

07/22/2024

[Street]

[City, State zip]

Dear [Participant],

Thank you for participating in the GenX Exposure Study 2023 blood collection event. We aim to understand human exposure to per- and polyfluoroalkyl substances (PFAS), including GenX, in people living in the Cape Fear River Basin, NC.

We are working in the Lower Cape Fear River Region (Brunswick and New Hanover County), the private well community around the Fayetteville Works facility near Fayetteville, and Pittsboro, NC. You are part of an important health study. Your participation will help us understand the long-term health consequences of PFAS exposure.

This letter shares the overall PFAS results for all study participants. At the end, we provide strip charts for the PFAS measured in your community. You should have already received your individual PFAS results in a separate letter. If you have not, please contact us at [genx-exposure-study@ncsu.edu](mailto:genx-exposure-study@ncsu.edu) or call us at **(855) 854-2641**. These samples and data were collected for research purposes only; they are not diagnostic. We are sharing your results with you so that you will know what we measured.

**What did we do?**

- From August 2023 through November 2023, we recontacted study participants who provided blood samples in 2020 and 2021. We asked them to come to another clinic event and provide a blood sample. A total of 519 people who participated in 2020-21 provided a second blood sample.
- We also enrolled 72 new participants to help improve the diversity of the study population.
- In total, we collected blood samples from 591 participants in the three study areas:
  - 347 people from Lower Cape Fear River Basin
  - 126 people from the Private well community around the Fayetteville Works facility, and
  - 118 people from the Town of Pittsboro.

- We tested blood samples for 41 PFAS in 2023. The list of all PFAS we tested for is on our website (<https://bit.ly/3VsNf40>). The blood samples were analyzed at Eurofins Environment Testing in Sacramento, California.
- We reported personal PFAS results in letters to all participants in April and May 2024.
- Now, we are sharing the summary results for your community.

### **What's in this letter?**

- The community level PFAS results from all blood samples collected in 2023.
- Stripcharts at the end of the letter showing your 2023 PFAS blood results compared to 2023 PFAS blood results for people in your community. You will also see the median concentration (half of the participants are above this value, half of the participants are below) of the results for each PFAS.
- While the community's results are shared with all participants in your community, your individual results are shared only with you. Details on your individual results are found in the letter you received in April or May 2024.
- Details on upcoming webinars and community meetings to discuss and share these results with you and others from your community.

### **What are PFAS and where did PFAS in the Cape Fear River Basin, NC, come from?**

- PFAS are human-made chemicals that are resistant to heat, water, and grease. Because of this, they have been used to make a large variety of products including non-stick cookware, fast-food packaging, rain gear, stain- and water-resistant carpeting and upholstery, paint, microchips, and fire-fighting foams. PFAS last for a long time in the environment and can accumulate in plants, animals, and people.
- Sources of PFAS contamination in the Cape Fear River Basin include textile and furniture manufacturing, use of sludge from wastewater treatment plants as fertilizer, and use of fire-fighting foams at airports.
- Also, discharges into water and air from the Fayetteville Works facility near Fayetteville, NC, have contaminated the Fayetteville area and lower Cape Fear River Basin with PFAS.

### **What did we find in blood samples collected in 2023?**

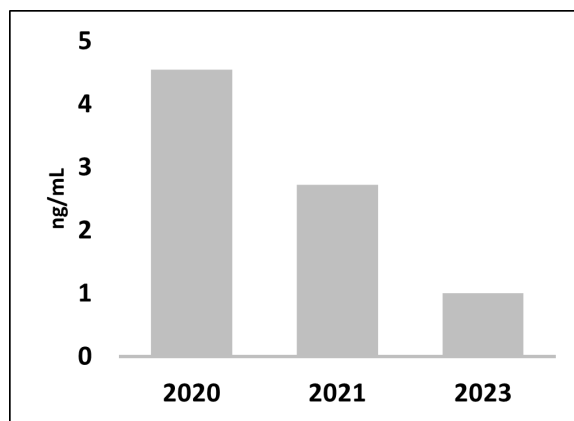
- We detected 4 PFAS (PFOS, PFOA, PFHxS, and PFNA) in almost everyone who participated no matter where they lived in the Cape Fear River Basin. These 4 PFAS are also commonly detected in people living in the United States. In this study, the concentrations in people were higher than the United States national averages.
- We detected 8 PFAS in more than half of participants across all communities (PFOS, PFOA, PFHxS, PFNA, PFDA, PFUnDA, PFHpS, and PFO5DoA).

- In 2023, we continue to detect PFO5DoA in most people (90%) in the Lower Cape Fear River Basin. We also measured it in some people (18%) in the Fayetteville private well community and some people from Pittsboro (13%).
- We detected Nafion byproduct 2 in more than half of people in the lower Cape Fear River Basin (57%) and in some people in the Fayetteville area (21%). Only one person from Pittsboro had a very low detectable level of Nafion byproduct 2.
- At the end of this letter (pages 7-10) are strip charts for each PFAS measured for your community in 2023, with your individual results noted on the charts.

### How have levels changed over time?

Since our initial blood collection, PFAS exposure through drinking water has been reduced through a combination of interventions, including treatment of public water, home filters, and bottled water. We can see the impact this has made in the PFAS blood measurements for samples collected in 2020, 2021, and 2023.

- On a community level, the blood levels of all PFAS were lower in 2023 than they were in 2020-2021.
- PFOA, PFOS, and PFHxS blood levels dropped 20-30% from 2020 to 2023.
- Blood levels of PFO5DoA and Nafion byproduct 2, two Chemours Fayetteville Works-related chemicals, continue to come down in people from the lower Cape Fear River Basin. **Figure 1** shows the change in median PFO5DoA blood levels from 4.5 ng/mL in 2020 to <1 ng/mL in 2023. Similar changes were seen for Nafion byproduct 2, but the overall levels were much lower.



**Figure 1:** Changes in Median PFO5DoA levels in blood from 2020 to 2023 in people from the Lower Cape Fear River Basin

- Although most people’s PFAS levels went down, some individuals did have some PFAS levels increase from 2020-2021. This may be due to ongoing exposures to PFAS or biological factors that affect PFAS levels in blood. We are working to understand why this is happening.

## What are the potential health effects?

In July 2022, the National Academies of Sciences, Engineering and Medicine (NASEM) reviewed the scientific literature on human health effects of PFAS. The committee determined that PFAS exposure is possibly associated with:

- elevated cholesterol,
- reduced immune response to vaccines,
- increased risk of breast, testicular, and kidney cancers,
- thyroid disruption,
- altered liver enzymes,
- increased risk of ulcerative colitis,
- decreased infant and fetal growth, and
- pregnancy-induced hypertension

Other health effects are possible but lacked sufficient evidence at the time of review.

Based on this literature review, the NASEM published recommendations for medical monitoring of PFAS-exposed people based on the total (sum) concentration of 7 specific PFAS in blood: PFOS, PFOA, PFHxS, PFNA, PFDA, PFUnDA and MeFOSAA (see table on right).

People with less than 2 ng/mL were not expected to have health effects related to PFAS exposure while those with more than 20 ng/mL serum PFAS were expected to have a higher risk. The NASEM report is available online ([bit.ly/PFAS-guidance](https://bit.ly/PFAS-guidance)). A summary of the guidance is included here.

### 2022 Guidance on PFAS from the National Academies of Sciences, Engineering, and Medicine (NASEM)

#### Sum PFAS More Than 20 ng/mL

Associated with higher risk of adverse effects. You should...

Reduce PFAS exposure

Ask your medical provider to check for elevated cholesterol levels, hypertensive disorders of pregnancy, breast cancer, thyroid function, kidney and testicular cancer, and ulcerative colitis

#### Sum PFAS Between 2 and 20 ng/mL

Associated with potential for adverse effects in sensitive populations. You should...

Reduce PFAS exposure

Ask your medical provider to check for elevated cholesterol levels, hypertensive disorders of pregnancy, breast cancer, thyroid function, kidney and testicular cancer, and ulcerative colitis

#### Sum PFAS Less Than 2 ng/mL

Health effects not expected at this time. You should...

Maintain usual medical care

These guidelines do not consider exposure to other PFAS, such as PFO5DoA. Please see your individual results letter, received April-May 2024, for your individual NASEM recommendations.

### How do study participants compare?

- In the 2023 round of GenX Exposure Study testing, 99% of the participants had more than 2 ng/mL of these PFAS in their blood, suggesting that almost everyone should follow the NASEM guidance for medical follow up.
- Over 20% of people in our study had levels higher than more than 20 ng/mL.

**How can you reduce your PFAS exposure?** The PFAS in your blood tells you about the PFAS that you are currently exposed to and what you were exposed to in the past. Many people in the Cape Fear River Basin have been exposed to PFAS through contaminated drinking water. You may also be exposed to PFAS through food, consumer products, and workplace use of PFAS.

Recently, municipal water suppliers have worked to remove PFAS from drinking water. The Sweeney Water Treatment plant of the Cape Fear Public Utility Authority (CFPUA) in New Hanover County, H2Go which serves some of Brunswick County, and the Town of Pittsboro have installed treatment technologies to remove PFAS from drinking water sources. Brunswick County Utilities' filtration technology is set to be completed early 2025.

If you use well water, you may want to have your water tested for PFAS and, if PFAS are detected, install filtration at your sink to reduce PFAS exposure. Private well owners in the Fayetteville area may be eligible for water testing and remediation (<https://bit.ly/DEQGenX>).

To learn what more you can do to reduce PFAS exposure, please visit this website (<https://bit.ly/ATSDRPFAS>). You can also contact our community partners:

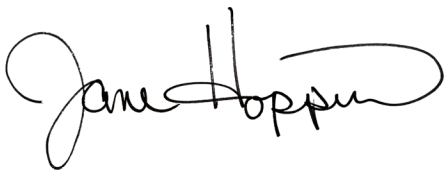
- Cape Fear River Watch for Lower Cape Fear River Basin (<https://capefearriverwatch.org/>; phone: **910-762-5606**),
- Sustainable Sandhills for private well community (<https://sustainablesandhills.org/>; phone: **910-484-9098**), and
- Haw River Assembly for Pittsboro (<https://hawriver.org>; phone: **910-542-5790**).

## What's next?

- Please join us for a webinar to learn more about these results. We will also have a question-and-answer period. The webinar is scheduled for August 6, 2024, 6-8pm, and here's the link to join <https://ncsu.zoom.us/s/99034944318> or telephone **(470) 381-2552**, webinar ID 990 3494 4318. If you miss the webinar, it will be recorded and available on our website, <https://genxstudy.ncsu.edu>.
- In addition to the webinar, we plan to come to your community in person to share these results and answer any questions. We will send you details by email, announce it on social media, and post on our website when meeting plans are finalized. We hope you will attend at least one of these meetings and bring others who are not study participants but would like to know what we are learning.
- Please check our study website (<https://genxstudy.ncsu.edu>) or the NC State Superfund website ([superfund.ncsu.edu](https://superfund.ncsu.edu)) for more information on the study and upcoming events.
- If you have questions about these results, the GenX Exposure Study, or the NASEM recommendations, please contact our study office by phone **(855-854-2641)** or email ([genx-exposure-study@ncsu.edu](mailto:genx-exposure-study@ncsu.edu)).

Once again, we thank you for your participation in the GenX Exposure Study.

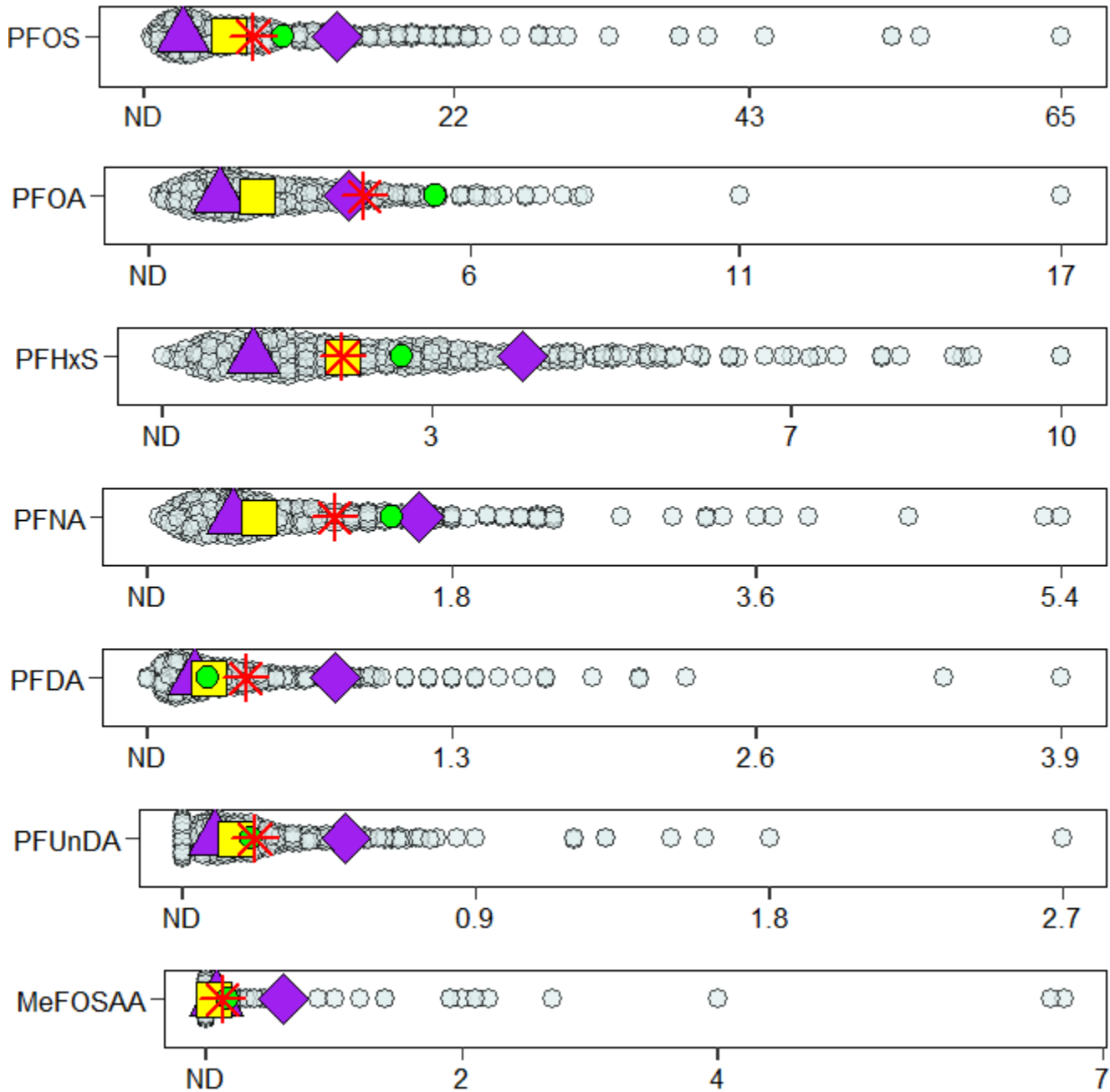
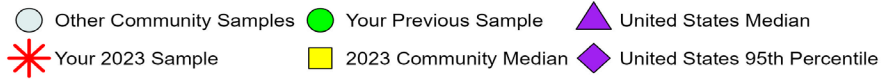
Sincerely,

A handwritten signature in black ink that reads "Jane Hoppin". The signature is fluid and cursive, with a large initial "J" and a long, sweeping underline.

Jane Hoppin, ScD

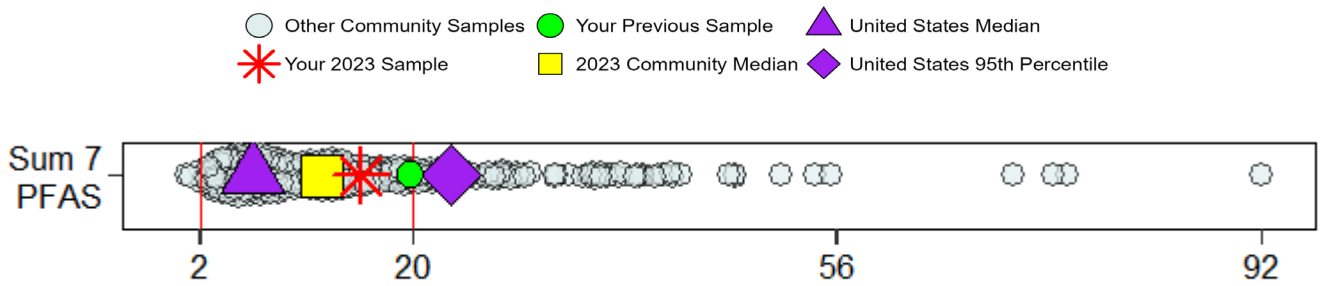
GenX Exposure Study, Principal Investigator

**Below are the results for the sample you provided in 2023.** Each strip chart shows results for all [Total] people who lived in the Lower Cape Fear River Basin, North Carolina, and provided a blood sample in 2023. For PFAS measured by the Centers for Disease Control and Prevention (CDC) in 2017-2020, we show the median and 95th percentile for United States residents. These values show you how your 2023 sample (red star) compares with your previous sample if you had one (green circle) and the average United States resident (purple triangle) and someone who has a blood level higher than 95% of US residents (purple diamond). **All concentrations are nanograms PFAS per milliliter of blood (ng/mL).** "ND" means not detected.



The National Academies of Sciences, Engineering, and Medicine recently published guidelines for PFAS blood levels based on the summed blood concentration of 7 PFAS (PFOS + PFOA + PFHxS + PFNA + PFDA + PFUnDA + MeFOSAA). **The strip chart below shows your blood's sum for these 7 PFAS in your sample from 2023 and the sums for samples from all [Total] people in the Lower Cape Fear River Basin, North Carolina, in 2023.** You can also see how your 2023 sample (**red star**) compares with your previous sample if you had one (**green circle**) and the average United States resident (**purple triangle**) and someone who has a blood level higher than 95% of US residents (**purple diamond**). **The concentrations are nanograms summed PFAS per milliliters of blood (ng/mL). "ND" means not detected.**

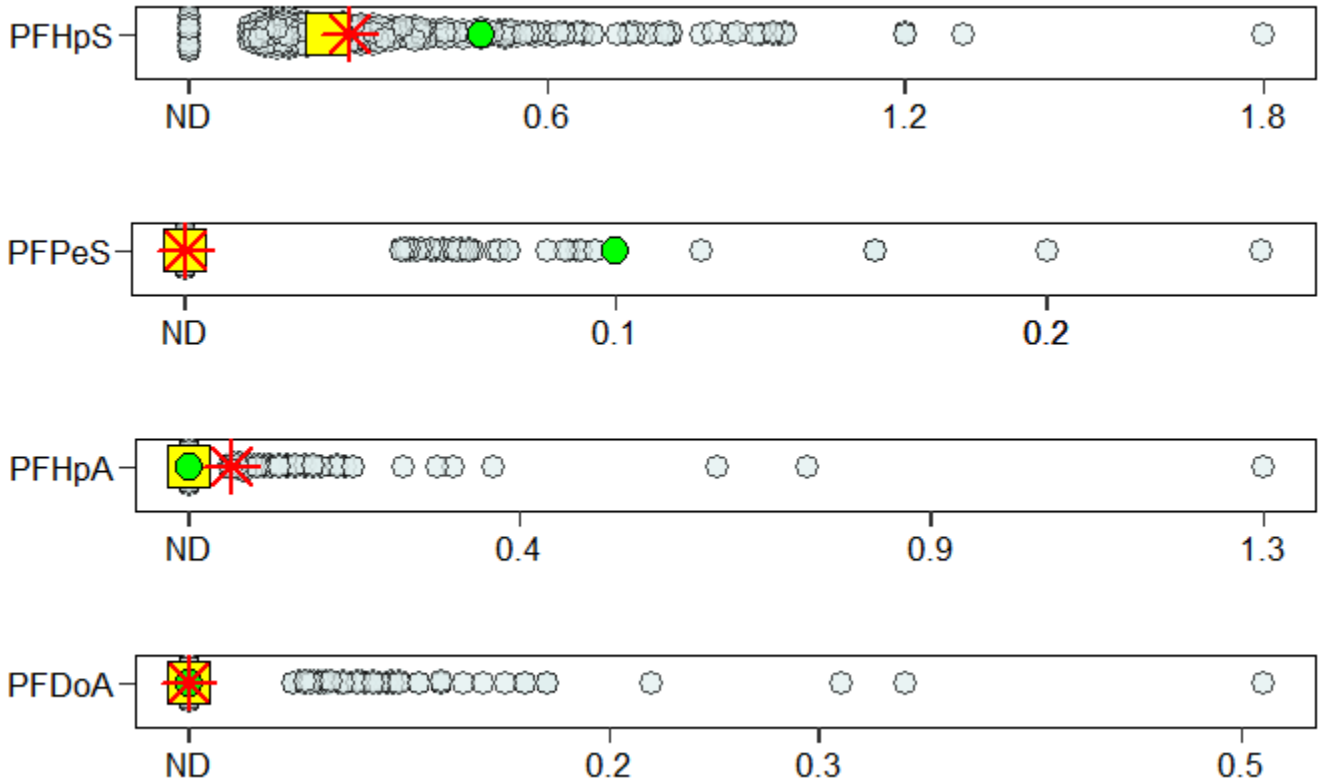
According to the National Academies report, sum PFAS between 2 and 20 ng/mL is associated with potential for adverse health effects in sensitive populations, and sum PFAS greater than 20 ng/mL is associated with higher risk of adverse health effects. We marked 2 ng/mL and 20 ng/mL with red, dotted lines on the strip chart below. See page 5 for more information about your sum and the National Academies' recommendations.





The strip charts below are for other PFAS frequently detected in Lower Cape Fear River Basin Region, North Carolina, in 2023. The United States median and 95th percentile are not shown on these strip charts because CDC did not test for these PFAS in blood samples collected 2017-2020. You can compare your 2023 sample (red star) to your previous sample if you had one (green circle) and to others in your community. **All concentrations are nanograms PFAS per milliliter of blood (ng/mL). "ND" means not detected.**

○ Other Community Samples \* Your 2023 Sample ● Your Previous Sample ■ 2023 Community Median



The strip charts below are for other PFAS frequently detected in Lower Cape Fear River Basin Region, North Carolina, in 2023. The United States median and 95th percentile are not shown on these strip charts because CDC did not test for these PFAS in blood samples collected 2017-2020. You can compare your 2023 sample (red star) to your previous sample if you had one (green circle) and to others in your community. All concentrations are nanograms PFAS per milliliter of blood (ng/mL). "ND" means not detected.

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