking waters that have not been reported in the scientific literature. The exact structure of these compounds is still being determined and requires obtaining standards of the pure materials, when available, to aid in identification. One compound (PFMOAA, structure I) has been positively identified through the custom synthesis of a standard. Structure elucidation of the remaining PFAS and any newly identified compounds will be carried out using multidimensional mass spectrometry to aid in identification.

Objective 2: Develop a method to quantify GenX in sediments collected along the Cape Fear River

Personnel involved: Four senior faculty (same personnel as Objective 1), one post-doctoral associate, two graduate students, and two undergraduate students.

Status: Four sets of sediment samples have been collected at approximately equal spatial intervals at four locations from north of Fayetteville just above the Chemours facility, just south of the Chemours facility with additional sites near Lock and Dam #1 (Table 1 and Figure 1). Sediment samples have also been collected on two estuarine transects using a grab sampler on the RV *Cape Fear* at seven locations within the estuary beginning at the seawater end member and moving upstream to the freshwater end north of the Port of Wilmington (Fig. 2). Additional transects will be collected during different seasons to evaluate how concentrations of GenX may change over time in river sediments. This portion of the research will continue through June 30, 2019.

The first phase of Objective 2 relates to the development of a method for the extraction of GenX from sediments with a timeline of 4 months beginning in December. This was required because no standard technique exists for determination of GenX in sediments. This phase of the project is now complete. The procedure we have developed is outlined below. The quality assurance protocol as indicated by percent recovery of the surrogate (a compound referred to as M8PFOA) can be found in Table 2. The average percent recovery among these 17 sediment samples was 110% indicating that our procedure is effectively recovering GenX from sediments of the Cape Fear River system. Procedural blanks as well as field blanks are routinely analyzed along with sediment samples.

Sediment samples were oven dried (40°C), gently disaggregated, and passed through a polyethylene/nylon sieve to obtain the <500 μm size fraction. The weight percent coarse (>500 μm) and fine (<500 μm) material were then recorded. Approximately 5 grams of dried sediment (exact weight recorded) was placed in high-density polyethylene tube for extraction. The surrogate (M8PFOA) was then added and allowed to incubate overnight. The following day 10 mL of methanol were added to the sample and shaken for 10 min followed by 30 minutes of sonication with periodic cooling of the sample. This process was repeated 3 times with fresh solvent. Extracts were filtered through 0.2 μm syringe filters, combined in a high-density polyethylene tube, and reduced in volume under a gentle stream of nitrogen to approximately 1 mL. GenX in the sediment extracts was quantified using an Agilent 1290 UHPLC/Bruker AmaZon SL ion trap LC mass spectrometer housed in the UNCW Department of Chemistry and Biochemistry.

Sediment concentrations of GenX can be found in Table 3. These are the first GenX concentrations ever reported for sediments. ***Note that the concentrations for sediment presented in this report are in units of ng/g (nanograms per gram, or parts per billion by weight) and cannot be directly compared to the health advisory goal set for GenX in drinking water of ng/L (nanograms per liter, or parts per trillion by volume).***

Data presented in Table 3 are important because they indicate that GenX is a ubiquitous component of the sediments sampled to date and that there is significant variability between sites. Sources likely include both point and non-point sources (possibly atmospheric deposition). The highest GenX concentration (21.6 ng/g dry sediments) was observed at site 2 near Lock and Dam #2 on the Cape Fear River (Fig. 1). The lowest concentration was observed at site 3 near the outfall of the Chemours facility. Significant concentrations (4.0 ng/g) were also observed above the Chemours outfall (site 4) and in the lower Cape Fear River (14.1 ng/g) near the port of Wilmington. It should be noted that sediments collected at a location on the river often reflect sediments deposited upstream that are then transported downstream. Also, the makeup of the sediments (e.g. sandy versus organic-rich) often control the level to which PFAS are attracted to and ultimately become associated with the sediments. As the research progresses, more information will become available to shed light on the transport and fate of this compound in the Cape Fear River and estuary.

An initial conclusion from this study is that sediments are acting as a repository of GenX that may be released into the overlying water column, potentially impacting sensitive estuarine ecosystems as well as drinking water utilities, even if it is no longer being released into the environment.

Objective 3: Conduct GenX biodegradation studies in sediments

Personnel Involved: Four senior faculty (same personnel as Objective 1), one post-doctoral associate (same personnel as Objective 1), one graduate student, and one undergraduate student.

Status: The third goal of HB 56 relates to the biodegradation of GenX in sediments. Often microbial communities present in sediments and exposed to specific substances are able to alter these substances. We will begin long-term (1 year) incubation experiments beginning May 2018 with sediments exposed to GenX to monitor potential loss of the compound over time. Selected

sediments will be incubated in the dark at ambient temperature for a period of several months. Aliquots will be removed at predetermined intervals and the concentration of GenX determined as a function of incubation time. An analogous series of biodegradation experiments will be carried out with spiked GenX samples in order to evaluate concentration effects. Depending on results, additional studies may be carried out to determine seasonal and spatial effects on the loss of ambient levels of GenX or loss of GenX spiked into the sediments.

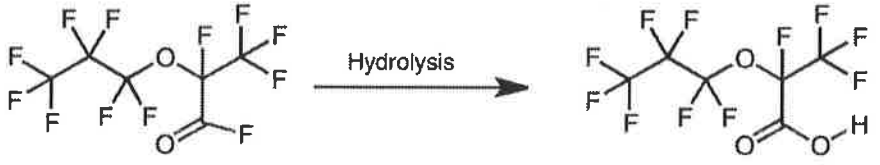
Additional Products:

Although our group's scope of work only focuses on GenX in sediments of the Cape Fear River, we have also performed other tasks of importance to the citizens of North Carolina regarding this unregulated compound.

Sediment: The focus of HB 56 is on GenX, however the sedimentary extraction and analysis by LC/QTOF provides high resolution mass spectrometric data that can be used for non-targeted exploration. Other than GenX (compound IV) in the sediments, there are an additional seven PFAS compounds that have been detected (Fig. 3 and 4). To the best of our knowledge this is the first reported occurrence of these compounds in sediments. Compounds I-III and V-VI have been previously reported in the Cape Fear River water column and drinking water. The structures of these compounds are shown in Fig. 4. Peaks VII and VIII have not been reported in the literature. The measured accurate masses of peak VII and peak VIII are 532.92270 u and 698.91672 u, respectively. Based upon the mass deficiency and isotopic pattern, both compounds appear to be perfluorinated and contain one atom of chlorine. Structure elucidation is ongoing and involves multidimensional mass spectrometry experiments.

Rainwater: Our group has been conducting National Science Foundation-funded rainwater research for over two decades resulting in one of the most comprehensive long-term data sets in the world. Using our rain collection facilities we collected and analyzed several rain samples for GenX. Based on these results we informed NCDAQ that GenX was indeed present in some rain samples leading to their current rainwater study of atmospheric transport of this compound.

The chemical characteristics of GenX do not indicate that it should be transported from water to the atmosphere. Barring direct physical injection of GenX in an aqueous aerosol, it was possible the GenX we detected in rainwater was from a precursor compound being emitted into the atmosphere. Based upon the scientific literature, the precursor identified is the hexafluoropropylene dimer acid acid fluoride (CAS 2062-98-8). Experiments performed in our laboratory showed the hydration (equation 1) to the corresponding carboxylic acid known as GenX (CAS 13252-13-6) occurs in less than 10 minutes. The latter compound is what is detected in drinking water and other matrices.



hexaflouropropylene dimer acid fluoride
(CAS 2062-98-8)

perfluoro-2-propoxypropanoic acid
(CAS 13252-13-6)

Equation 1

Biosolids: After discussions with CFPUA about the biosolid collection from the water treatment process we offered to analyze this material for GenX. Although our sediment methodology was still in the development phase, we were able to conclude that GenX was present in biosolids from CFPUA. This resulted in the current measurements and study of GenX in biosolids being conducted by private laboratories by CFPUA.

Statewide GenX symposium: Our group organized and hosted a symposium on December 10, 2017 that included the major groups working on GenX studies within the state. This included university researchers (e.g., UNCW, NCSU, Duke, ECU), state agencies (e.g., DEQ and DAQ), water treatment facility representatives from CFPUA and Brunswick County, and non-profits (e.g., NC River Watch, Southern Environmental Law Center, NC Coastal Federation). Presentations updated all parties involved on the status of the GenX issue as well as the research challenges relevant to addressing this statewide problem. Collaborations were established between the variety of groups and organizations to leverage current resources to answer important questions related to GenX.

Table 1. Date and location of sample collections

Date of Collection	Middle Cape Fear River (sites 1-4) Sediment and water column	Lower Cape Fear River Sediment and water column
9/11/17		X
9/19/17	X	
10/23/17		X
11/2/17	X	
1/30/18	X	
2/6/18		X
3/26/18	X	

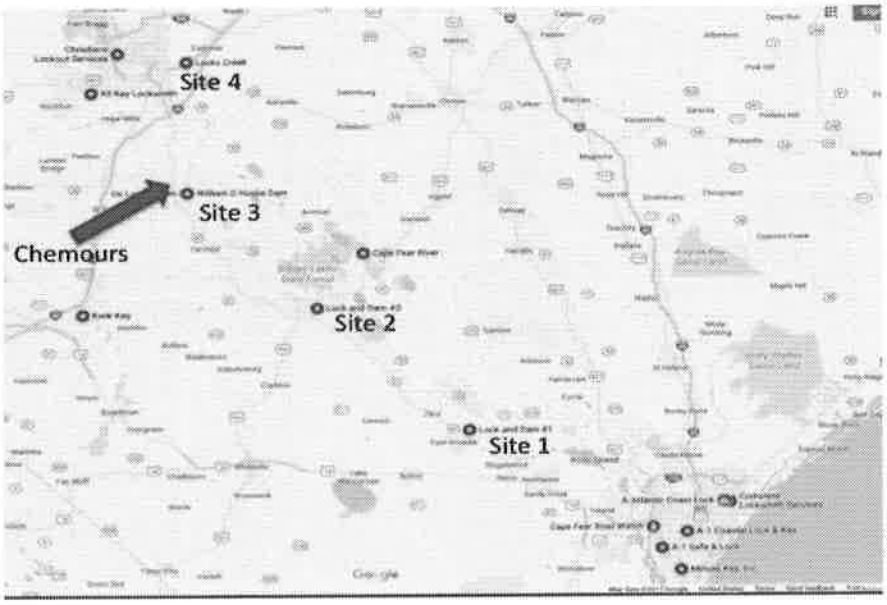
Table 2. Recovery of surrogate M8PFOA.

Sample ID	Recovery
site 1_1	117%
site 1_2	84%
site 1_3	118%
site 2_1	92%
site 2_2	107%
site 2_3	100%
site 3_1	99%
site 3_2	95%
site 3_3	82%
site 4_1	129%
site 4_2	122%
site 4_3	125%
HB1	104%
HB2	114%
HB3	93%
M61_1	133%
M61_2	135%
M61_3	124%
Average	110%

Table 3. GenX concentration in Cape Fear River sediments collected on 9/19/17

Sample Site	Gen X concentration (ng/g dry sediments)
site 1	12.8
site 2	21.6
site 3	3.1
site 4	4.0
M61	14.1

Figure 1: Map of sampling locations along the middle Cape Fear River including a site above the Chemours facility (site 4) and a site just below the Chemours facility (site 3)



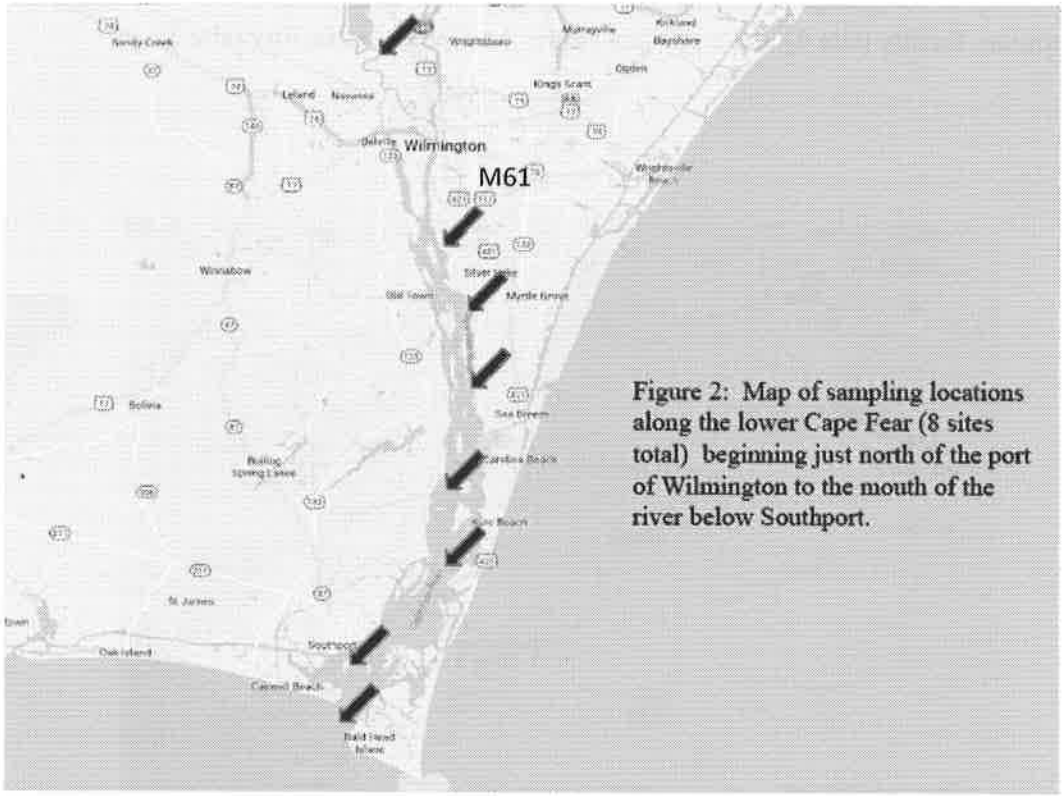


Figure 2: Map of sampling locations along the lower Cape Fear (8 sites total) beginning just north of the port of Wilmington to the mouth of the river below Southport.

Figure 3: Extracted ion chromatogram generated from LC/QTOF data of extracted sediment from M61 located in the Cape Fear River. The numbers above the peaks indicate several PFAS compounds detected through non-targeted analysis. As a reference point peak IV is GenX. Tentative reported structures of peaks I-VI can be found in Fig. 4.

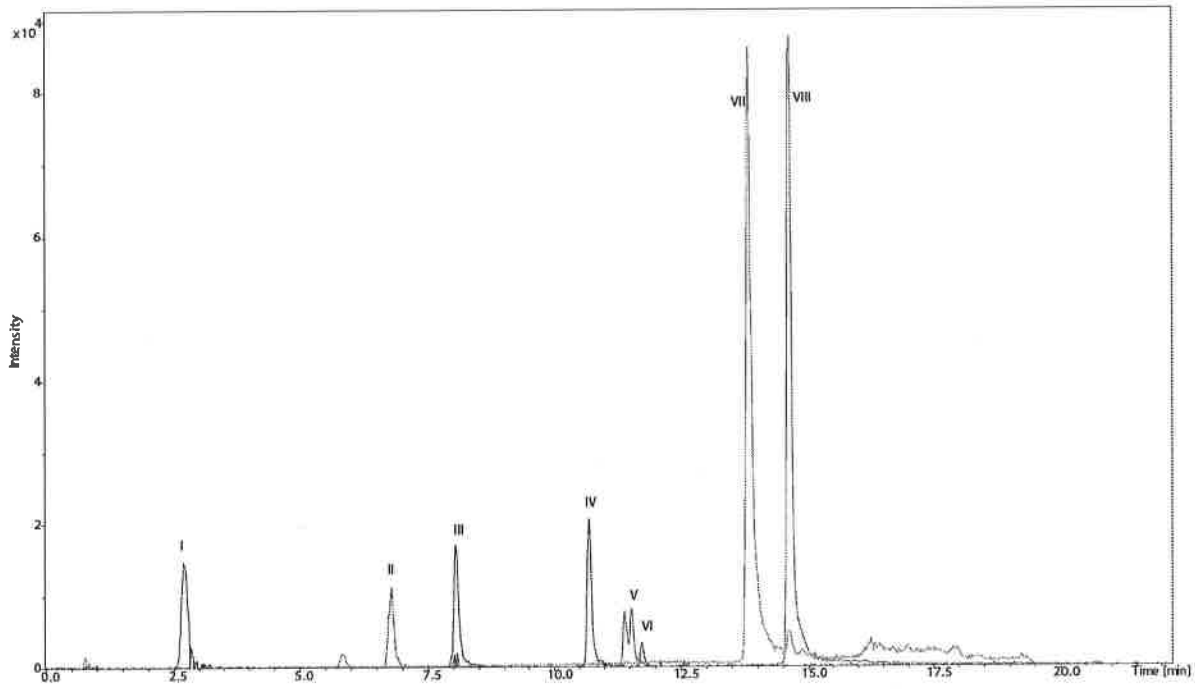
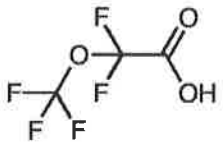
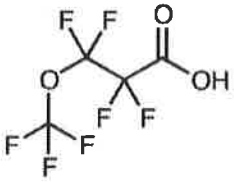


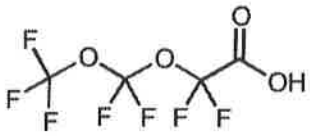
Figure 4: Structures and chemical names of PFAS compounds detected in sediment collected from Cape Fear River. The peak numbers corresponds to those shown in figure 3.



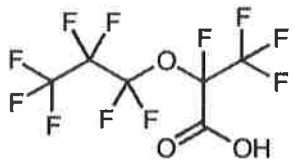
Peak I
perfluoro-2-methoxyacetic acid



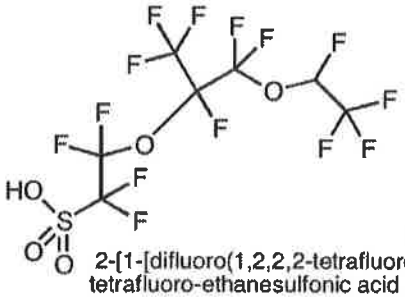
Peak II
perfluoro-3-methoxypropoanoic acid



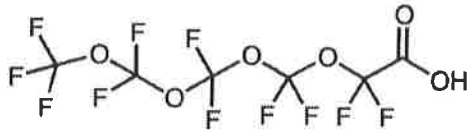
Peak III
perfluoro(3,5-dioxahexanoic)acid



Peak IV
perfluoro-2-propoxypropanoic acid



Peak V
2-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-ethanesulfonic acid



Peak VI
perfluoro(3,5,7,9-tetradecanoic)acid

Objective 4: Bioaccumulation in the ecosystem, initially through examination of levels of GenX that may result in ecological impairment in oysters and of the potential for oysters to uptake and accumulate GenX.

Personnel Involved: Three senior faculty, two graduate students, one undergraduate Honors student, and a middle school student.

Status: We conducted preliminary experiments to examine the levels of GenX that may result in ecological impairment in juvenile oysters. Juvenile oysters were obtained from UNCW's Shellfish Hatchery. Four test treatments (0, 1, 10, and 100 parts per billion; ppb nominal concentrations obtained by diluting 100% stock) of GenX with three replicates for each treatment (12 juvenile oysters/replicate) were used to examine the effects of GenX on the growth, survival and filtration (clearance) rates of juvenile oysters (10-20 mm). Oysters were exposed to GenX in two-liter beakers in a static system three times per week for four weeks. Oysters were fed a mixture of algal diet daily. Mortality was noted during water change (2X/week). Size and clearance rates using flow cytometry were measured on days 14 and 28 post-exposure. Clearance rates of oysters were measured by decrease in concentration of *Isochrysis galbana* (3 million cells/ml) over two hrs. Algal samples were fixed with glutaraldehyde and concentrations of cells measured using a Guava flow cytometer.

At the end of the 28-day exposure period, surviving oysters were frozen at -80C for determining the bioaccumulation of GenX in oyster tissues (Delinsky et. al 2009). Each sample set contained matrix calibration curve samples (spiked adult oyster from UNCW Shellfish Hatchery), a method blank (ultrapure deionized water), and a matrix blank (adult oysters from UNCW hatchery). Oysters were shucked and tissues were stored in -80°C until analysis. Oyster tissue samples were thawed and homogenized for 10 seconds using a Retsch MM 400 Mixer Mill (frequency = 30). Oyster tissue used for the matrix calibration curve was pooled to reduce individual variability. A 1g aliquot of homogenized tissue was added to 3mL of ultrapure deionized water and vortexed. Matrix calibration curve samples were spiked with appropriate levels of GenX. All samples were diluted in 0.01 NaOH in MeOH and vortexed. Samples were vortexed and placed on an orbital shaker with gentle shaking action for 16 hours, followed by 30 minutes of vigorous shaking. Samples were centrifuged for 5 minutes at 2000 rpm. A 3 mL aliquot of the supernatant was added to 27mL of ultrapure deionized water and vortexed.

Solid Phase Extraction (SPE) was performed on the diluted supernatant using a Visiprep vacuum manifold. Waters oasis 3 cc WAX cartridges (60 mg sorbent, 60µm particle size) were conditioned with 4 mL of 0.03% NH4OH in MeOH, 4 mL of MeOH, and 4 mL of ultrapure deionized water. The entire 30mL samples were loaded into the cartridges. To wash, the cartridges were loaded with 4 mL of 25mM sodium acetate buffer (pH = 4). Our analyte was eluted into 15 mL centrifuge tubes using 4 mL of 0.03% NH4OH in MeOH. The elute was evaporated with nitrogen gas to 1mL and vortexed. A 280 µL aliquot of the concentrated elute was added to a 2 micron filter spin column with 120 µL of 2mM ammonium acetate buffer (pH = 6.5). Spin columns were centrifuged at 8000 rpm for 1 minute. Contents of each spin column were placed into respectively labeled MICROSOLV autosampler vials for LC/MS mass spectrometry analysis.

Oyster size did not vary between treatments. Given that these experiments were carried out under static conditions and fed algal paste diet, lack of growth in oysters was not surprising. While one to two oysters encountered mortality in control, 1 and 10 ppb treatments, nine out of 36 oysters encountered mortality in the 100 ppb treatment suggesting that 100 ppb was stressful to juvenile oysters under the experimental conditions. Similarly, while filtration rate was not affected in oysters from treatments 0, 1 and 10 ppb, oysters at 100 ppb showed a reduced clearance rates compared to other treatments (Fig 5).

Tissue concentrations of GenX in juvenile oysters at control (0 ppb), 1 and 10 ppb were < 0.5 ppb, while oysters exposed to 100 ppb had 1.7 ppb (0.0017 ppm; Fig. 6). Trace levels of GenX in control oysters may be due to the proximity of experimental chambers to the 1, 10 and 100 ppb treatments. Since water in the beakers has to be bubbled to maintain favorable oxygen levels for oysters to survive, aerosolization of GenX in bubbles may have contributed to trace levels of GenX in control treatments. Although oysters were exposed to high levels of GenX, it did not appear that bioaccumulation of GenX was high in oyster tissue. For example, while oysters were exposed to 100 ppb of GenX three times per week for four weeks, tissue concentration in oysters from this treatment was 1.7 ppb. This may be due to either adsorption of GenX to the test chamber (glass) or lack of bioaccumulation of GenX due to its polar nature.

Results from the preliminary experiment suggests that very high concentrations (between 10 and 100 ppb nominal concentrations) may decrease filtration in oysters. Also, while oysters were exposed to 1-100 ppb of GenX, there was little bioaccumulation of GenX in oyster tissues. GenX concentration in 0, 1 and 10 ppb treatments ranged between 0.1 and 0.2 ppb, while oysters even in 100 ppb treatment had 1.7 ppb of GenX in their tissues. GenX concentrations reported in Cape Fear River ranged between 800 – 2400 parts per trillion (0.8 – 2.4 ppb). These concentrations are far lower (100-fold) than the concentrations that resulted in decrease in filtration and higher mortality under experimental conditions. It should be cautioned that these are preliminary experiments to examine the levels of GenX that may result in impairment of ecological responses in oysters. We are currently in the process of conducting further experiments involving adult oysters using environmentally realistic concentrations of GenX using non-glass exposure chambers.

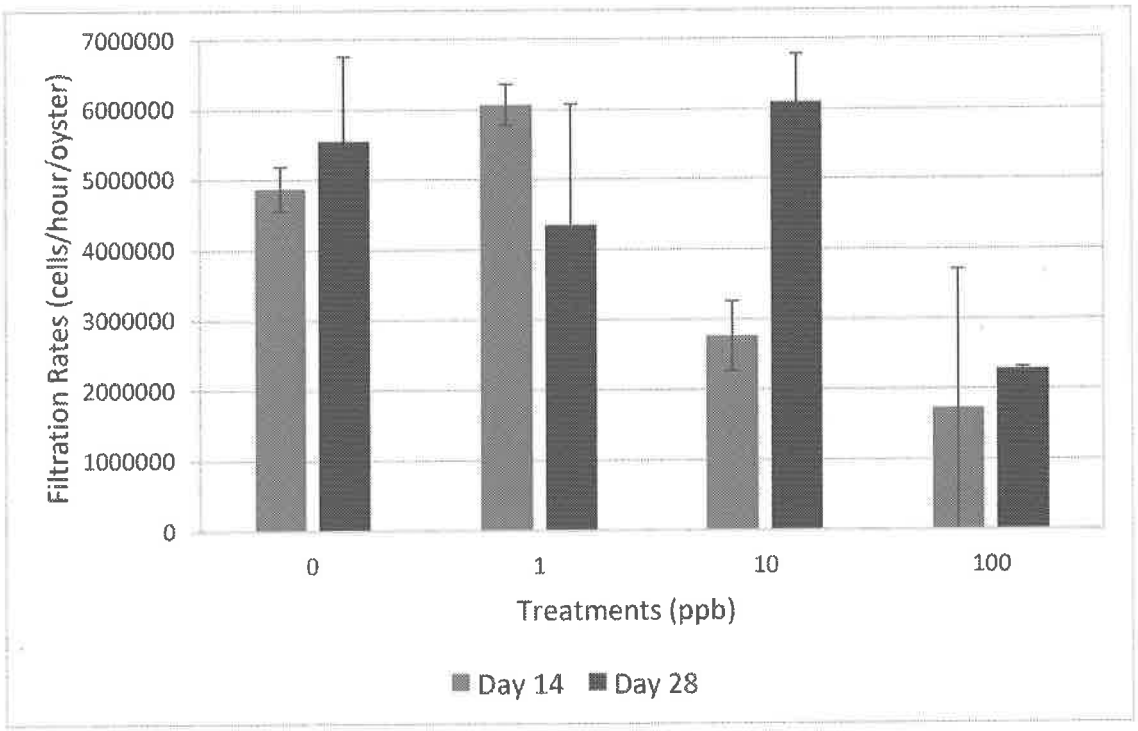


Fig. 5: Filtration (clearance rate) of juvenile oysters exposed to 0, 1, 10, and 100 ppb of GenX. Results suggest that oysters exposed to 100 ppb may result in decrease in filtration capacity of oysters. This level is far higher than levels of GenX found in Cape Fear River.

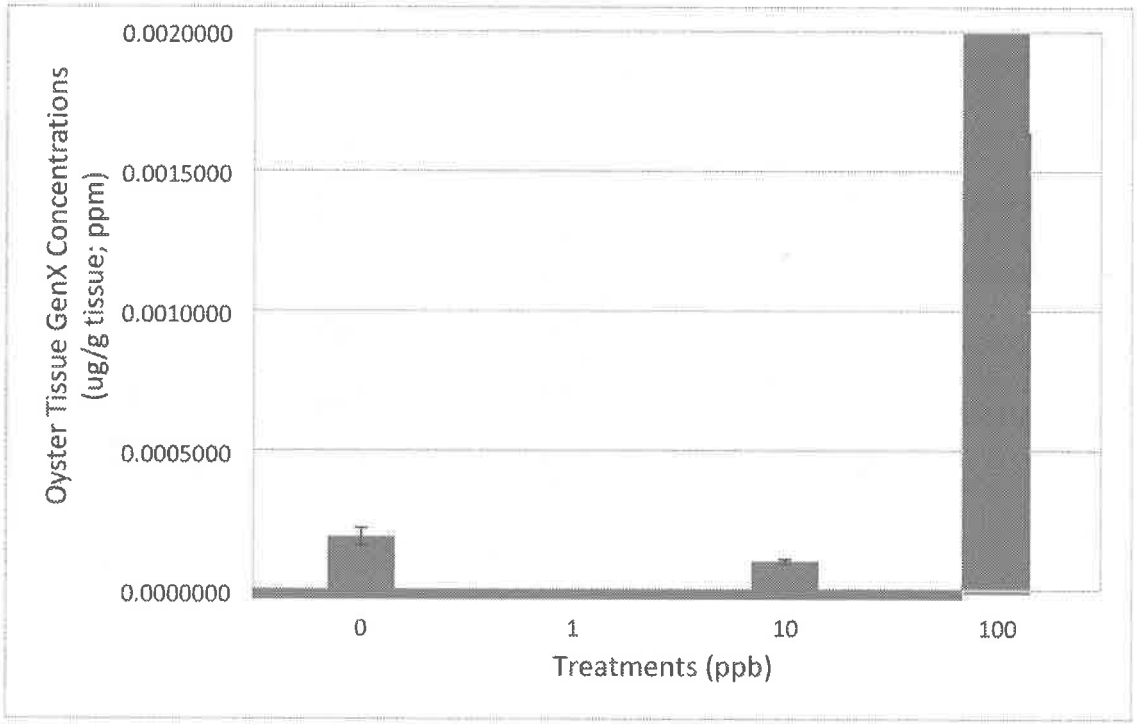


Fig. 6: Tissue concentrations of GenX in juvenile oysters exposed to 0, 1, 10 and 100 ppb of GenX three times/week for four weeks. Results suggest that even oysters exposed to 100 ppb accumulated very little GenX (1.7 ppb).

Future oyster experiments:

Two sets of experiments are planned for the coming months. First set of experiments will involve collecting oysters from Cape Fear River from upstream to downstream (along a salinity gradient) to determine bioaccumulation of GenX (if any) in oyster populations in the wild. Since GenX source is at the upstream location, one would anticipate higher concentrations in water at upstream locations and lower concentrations in the water in downstream locations. These may be reflected in tissue accumulation of GenX in oysters. Since GenX is a polar compound (soluble in water as opposed to oil and pesticides), it is possible that oysters may not accumulate and they merely reflect concentrations found in the water surrounding them. Alternatively, given their high filtration rate, if there is any tissue bioaccumulation, it has potential for physiological impacts on oysters and/or bio-concentration in higher trophic levels as other organisms consume oysters. We anticipate accomplishing this task by early May. To date, we collected oysters from two downstream locations (Fig. 7). Oyster tissues from these two locations were extracted according to the methods described above and awaiting tissue analyses of GenX. We plan to collect oysters from three upstream locations in the Cape Fear River in the next two to four weeks and analyze tissue concentrations of GenX.



Fig. 7: Locations of oyster collection from downstream locations in Cape Fear River. Tissue concentrations of GenX (if any) will be determined from these oysters as well as oysters from upstream locations in the river.

A second set of experiments will be comprised of exposing clean oysters to various concentrations of GenX (0 to 5000 parts per trillion) under controlled laboratory conditions. Oysters will be exposed to GenX for three weeks. Three replicate tanks will house 25 oysters each for each treatment level. Two oysters from each tank will be sub-sampled on Day 1, 3,

5, 7, 14 and 21 days to examine the bioaccumulation of GenX under various concentrations. This will inform us as to how quickly oysters may take up and accumulate (or not) GenX and will enable us to model potential bioaccumulation in the field given particular GenX concentration. We anticipate starting this experiment in the last week of April and completing it by June.

Future experiments will examine depuration kinetics (i.e., how quickly do oysters rid themselves of GenX should cleaner conditions prevail, with no GenX present). Additional experiments will examine potential biological impacts on oysters and will be the subject of studies to examine sub-lethal responses of oysters upon exposure.

Attachment 10

NORTH CAROLINA GENERAL ASSEMBLY

HOUSE SELECT COMMITTEE ON NORTH CAROLINA RIVER QUALITY

REPORT TO THE 2018 SESSION of the 2017 GENERAL ASSEMBLY OF NORTH CAROLINA

APRIL 26, 2018

A LIMITED NUMBER OF COPIES OF THIS REPORT ARE AVAILABLE FOR DISTRIBUTION THROUGH THE LEGISLATIVE LIBRARY

ROOM 500
LEGISLATIVE OFFICE BUILDING
RALEIGH, NORTH CAROLINA 27603-5925
TELEPHONE: (919) 733-9390

DRAFT

TABLE OF CONTENTS

LETTER OF TRANSMITTAL 5

COMMITTEE MEMBERSHIP 7

COMMITTEE CHARGE 9

COMMITTEE PROCEEDINGS 11

RECOMMENDATIONS 27

DRAFT

This page intentionally left blank

DRAFT

TRANSMITTAL LETTER

April 26, 2018

[Back to Top]

TO THE MEMBERS OF THE 2018 REGULAR SESSION
OF THE 2017 GENERAL ASSEMBLY

The House Select Committee on North Carolina River Quality, pursuant to G.S. 120-19.6(a1) and Rule 26(a) of the Rules of the House of Representatives of the 2017 General Assembly, respectfully submits the following report to the 2018 Regular Session of the 2017 General Assembly.

Representative Ted Davis, Jr.
Senior Chair

Representative Holly Grange
Co-Chair

Representative Frank Iler
Co-Chair

This page intentionally left blank

DRAFT

COMMITTEE MEMBERSHIP

[Back to Top]

2017-2018

The Committee consists of fourteen members appointed by the Speaker of the House of Representatives. The membership of the Committee shall include legislators as specified below. Members serve at the pleasure of the Speaker of the House of Representatives. The Speaker of the House of Representatives may dissolve the Committee at any time. Vacancies are filled by the Speaker of the House of Representatives. A Chair, Vice Chair, or other member of the Committee continues to serve until a successor is appointed.

Senior Chair

Representative Ted Davis	Ted.Davis@ncleg.net

Co-Chairs

Representative Holly Grange	Holly.Grange@ncleg.net
Representative Frank Iler	Frank.Iler@ncleg.net

Legislative Members

Representative William Brisson	William.Brisson@ncleg.net
Representative Jimmy Dixon	Jimmy.Dixon@ncleg.net
Representative Elmer Floyd	Elmer.Floyd@ncleg.net
Representative Kyle Hall	Kyle.Hall@ncleg.net
Representative Pricey Harrison	Pricey.Harrison@ncleg.net
Representative Pat McElraft	Pat.McElraft@ncleg.net
Representative Chuck McGrady	Chuck.McGrady@ncleg.net
Representative Bob Muller	Bob.Muller@ncleg.net
Representative Bob Steinburg	Bob.Steinburg@ncleg.net
Representative Scott Stone	Scott.Stone@ncleg.net
Representative Larry Yarborough	Larry.Yarborough@ncleg.net

Commission Staff:
Jeff Hudson, Commission Counsel
Jennifer McGinnis, Commission Counsel
Chris Saunders, Commission Counsel
Mariah Matheson, Commission Assistant
Commission Clerk: Judy Lowe

Commission Contact Information:
545 Legislative Office Building
300 North Salisbury Street
Raleigh, North Carolina 27603
(919) 733-2578
FAX: (919) 715-5460

This page intentionally left blank

DRAFT

COMMITTEE CHARGE

[Back to Top]

Section 1. The House Select Committee on North Carolina River Quality (hereinafter "Committee") is established by the Speaker of the House of Representatives pursuant to Rule 26(a) of the Rules of the House of Representatives of the 2017 General Assembly.

Section 2. The Committee consists of fourteen members appointed by the Speaker of the House of Representatives. The membership of the Committee shall include legislators as specified below. Members serve at the pleasure of the Speaker of the House of Representatives. The Speaker of the House of Representatives may dissolve the Committee at any time. Vacancies are filled by the Speaker of the House of Representatives. A Chair, Vice Chair, or other member of the Committee continues to serve until a successor is appointed.

Representative Ted Davis, Senior Chair	Representative Kyle Hall
Representative Holly Grange, Co-Chair	Representative Pricey Harrison
Representative Frank Iler, Co-Chair	Representative Pat McElraft
Representative Scott Stone	Representative Chuck McGrady
Representative William Brisson	Representative Bob Muller
Representative Jimmy Dixon	Representative Bob Steinburg
Representative Elmer Floyd	Representative Larry Yarborough

Section 3. The Committee, while in the discharge of its official duties, may exercise all powers provided for under G.S. 120-19 and Article 5A of Chapter 120 of the General Statutes. The Committee may contract for professional, clerical, or consultant services, as provided by G.S. 120-32.02

Section 4. Members of the Committee shall receive per diem, subsistence, and travel allowance as provided in G.S. 120-3.1.

Section 5. The expenses of the Committee including per diem, subsistence, travel allowances for Committee members, and contracts for professional or consultant services shall be paid upon the written approval of the Speaker of the House of Representatives pursuant to G.S. 120-32.02(c) and G.S. 120-35 from funds available to the House of Representatives for its operations. Individual expenses of $5,000 or less, including per diem, travel and subsistence expenses of members of the Committee, and clerical expenses shall be paid upon the authorization of a Chair of the Committee. Individual expenses in excess of $5,000 shall be paid upon the written approval of the Speaker of the House of Representatives.

Section 6. The Legislative Services Officer shall assign professional and clerical staff to assist the Committee in its work. The Director of Legislative Assistants of the House of Representatives shall assign clerical support staff to the Committee.

Section 7. The Committee may meet at various locations around the State in order to promote greater public participation in its deliberations.

Section 8. The Committee may submit an interim report on the results of the study, including any proposed legislation, to the members of the House of Representatives at any time. The Committee shall submit a final report on the results of its study, including any proposed legislation to the members of the House of Representatives on or before December 31, 2018. The Committee may advise the House to concur or not to concur on legislation within the Committee's possession. Reports shall be submitted by filing a copy of the report with the Office of the Speaker of the House of Representatives, the House Principal Clerk, and the Legislative Library. The Committee terminates on December 31, 2018, or upon the filing of its final report, whichever occurs first.

DRAFT

COMMITTEE PROCEEDINGS

[Back to Top]

The House Select Committee on North Carolina River Quality met six times after the 2017 Regular Session. The following is a brief summary of the Committee's proceedings. Detailed minutes and information from each Committee meeting are available in the Legislative Library.

AGENDA
9:00 a.m. Thursday, September 28, 2017
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Davis, presiding

2. Introductory remarks by Cochairs
   Representative Davis
   Representative Grange
   Representative Iler

3. Presentation on the regulatory history of the Chemours Fayetteville Works facility including:
   - The permitting and enforcement history of the facility at the State and federal levels
   - All legal action taken by the State relative to the Chemours Fayetteville Works facility
   - Water quality test results for wells adjacent to the Chemours Fayetteville Works facility and efforts to address contamination
   - Investigation into potential air emissions

   (1 hour 30 minutes)
   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

4. Presentation of action plan to implement Section 20(a)(1) of House Bill 56 (GenX Response Measures); report on the GenX contamination of the Cape Fear Public Utility Authority's aquifer storage *(1 hour)*
   Mike Brown, Chairman of the Board
   Cape Fear Public Utility Authority Board

   Frank Styers, Chief Operations Officer
   Cape Fear Public Utility Authority

5. Presentation of action plan to implement Section 20(a)(2) of House Bill 56 (GenX Response Measures) *(30 minutes)*
   Mark Lanier, Assistant to the Chancellor
   University of North Carolina Wilmington

   Dr. Ralph Mead, Professor, Department of Chemistry and Biochemistry
   University of North Carolina Wilmington

   Lunch break *(1 hour)*

6. Presentation on the presence and health effects of GenX and related compounds in the Lower Cape Fear River Basin *(1 hour)*
   Mark Benton, Deputy Secretary for Health Services
   Department of Health and Human Services

   Zack Moore, MD, MPH
   State Epidemiologist and Epidemiology Section Chief
   Division of Public Health, Department of Health and Human Services

7. Presentation on emerging compounds and federal regulations, State regulations, and regulatory gaps related to emerging compounds *(1 hour 30 minutes)*
   Tracy Skrabal, Coastal Scientist and Manager of the Southeast Regional Office
   North Carolina Coastal Federation

   Dr. Lee Ferguson, Associate Professor, Department of Civil and Environmental Engineering
   Duke University

8. Commission discussion and announcements

9. Adjourn

The first meeting of the House Select Committee on North Carolina River Quality was held on Thursday, September 28, 2017, at 9:30 a.m. in Room 643 of the Legislative Office Building. Representative Davis presided.

Ms. Sheila Holman, Assistant Secretary for Environment, Department of Environmental Quality (DEQ), presented on the regulatory history of the Chemours Fayetteville Works facility, including State and federal permitting, enforcement actions taken, and ongoing and future investigations.

The Committee discussed emerging contaminants, data collected by DEQ so far, the link between C8 and GenX, issued Notice of Violations and potential enforcement actions, comparisons between GenX and perfluorooctanoic acid (PFOA), air quality and possible emissions testing, DEQ's staff, the National Pollutant Discharge Elimination System

(NPDES) permitting backlog, private well water contamination and potential monitoring, and federal emerging contaminant standards.

Mr. Mike Brown, Chairman of the Board, Cape Fear Public Utility Authority (CFPUA), and Mr. Frank Styers, Chief Operations Officer, CFPUA, reported on CFPUA's implementation of GenX response measures as directed by House Bill 56 (S.L. 2017-209).

The Committee discussed the Authority's use of reverse osmosis to treat contamination, Dr. Knappe's report on treatment options for emerging contaminants, and the Authority's ongoing and future testing and treatment operations.

Mr. Mark Lanier, Assistant to the Chancellor, University of North Carolina Wilmington (UNCW), and Dr. Ralph Mead, Professor, Department of Chemistry and Biochemistry, UNCW, reported on UNCW's implementation of GenX response measures as directed by House Bill 56 (S.L. 2017-209).

The Committee discussed UNCW's use of funding, establishment of health goals, possible bioaccumulation of GenX, the process to identify new chemicals, and similarities between C8, GenX and PFOA.

After a lunch break, Mr. Mark Benton, Deputy Secretary, Department of Health and Human Services (DHHS), Division of Public Health (DPH), and Dr. Zack Moore, State Epidemiologist, DHHS, DPH, presented on the presence and health effects of GenX and related compounds in the Lower Cape Fear River Basin.

The Committee discussed the health effects of GenX on humans versus animals, how DPH began its investigation and the starting point for controlled laboratory studies, guidance for setting health standards, and establishing health standards and goals for GenX.

Ms. Tracy Skrabal, Coastal Scientist and Manager, Southeast Regional Office, North Carolina Coastal Federation, and Dr. Lee Ferguson, Associate Professor, Department of Civil and Environmental Engineering, Duke University, presented on emerging compounds and federal regulations, State regulations, and regulatory gaps.

The Committee discussed possible regulatory, technological, research, and infrastructure gaps in addressing emerging contaminants, where the burden of proof lies for proving certain discharges, other emerging contaminant monitoring systems, GenX detection in other states, whether GenX is included in the federal Safe Drinking Water Act, whether the Toxic Substances Control Act needs reform, and bioaccumulation of GenX in the environment.

AGENDA
9:30 a.m. Thursday, October 26, 2017
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Davis, presiding

2. Introductory remarks by Cochairs
   Representative Davis
   Representative Grange
   Representative Iler

3. Presentation on research into emerging compounds, including:
   - Explanation of targeted versus nontargeted screening
   - Work in the Cape Fear River watershed on testing for emerging compounds

   (1 hour 15 minutes)
   Dr. Detlef Knappe, Professor, Department of Civil, Construction, and Environmental Engineering, North Carolina State University

4. Department of Environmental Quality update on response to emerging compounds and responses to previous questions, including:
   - Latest surface water and groundwater monitoring results
   - Information on air emissions from the Chemours Fayetteville Works facility
   - How wastewater from the closed-loop system at the Chemours Fayetteville Works facility is disposed of
   - Improving the disclosure process for National Pollutant Discharge Elimination System (NPDES) permits
   - Impact of interbasin transfers
   - Description of Departmental resources devoted to the monitoring, analysis, and regulation of emerging compounds

   (1 hour 30 minutes)

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

   Mike Abraczinskas, Director, Division of Air Quality
   Department of Environmental Quality

Lunch break *(1 hour)*

5. Department of Health and Human Services update on response to emerging compounds and responses to previous questions, including:
   - Description of Departmental resources devoted to the monitoring, analysis, and regulation of emerging compounds
   - Overview of research and studies that contributed to the 140 parts per trillion health goal for GenX
   - Description of the Science Advisory Board and its work

   (45 minutes)

   Elizabeth Cuervo Tilson, MD, MPH
   State Health Director, Chief Medical Officer
   Department of Health and Human Services

   Danny Staley, MS
   Director, Division of Public Health
   Department of Health and Human Services

   Zack Moore, MD, MPH
   State Epidemiologist and Epidemiology Section Chief
   Division of Public Health, Department of Health and Human Services

6. Update on the action plan to implement Section 20(a)(1) of House Bill 56 (GenX Response Measures) and testing conducted by the Cape Fear Public Utility Authority for the filtration and removal of GenX and other emerging compounds from drinking water *(45 minutes)*

   Jim Flechtner, Executive Director
   Cape Fear Public Utility Authority

   Frank Styers, Chief Operations Officer
   Cape Fear Public Utility Authority

7. Presentation on issues concerning emerging compounds *(30 minutes)*

   Kemp Burdette, Cape Fear Riverkeeper
   Cape Fear River Watch

8. Commission discussion and announcements

9. Adjourn

The second meeting of the House Select Committee on North Carolina River Quality was held on Thursday, October 26, 2017, at 9:30 a.m. in Room 643 of the Legislative Office Building. Representative Davis presided.

Dr. Detlef Knappe, Professor, Department of Civil, Construction, and Environmental Engineering, North Carolina State University, presented on research into emerging

compounds, including an explanation of targeted versus non-targeted screening and his work in the Cape Fear River watershed.

The Committee discussed when sampling occurred, effects of lifetime exposure, availability of filtering technology, reverse osmosis, ongoing monitoring efforts, screening priority lists and testing, the relationship between perfluorooctane sulfonate (PFOS) and firefighting foam, biosolids, and ongoing health studies.

Ms. Sheila Holman, Assistant Secretary for the Environment, Department of Environmental Quality (DEQ), reported on the Department's ongoing response to GenX contamination. Her presentation included updates on DEQ's water and air testing, interbasin transfers, potential improvements to the NPDES disclosure process, and a description of DEQ resources devoted to addressing emerging compounds.

The Committee discussed DEQ's message on GenX to the public, biosolids, DEQ's enforcement authority concerning air emissions, DEQ staff dedicated to NPDES permitting and water quality monitoring, mass spectrometers, air quality permitting and testing at the Chemours facility, and the wide-ranging effects of any potential changes to the water quality permit process.

After a lunch break, Dr. Elizabeth Tilson, State Health Director, Department of Health and Human Services (DHHS), Mr. Danny Staley, DHHS, Division of Public Health (DPH), and Dr. Zack Moore, State Epidemiologist, DHHS, DPH, presented on the Departments response to emerging contaminants, including DHHS resources devoted to the issue, research and studies that contributed to the established health goal, and a description of the Science Advisory Board.

The Committee discussed coordinating information between the various entities addressing emerging contaminants, the toxicologists working at DHHS, potentially joining the Interstate Chemical Clearinghouse, rationale and discussion behind revising GenX health goals, and the long-term environmental outlook regarding emerging contaminants.

Mr. Jim Flechtner, Executive Director, Cape Fear Public Utility Authority (CFPUA), and Mr. Frank Styers, Chief Operations Officer, CFPUA, reported on CFPUA's implementation of GenX response measures as directed by House Bill 56 (S.L. 2017-209).

The Committee discussed whether GenX clean-up measures could be used to address other contaminants, tests for other contaminants, and consultants used by CFPUA.

Mr. Kemp Burdette, Cape Fear Riverkeeper, Cape Fear River Watch, presented on issues concerning emerging compounds, including a primer on the "precautionary principle."

The Committee discussed the Cape Fear River Watch's sampling efforts, funding sources, and whether it ever filed lawsuits against polluters.

AGENDA
9:30 a.m. Thursday, November 30, 2017
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Davis, presiding

2. Introductory remarks by Cochairs
   Representative Davis
   Representative Grange
   Representative Iler

3. Department of Environmental Quality update on response to emerging compounds and responses to previous questions, including:
   - Latest surface water and groundwater monitoring results
   - Information on air emissions from the Chemours Fayetteville Works facility
   - Enforcement actions, including enforcement actions related to an unreported chemical spill at the Chemours Fayetteville Works facility
   - Discovery of additional emerging compounds
   - Information on Departmental water quality monitoring

   (2 hours)

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

   Mike Abraczinskas, Director, Division of Air Quality
   Department of Environmental Quality

4. Discussion of schedule and plans for future committee meetings

5. Announcements

6. Adjourn

The third meeting of the House Select Committee on North Carolina River Quality was held on Thursday, November 30, 2017, at 9:30 a.m. in Room 643 of the Legislative Office Building. Representative Davis presided.

Ms. Sheila Holman, Assistant Secretary for the Environment, Department of Environmental Quality (DEQ), presented on the Department's response to emerging contaminants and provided answers to previous Committee questions. The presentation included information on water monitoring results, air emissions, enforcement actions, additional emerging contaminants, and the water quality monitoring process.

The Committee discussed the effect an earlier release would have on additional GenX testing, larger context for the numbers, further DEQ responses to Chemours, whether other contaminants could be confounding groundwater tests for GenX, whether Chemours was paying for bottled water for residents affected by contaminated groundwater, additional context for the air quality numbers reported by the Division, the decision to not join an interstate chemical clearinghouse, and the day-to-day experience of NPDES monitoring staff, including testing procedures and guidelines.

The Committee then discussed future meetings, and expressed a desire to have a legislative proposal ready for the January 10, 2018 Special Session.

AGENDA
9:30 a.m. Thursday, January 4, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Committee consideration and vote on short-term legislative proposals for the January 10, 2018 Session
   Representative Ted Davis

   Public Comment

4. Committee discussion on non-agenda items and announcements

5. Adjourn

The fourth meeting of the House Select Committee on North Carolina River Quality was held on Thursday, January 4, 2018, at 9:30 a.m. in Room 643 of the Legislative Office Building. Representative Davis presided.

Mr. Jeffrey Hudson, Committee Counsel, House Select Committee on North Carolina River Quality, summarized a Proposed Committee Substitute, 2017-SBz-21 [v.13], that would implement short-term legislative proposals to address water quality issues relating to the Chemours discharge of GenX into the Cape Fear River. The entire PCS, 2017-SBz-21 [v. 13], is included in this report's Recommendations, on page 27.

The Committee discussed the requirement that the Department of Health and Human Services (DHHS) work with the Science Advisory Board to develop "health goals," and whether health goals were legal/regulatory standards.

Public comment on the proposals focused on requesting funding for DEQ. Representative Davis said that the Committee was working to secure appropriations to address GenX, but could not promise the size or timing of the appropriation at the time of the meeting.

Representative McGrady echoed comments from the rest of the Committee, saying that the PCS was a good first step to move towards addressing the GenX issue, but that it is not intended to solve the GenX problem entirely.

Representative Dixon made a motion to recommend the PCS to the House for consideration. The motion passed unanimously.

DRAFT

AGENDA
9:30 a.m. Wednesday, February 21, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Department of Environmental Quality update on response to emerging compounds and responses to previous questions, including:
   - Spikes in GenX concentrations near the Cape Fear Public Utility Authority Plant in December, 2017
   - Potential use of private drinking water well filtration systems
   - Update on enforcement actions taken

   (1 hour 15 minutes)

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

   Mike Abraczinskas, Director, Division of Air Quality
   Department of Environmental Quality

4. Interim report on implementation of Section 20(a)(1) of S.L. 2017-209 (House Bill 56) (GenX Response Measures); report on spikes in GenX concentrations near the Cape Fear Public Utility Authority Plant in December, 2017 *(30 minutes)*
   Jim Flechtner, Executive Director
   Cape Fear Public Utility Authority

   Frank Styers, Chief Operations Officer
   Cape Fear Public Utility Authority

5. Interim report on implementation of Section 20(a)(2) of S.L. 2017-209 (House Bill 56) (GenX Response Measures) *(45 minutes)*
   Dr. Robert Keiber, Professor and Graduate Coordinator
   Department of Chemistry and Biochemistry,

University of North Carolina Wilmington

Lunch break *(1 hour)*

6. Use and availability of high resolution mass spectrometers for detection and analysis of GenX and other emerging contaminants *(1 hour)*
   Mark Strynar, Physical Scientist
   National Exposure Research Laboratory, United States Environmental Protection Agency

   Andy Miller, Director of Legislative Affairs
   Department of Environmental Quality

7. Discussion of House Bill 189 (Water Safety Act) *(1 hour)*

8. Committee discussion and announcements

9. Adjourn

The fifth meeting of the House Select Committee on North Carolina River Quality was held on Thursday, February 21, 2018, at 9:30 a.m. in Room 643 of the Legislative Office Building. Representative Davis presided.

During preliminary remarks, Representative Dixon asked the Department of Environmental Quality (DEQ) to produce any public comments received related to the permitting of the DuPont/Chemours facility. He noted that review of those comments would be enlightening as to awareness of potential problems that may have existed during the permitting process.

Ms. Sheila Holman, Assistant Secretary for the Environment, DEQ, reported on DEQ's response to GenX, including spikes in GenX concentration, potential private well filtration systems, and additional enforcement actions.

There was Committee discussion on water quality samples at private wells, investigations into other potential sources of GenX contamination, the economic impact of GenX, the implementation of home filtration systems, private well testing, U.S. Environmental Protection Agency's (EPA) turnaround time for water sample testing, the lifetime health advisory, media coverage, DEQ's enforcement authority, cooperation from Chemours, potential legislative measures to aid DEQ's enforcement, and air quality testing throughout the State.

Mr. Jim Flechtner, Executive Director, Cape Fear Public Utility Authority (CFPUA), and Mr. Frank Styers, Chief Operations Officer, CFPUA, reported on CFPUA's implementation of GenX response measures, as directed by S.L. 2017-209.

The Committee discussed the ability of citizens to use private wells, the difference in test results between CFPUA and DEQ, the potential of publishing test results outside of CFPUA's website, possible collaboration between CFPUA, DEQ, and Chemours, installing home filtration systems, fluctuating GenX levels, potential non-point sources of GenX, comparisons between GenX levels upstream and after filtration, notice to the public of ongoing filtration efforts, and additional research on GenX and other contaminants.

Dr. Robert Keiber, Professor, Department of Chemistry and Biochemistry, University of North Carolina Wilmington (UNCW), reported on UNCW's implementation of GenX response measures, as directed by S.L. 2017-209. Dr. Keiber updated the Committee on UNCW's research and contaminant sampling.

The Committee discussed CFPUA's efforts below the Cape Fear dam, how GenX could still show up in the Cape Fear River after Chemours moved to a closed-loop system, how UNCW has addressed GenX in sediment, and the extent and range of GenX and other emerging contaminants found throughout the State.

After a lunch break, Mr. Mark Strynar, Physical Scientist, National Exposure Research Laboratory, EPA, presented on the use and availability of high-resolution mass spectrometers at EPA's Raleigh-Durham facility.

The Committee discussed West Virginia's experience with C8 processors, bottled water, various mass spectrometers, the University system's capability and capacity to handle water quality testing, targeted versus non-targeted testing, Senate discussions on mass spectrometers, and water sample testing for pharmaceuticals.

Mr. Andy Miller, Director of Legislative Affairs, DEQ, presented on the current availability of mass spectrometers in State government.

The Committee discussed funding for DEQ and the Department of Health and Human Services, staffing changes because of GenX contamination, the H189 proposal from earlier in the year, and continued support for addressing the GenX contamination.

Chairman Ted Davis, presented an overview of the differences between the House and Senate versions of H189.

There was extensive Committee discussion about ongoing university research, the need for DEQ to have a mass spectrometer, legislative strategies for working with the Senate to address GenX contamination, and how to move forward into the short session.

AGENDA
9:30 a.m. Thursday, March 22, 2018
Room 643 Legislative Office Building
Raleigh, North Carolina

1. Call to order
   Representative Ted Davis, presiding

2. Introductory remarks by Cochairs
   Representative Ted Davis
   Representative Holly Grange
   Representative Frank Iler

3. Department of Environmental Quality update on response to emerging compounds and responses to previous questions (*1 hour*)

   Sheila Holman, Assistant Secretary for Environment
   Department of Environmental Quality

   Linda Culpepper, Deputy Director, Division of Water Resources
   Department of Environmental Quality

   Michael Scott, Director, Division of Waste Management
   Department of Environmental Quality

   Mike Abraczinskas, Director, Division of Air Quality
   Department of Environmental Quality

4. Committee discussion and announcement

5. Adjourn

SITE VISIT:

The business meeting will be followed by a tour of the Department of Environmental Quality's Water Sciences and Air Quality Lab Complex at 4403 Reedy Creek Road, Raleigh, North Carolina. The tour will begin at approximately 11:00 a.m. and is expected to last approximately one hour. This is a site visit; no votes will be taken. Subject to space limitations and operational requirements of the Lab Complex, members of the press and the public will also be accommodated for purposes of the site visit.

The sixth meeting of the House Select Committee on North Carolina River Quality was held on Thursday, March 22, 2018, at 9:30 a.m. in Room 643 of the Legislative Office Building. Representative Davis presided.

Ms. Sheila Holman, Assistant Secretary for the Environment, Department of Environmental Quality (DEQ), reported on DEQ's ongoing response to GenX contamination. Her presentation included specific updates on testing and enforcement actions from the Divisions of Water Resources, Waste Management, and Air Quality.

The Committee discussed how water sampling was conducted, possible explanation for spikes in GenX concentration in stormwater runoff, previous public comment on Chemours' wastewater permit applications, timelines for certain action by Chemours, funding requests from DEQ and the Department of Health and Human Services, providing clean water to affected citizens, developing health goals for GenX, potential enforcement mechanisms against Chemours, historical health goals for GenX, and additional funding.

The business meeting was followed by a tour of the Department of Environmental Quality's Water Sciences and Air Quality Lab Complex at 4403 Reedy Creek Road, Raleigh, North Carolina.

DRAFT

Agenda and proceedings for the April 26th meeting will be included.

DRAFT

RECOMMENDATIONS

[Back to Top]

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2017

U **D**

BILL DRAFT 2017-SBz-21 [v.13] (12/04)

(THIS IS A DRAFT AND IS NOT READY FOR INTRODUCTION)
01/02/2018 11:16:06 AM

Short Title:	Short Term Response to Emerging Contaminants.	(Public)
Sponsors:		
Referred to:		

A BILL TO BE ENTITLED

AN ACT TO IMPLEMENT SHORT-TERM MEASURES TO RESPOND TO EMERGING CONTAMINANTS IN THE ENVIRONMENT.

The General Assembly of North Carolina enacts:

DIRECT THE DEPARTMENT OF HEALTH AND HUMAN SERVICES TO CONSULT WITH THE SECRETARIES' SCIENCE ADVISORY BOARD IN THE DEVELOPMENT OF HEALTH GOALS FOR CONTAMINANTS

SECTION 1.(a) For purposes of this section, the Secretaries' Science Advisory Board shall mean the Science Advisory Board established by the Secretary of Environmental Quality and the Secretary of Health and Human Services on July 28, 2017.

SECTION 1.(b) The Department of Health and Human Services shall consult with the Secretaries' Science Advisory Board on the Department's process for the establishment of health goals for contaminants. The Secretaries' Science Advisory Board shall review the process by which the Department establishes health goals for contaminants and make recommendations on how to improve the process, including how to promote greater public understanding of and confidence in the health goals.

SECTION 1.(c) To the extent practicable, the Department of Health and Human Services shall notify the Chair of the Secretaries' Science Advisory Board prior to issuing a provisional health goal for a contaminant. The Department of Health and Human Services shall submit all newly issued provisional health goals to the Secretaries' Science Advisory Board at their next scheduled meeting.

STUDY NPDES PERMIT PROGRAM

SECTION 2. The Department of Environmental Quality shall study the State's National Pollutant Discharge Elimination System (NPDES) permitting program to ensure that associated requirements are sufficient to protect public health, safety, welfare, and the environment. In conducting the study, the Department shall examine the adequacy of:

(1) Requirements for persons applying for individual NPDES permits to fully disclose in applications for new permits, permit renewals, or permit modifications, all pollutants, including emerging chemicals for which an applicable discharge standard has not been established under State or federal law, included in their discharge.

(2) Monitoring, sampling, and laboratory analytical requirements applicable to persons holding current NPDES permits, and to persons applying for new NPDES permits. In assessing the adequacy of analytical requirements, the Department shall evaluate the consistency of analytical methods used by private labs to detect and quantify pollutants, including emerging chemicals for which an applicable discharge standard has not been established under State or federal law. And, based on information gathered in that regard, whether, to ensure the accuracy of discharge sampling results, it would be feasible and advisable for the Department to develop a certified list of laboratories through which dischargers must obtain laboratory analyses of their discharge, or whether the Department should require submission of discharge samples to the Department for laboratory analyses by the Department.

(3) Existing processes for developing standards or limitations for emerging chemicals for which an applicable discharge standard has not previously been established under State or federal law, included in a permittee's discharge.

(4) Internal permit review processes to ensure thorough and timely review of permit applications.

The Department shall submit an interim report with findings, including any recommendations for legislative action, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than April 1, 2018, and a final report with findings, including any recommendations for legislative action, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission no later than December 1, 2018.

DIRECT THE DEPARTMENT OF ENVIRONMENTAL QUALITY TO COORDINATE AND SHARE WATER QUALITY DATA WITH STATES IN THE REGION

SECTION 3. Article 21 of Chapter 143 of the General Statutes is amended by adding a new section to read:

"**§ 143-215.1D. Coordination with neighboring states.**

The Department of Environmental Quality shall coordinate with the Georgia Department of Natural Resources, the South Carolina Department of Health and

Environmental Control, the Tennessee Department of Environment and Conservation, the Virginia Department of Environmental Quality, and the West Virginia Department of Environmental Protection to improve processes for sharing information about contaminants identified in surface water or groundwater shared by or passing or flowing across the border of those states and this State. As needed, the Department shall share with those agencies water quality data for, and information about any contaminant identified in, surface water or groundwater shared by or passing or flowing across the border of those states and this State."

DEPARTMENT OF ENVIRONMENTAL QUALITY REPORTING AND NOTICE STUDY

SECTION 4. The Department of Environmental Quality shall study the statutory requirements for dischargers of untreated wastewater, untreated waste, and other substances to notify the Department and the public of discharges, including the volumetric thresholds that trigger the reporting requirements, to ensure that the requirements are sufficient to protect public health and provide adequate notice to the Department and the public. The Department shall consider whether there are any conflicts or redundancies in the statutory notice and reporting requirements. The Department shall also study its processes for notifying the General Assembly and the Environmental Management Commission of the presence in the environment of emerging chemicals for which an applicable discharge standard has not been established under State or federal law. The Department shall report its findings, including any legislative recommendations, to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission, no later than April 1, 2018.

WATER UTILITY CIVIL LIABILITY STUDY

SECTION 5. The School of Government at the University of North Carolina at Chapel Hill shall study the extent to which public and private water utilities may be held civilly liable for distribution of drinking water contaminated by a pollutant without applicable discharge standards established under State or federal law, and the extent to which public water utilities and private water utilities are treated differently for purposes of civil liability. The School of Government shall submit the results of the study to the House Select Committee on North Carolina River Quality, the Senate Select Committee on North Carolina River Water Quality, and the Environmental Review Commission, no later than April 1, 2018.

EFFECTIVE DATE

SECTION 6. Except as otherwise provided, this act is effective when it becomes law.

DRAFT

Committee Sergeants at Arms

NAME OF COMMITTEE Hse Select Committee on N.C. River Quality

DATE: 4/26/2018 Room: 643 LOB

House Sgt-At Arms:

1. Name: Jonas Cherry
2. Name: Rey Cooke
3. Name: Kenneth Gilbert
4. Name: Dean Marshbourne
5. Name: Glen Wall

Senate Sgt-At Arms:

1. Name:
2. Name:
3. Name:
4. Name:
5. Name:

VISITOR REGISTRATION SHEET

Hse. Select Committee on N.C. River Quality — April 26,2018

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Tom Beau	EDF, NCWF
Timothy Webster	DEQ
Ellen Lorscheider	DEQ-DWM
Brian Powell	NC Conservation Network
Lindsey Dowling	FSP
Paul Collins	Walk West
Rivian Merwald	WM
Lisa Sorg	NC Policy Watch
Dana Sargent	Cape Fear River Watch
Jenna Calderone	RFNC
LT McCrimmon	DHHS

VISITOR REGISTRATION SHEET

Hse. Select Committee on N.C. River Quality — April 26,2018

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Tracy Skrabal	NC COASTAL FEDERATION
Matthew Starr	Neuse Riverkeeper

VISITOR REGISTRATION SHEET

Hse. Select Committee on N.C. River Quality — April 26,2018

Name of Committee — Date

VISITORS: PLEASE SIGN IN BELOW AND RETURN TO COMMITTEE CLERK

NAME	FIRM OR AGENCY AND ADDRESS
Jennifer Adams	CFPNA. Wilm NC
Rhaegan Jackson	Focus Carolina
[signature]	CSS
Tommy Stevens	Stevens Lobby
Jon Carr	Jordan Price
Jon Lanier	NCDA & CS
Keith Larick	NC Farm Bureau
Justin Clayton	Governor
Sallie James	Governor
Preston Howard	NCMA
Rob Lamm	RCSI

STATE OF NORTH CAROLINA
GENERAL ASSEMBLY

Interim House Legislative Assistant Committee Payment Form

NC River Quality
(Complete Name of Committee)

Location of Meeting (City): Raleigh

Date of Meeting: April 26, 2018

Legislative Assistant's Name: Andrew Bowers

Temporary or Permanent Employee ***(please circle)***

(Legislative Assistant's Signature)

(Approval Signature)
[Must be approved by Chairperson]

(Approval Signature)
[Must be approved by House LA Office]

Please note that Committee pay ($100) is received per committee meeting, not per clerk. Pay may be split if there is more than one clerk for the meeting.

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh 103

Date(s) of Meeting: 4-26-18

Member: Rep. Bob Steinburg

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage Same
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Rep Bob Steinburg
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

10/1/18
(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: 4/26/18

Member: Percy Harrison

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality
(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: 4/26/2018

Member: Jimmy Dixon

Total Number of day's subsistence claimed ____
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Jimmy Dixon
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: 4-26-18

Member: Carr Harborough

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☑
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): RALEIGH

Date(s) of Meeting: 4/26

Member: SCOTT STONE

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: 4-26-18

Member: Pat McElraft

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☒ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Pat McElraft
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: 4/26/2018

Member: William Brisson

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

William Brisson
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): RALEIGH, NC

Date(s) of Meeting: 4/26/18

Member: CHUCK MCGRADY

Total Number of day's subsistence claimed
(This line MUST be completed to be reimbursed) 1

Arrived the day prior to meeting day
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Yes ☒ No ☒

Car Mileage
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): Raleigh

Date(s) of Meeting: 4-26-18

Member: Elmer Floyd

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☐ No ☒
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage on file
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

Elmer Floyd
(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): RALEIGH

Date(s) of Meeting: 4/26/18

Member: REP. FRANK ILER

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage ALREADY CLAIMED IN ANOTHER COMMITTEE
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 0

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

NC River Quality

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

Location of Meeting (City): RALEIGH

Date(s) of Meeting: 4/26/2018

Member: Bob Muller

Total Number of day's subsistence claimed 1
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage _____
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786

N.C. General Assembly

Administrative Division
Financial Services Section

Members' In-State Reimbursement Form

This form is used to request for in-state reimbursement for subsistence and travel for Committee, Commission or Other In-State Meetings/Legislative Business by members.

Form: **PR008**

Rev: 12/2012

Financial Services Use:

Budget to Charge

(**Complete** Name of Committee or Commission **or** Description of Meeting/Business)

House Select Committee on NC River Quality

Location of Meeting (City): Raleigh

Date(s) of Meeting: April 26, 2018

Member: Ted Davis

Total Number of day's subsistence claimed 2
(This line MUST be completed to be reimbursed)

Arrived the day prior to meeting day Yes ☑ No ☐
(Claim one day for each meeting day you attended. If spending the night prior to the first meeting day, you are entitled to an extra day.)

Car Mileage 280
(Fill out this line if mileage is different than what is certified on file)

Number of Round Trips 1

(Member's Signature)

[Must be approved by Chairperson, Senate President Pro Tempore or House Speaker]

(Approval Signature)

Committee Assistant Name: Andrew Bowers Ext. 35786