



Introduction to the PFAST Network Research Initiative



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Duke
UNIVERSITY



UNC CHARLOTTE

NC STATE
UNIVERSITY



Detlef Knappe
NC State University
(knappe@ncsu.edu)

Jason Surratt
UNC-Chapel Hill
(surratt@unc.edu)



NORTH CAROLINA
AGRICULTURAL AND TECHNICAL
STATE UNIVERSITY

Emerging PFAS Contaminants in the Cape Fear Region: University
Collaborations on Environmental, Drinking Water and Health Effects
UNC-Wilmington, May 31, 2019

Questions we would like to answer in this presentation

- What are PFAS?
- Why are North Carolina communities concerned about exposure?
- What are we doing to understand the extent and significance of this exposure?

PFAS?

- An abbreviation that stands for **per- and polyfluoroalkyl substances**
- A class of **synthetic** chemicals
- Desirable properties
 - High thermal resistance
 - Water repellent
 - Grease repellent
 - Stain repellent

Two types of PFAS have been heavily studied → “Legacy Compounds”

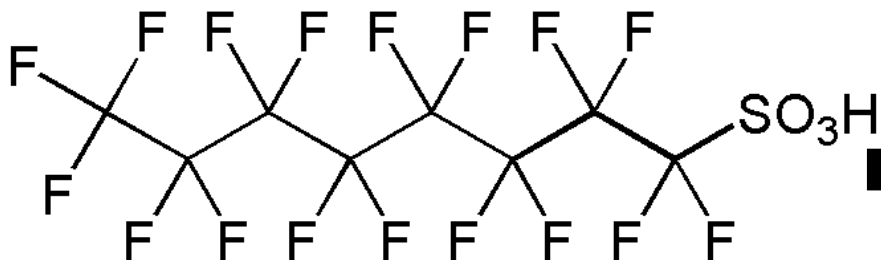
**Perfluorooctanoic acid
(PFOA / C8)**



**Common uses:
Goretex, Teflon**



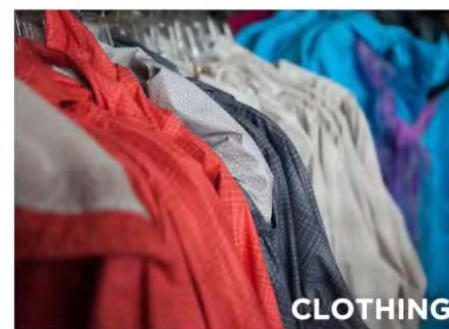
**Perfluorooctane sulfonate
(PFOS)**



**Common uses:
Firefighting, stain
repellent**



PFAS are found in many consumer products




<http://www.sixclasses.org/>

...but

- PFAS are **persistent**
- PFAS are **toxic**
- PFAS are **bioaccumulative** (long-chain) or **mobile** in the environment (short-chain)

Compound	PFOA (C8)	PFOS	PFHxA (C6)
Half-Life (Human)	3.8 years	5.4 years	32 days

C6 is the most similar to GenX, and gives us our best guess at its half-life



Half-life = the time it takes for the concentration of a substance to decrease by half

Why are North Carolina communities concerned about exposure?

Toxin taints CFPUA drinking water

MOST POPULAR

1 Toxin taints CFPUA drinking water
Jun 8 at 10:38 AM

2 WATER FAQs: What we know and what we don't know
Jun 8 at 3:35 PM

3 GenX fallout: Is my water safe to drink?
Jun 8 at 5:59 PM

4 Local officials respond to GenX report
Jun 8 at 5:30 PM



▲ HIDE CAPTION

A 2000 aerial photo of Fayetteville Works on the Cumberland-Bladen county line. The site, home to several plants, one of which makes GenX, is about 100 miles upstream from Wilmington. [COURTESY OF THE FAYETTEVILLE OBSERVER]

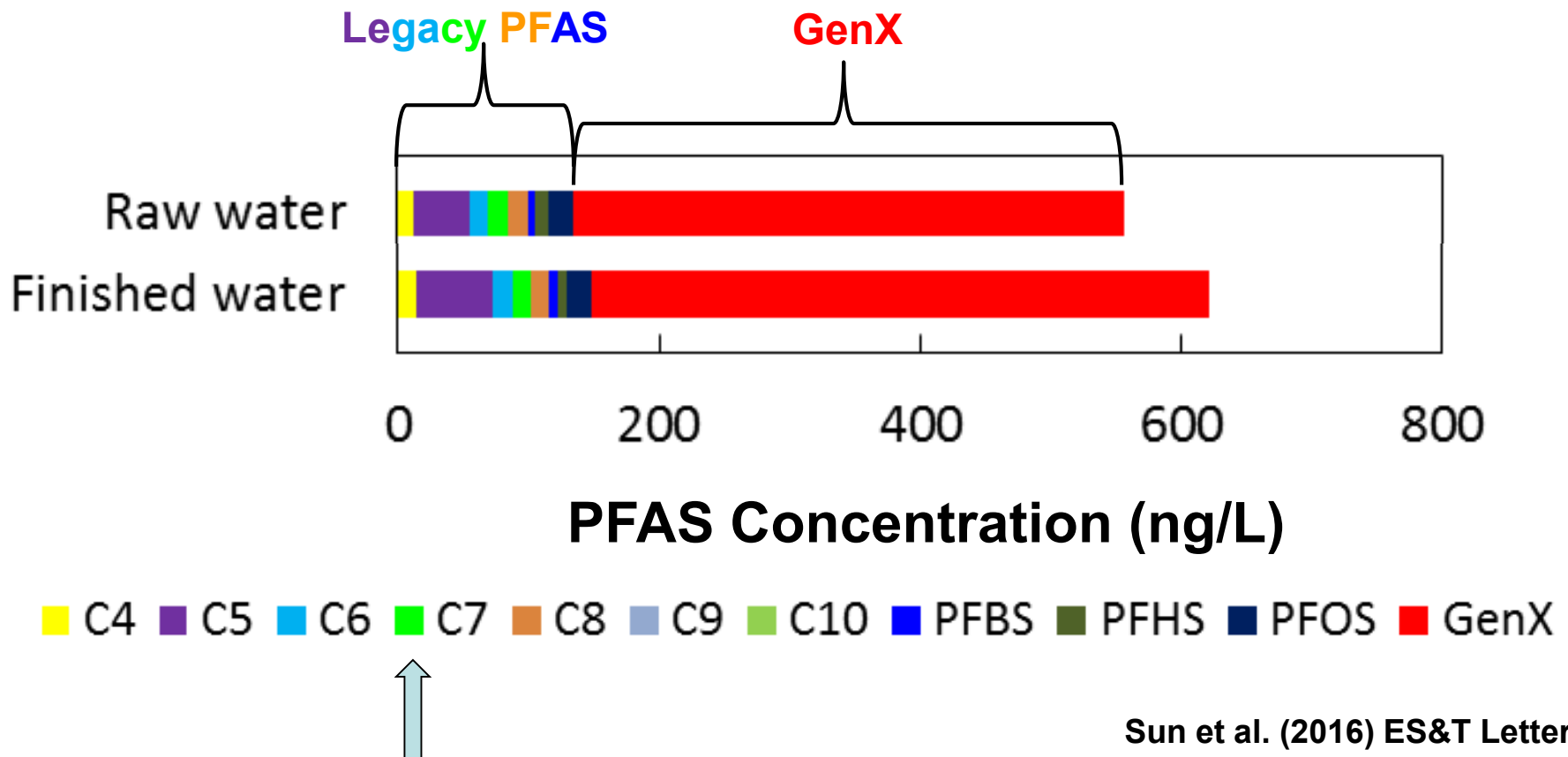
Utility can't filter out chemical produced upriver at Fayetteville plant

By Vaughn Hagerty StarNews Correspondent

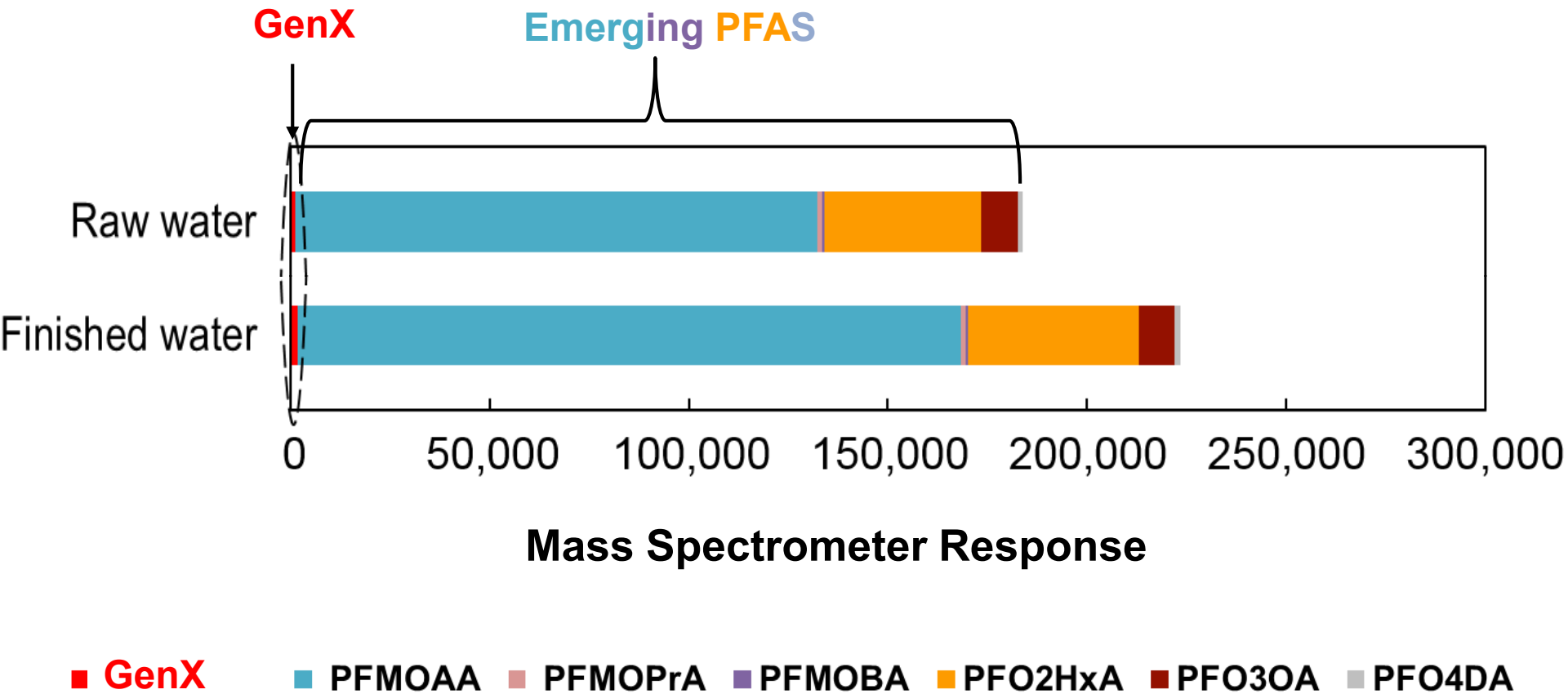
Posted Jun 7, 2017 at 10:31 AM

Updated Jun 8, 2017 at 10:38 AM

In Wilmington, only C7 was detected in samples collected as part of EPA's Third Unregulated Contaminant Monitoring Rule (2013-2015). C7 was only a very small percentage of the total PFAS concentration we could quantify



... and GenX was only a small fraction of the total mass spectrometer response associated with PFAS



Why are North Carolina communities concerned about exposure?

6/21/2017

Chemours: GenX polluting the Cape Fear since 1980 - News - Wilmington Star News - Wilmington, NC



Chemours: GenX polluting the Cape Fear since 1980

By Adam Wagner and Tim Buckland GateHouse Media

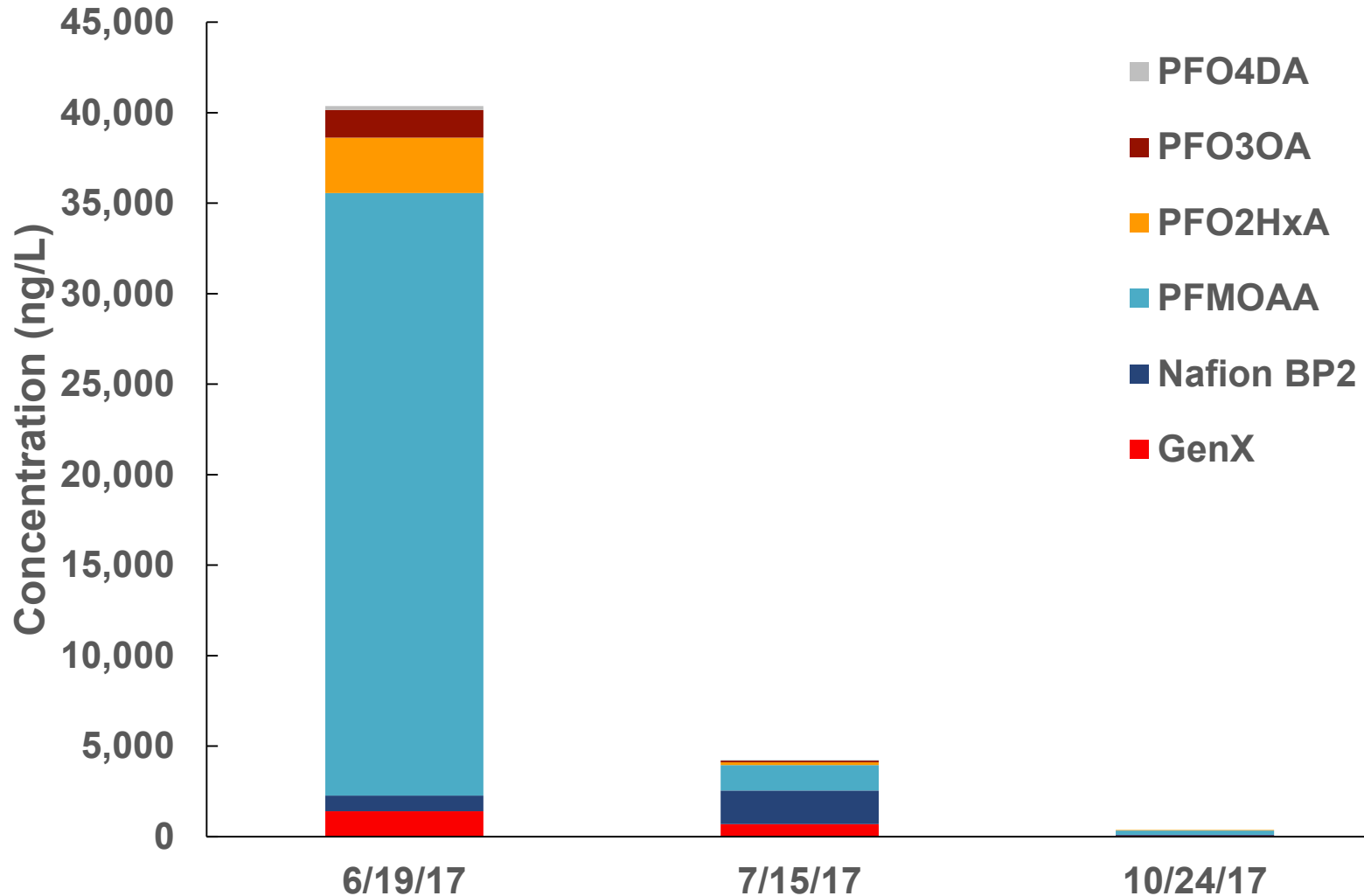
Posted Jun 15, 2017 at 2:00 PM

Updated Jun 16, 2017 at 12:06 AM

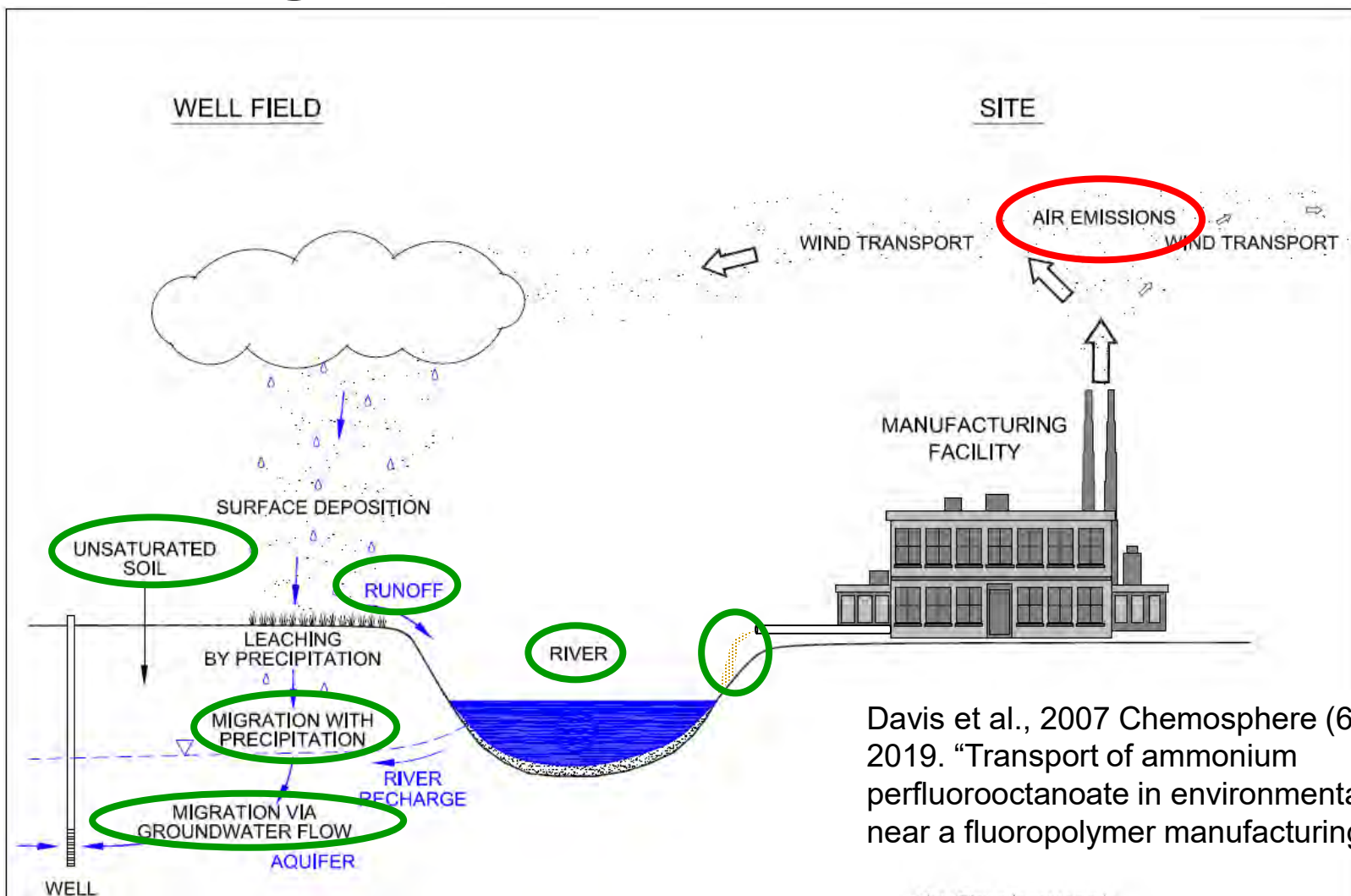
Wilmington-area officials demand answers, action during invitation-only meeting with company

WILMINGTON -- A former DuPont plant has been discharging an unregulated toxic chemical into the Cape Fear River since 1980, company officials revealed Thursday at a meeting with local and state officials.

PFAS concentrations in the lower Cape Fear River have dropped dramatically since mid-June 2017 (Kings Bluff Intake)



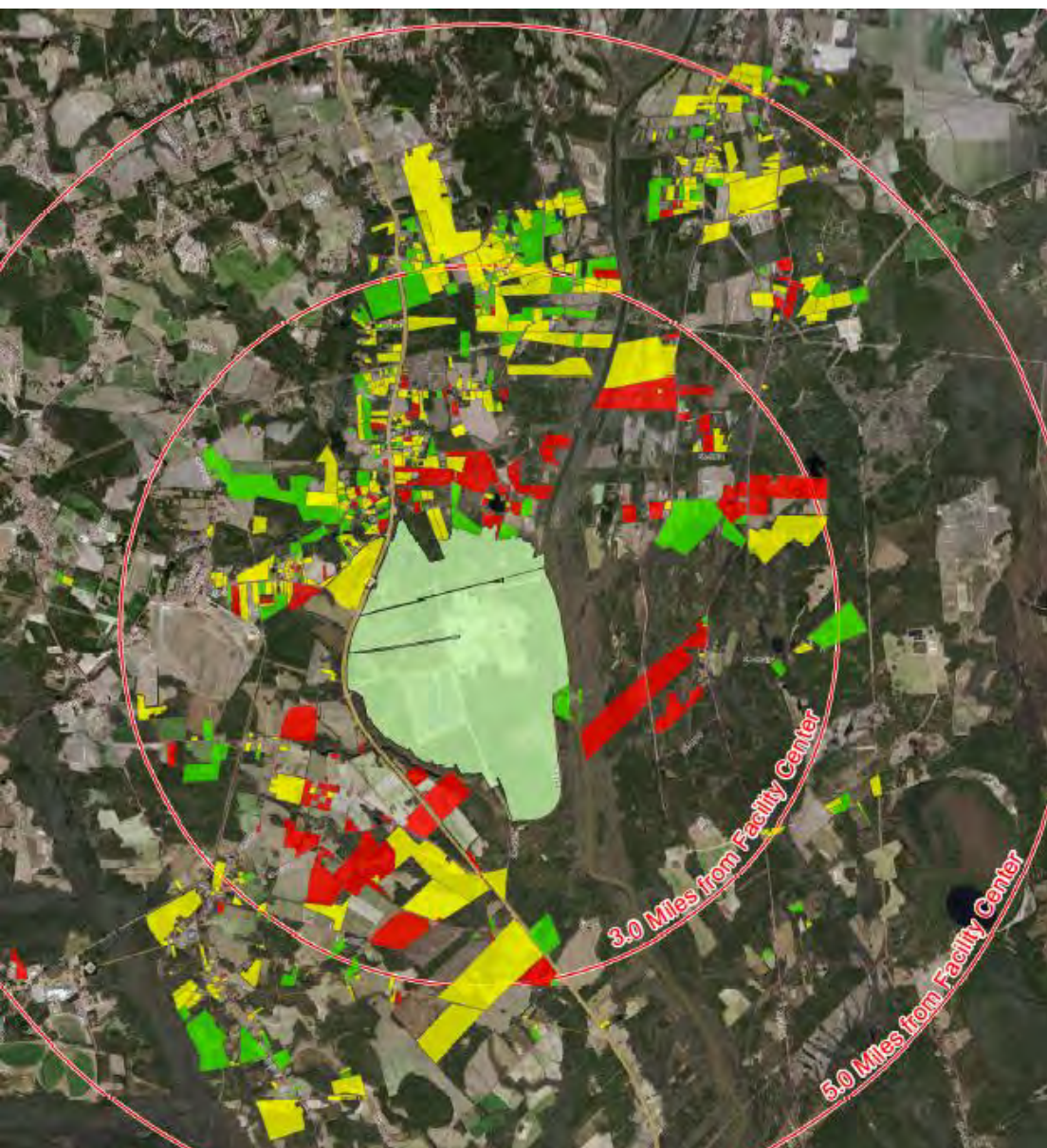
PFAS originate from emissions to air and water and can contaminate rivers, groundwater, air, soil, and plants



Davis et al., 2007 Chemosphere (67) 2011-2019. "Transport of ammonium perfluorooctanoate in environmental media near a fluoropolymer manufacturing facility"

*Note Figure is not to scale

GenX detected in private drinking water wells >5 miles from plant



Red: >140 ng/L

Yellow: detect-140 ng/L

Green: non-detect

~1,000 wells analyzed:

GenX >140 ng/L: 225

Detect – 140 ng/L: 538

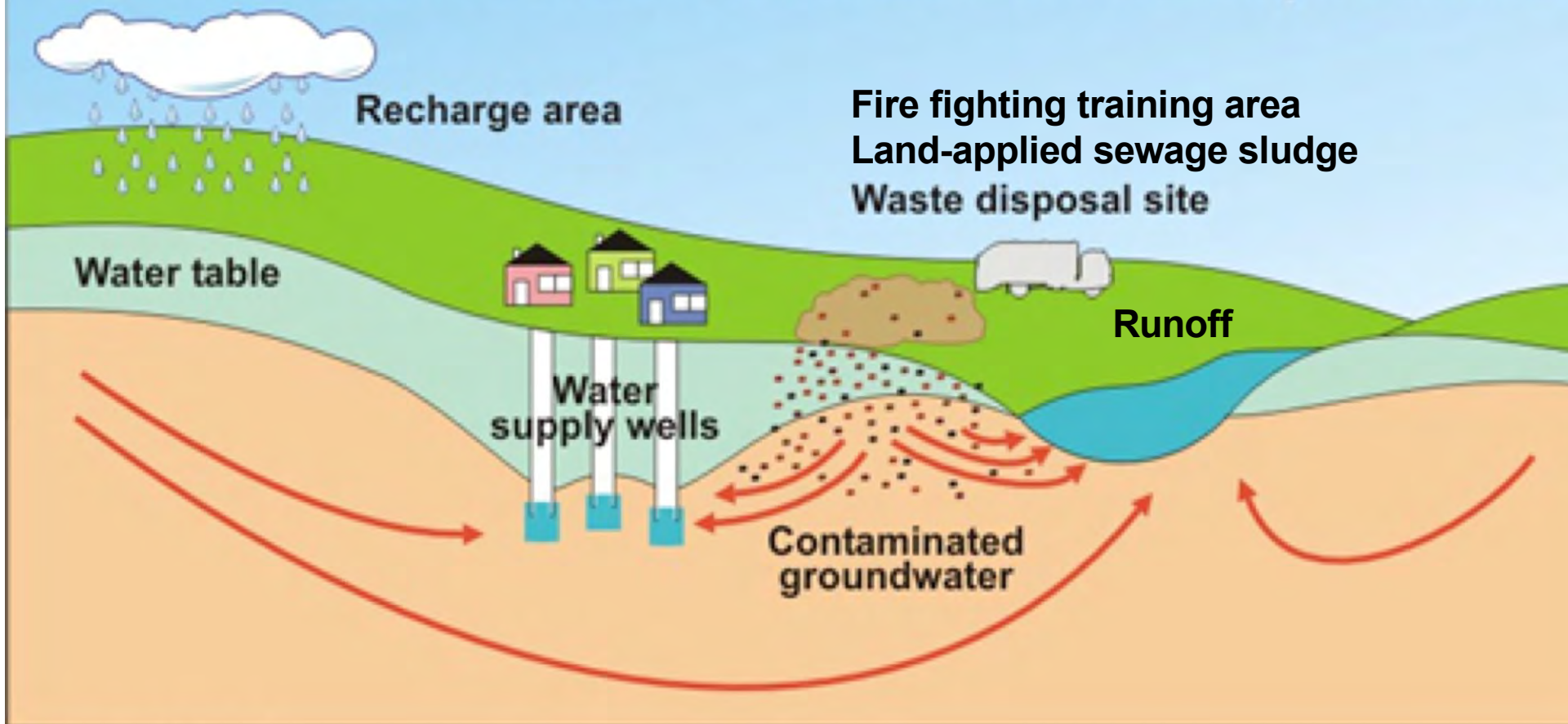
Non-detect: 231

Max. GenX: 4,000 ng/L

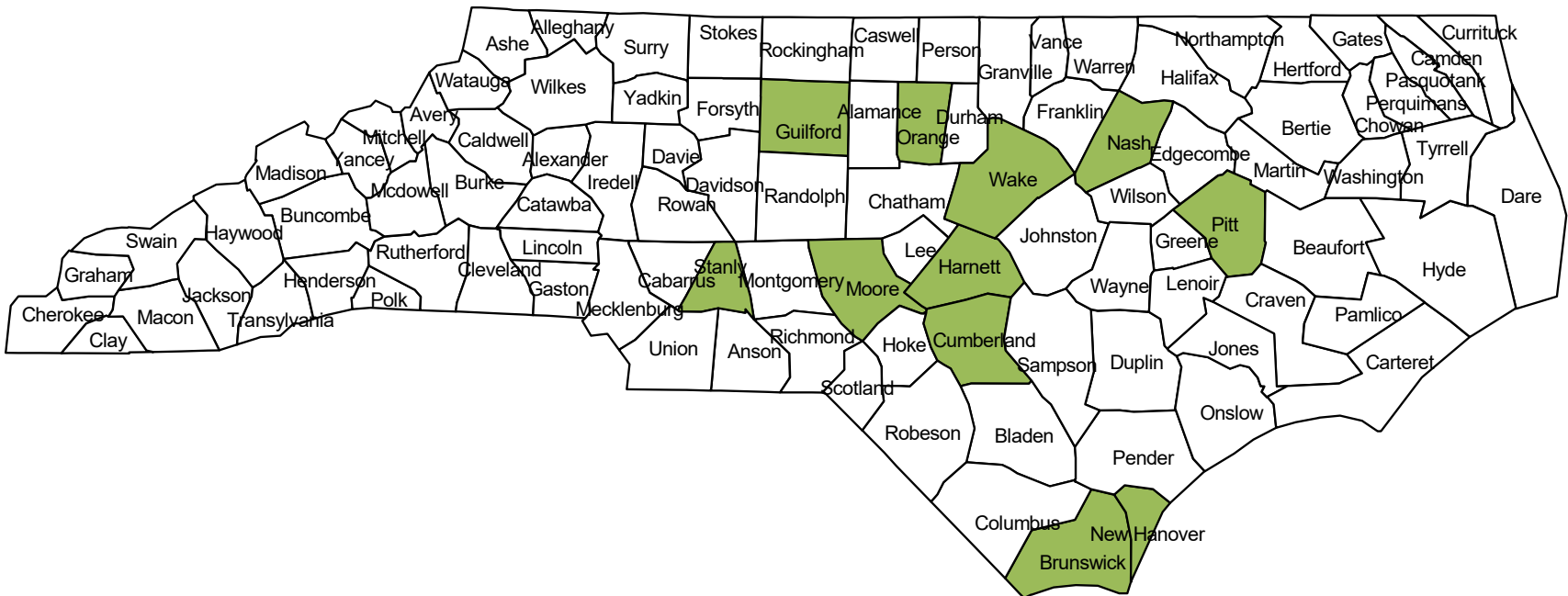
GenX detections in 3 counties

as fire fighting training can contaminate groundwater and surface water with PFAS

Groundwater contaminated from waste disposal site



**Based on UCMR3 data, PFAS were detected in 20 public water systems
Based on EPA data (2013-2015), PFAS were detected in 20 public water systems
located in 11 NC counties**



High levels of PFAS are present in the Haw River at Bynum (drinking water source for Pittsboro)

