Dear [INSERT PARTICIPANT/PARENT NAME],

Thank you for participating in the GenX Exposure Study. This research study aims to see if GenX and other per- and polyfluoroalkyl substances (PFAS) are in the bodies of people living in the Cape Fear River Basin, NC, and to better understand human exposure to PFAS. PFAS are a large group of human-made chemicals that stay in the environment for a long time.

As part of this study, we collected well water and blood samples from people living in Cumberland or Bladen counties, NC, in February 2019, and we developed ways to measure GenX and other PFAS in those samples. In May 2020, you should have received the PFAS results of the water samples. The report you are receiving today describes the results from the blood samples collected in 2019. Your individual PFAS blood results are on Pages 7-9. We have not begun to analyze the blood samples collected in 2021.

What did we do?

- In February 2019, we enrolled 153 participants (ages ranged from 9 to 85 years) from Cumberland or Bladen counties and we collected one blood sample from each participant. We recruited people whose wells had already been tested for GenX and GenX values had previously been reported to the NC Department of Environmental Quality. We tried to have about half of the homes in our study have wells with GenX levels above 140 ng/L, and half with levels below 140 ng/L.
- We tested blood samples for 26 different PFAS including GenX and Nafion byproduct 2.
  - These 26 PFAS were chosen based on which PFAS have been found in the Cape Fear River Basin and which PFAS are commonly found in the blood of people living in the United States.
The testing of blood samples took place at the US Environmental Protection Agency (USEPA) in Research Triangle Park, NC.

The full list of the 26 PFAS tested in blood are on the GenX Exposure Study website (https://genxstudy.ncsu.edu/what-we-are-measuring/).  

**What did we find?**

- We detected 22 of the 26 PFAS in at least one blood sample (see Figure 1). If we did not measure a PFAS above the reporting limit of our testing method, the sample was considered a “non-detect” for that PFAS.

Figure 1 Percent (%) detection for 22 PFAS, from most frequently detected to least frequently detected, in 153 participants’ blood samples, Fayetteville, NC, 2019
• We detected five PFAS (PFHxS, PFOS, PFNA, PFOA and PFHpS) in more than 90% of samples. These PFAS have been detected throughout the Cape Fear River Basin and have been found in many people living in the United States.

• We detected Nafion byproduct 2 in over half (56%) of participants’ samples (see Figure 2). Nafion byproduct 2 is a byproduct of production at the Fayetteville Works Facility in North Carolina. Therefore, people in the Cape Fear River Basin have been uniquely exposed to Nafion byproduct 2.

Figure 2 Nafion byproduct 2 results in ng/mL (or parts-per-billion) for 153 blood samples from the Fayetteville area, NC, 2019.

• We detected six PFAS (PFUnDA, PFO5DA, PFHpA, 6:2 FTS, PEPA, and PFPeS) somewhat frequently. These six PFAS were detected in more than 10% but fewer than 50% of participants’ samples.

• We detected ten PFAS (PFO2HxA, PFHxA, 4:2 FTS, NVHOS, 8:2 FTS, PFTrDA, PFO4DA, PFPeA, PFDS, and PFO3DA) in fewer than 10% of participants’ samples.

• We did not detect four PFAS (GenX, Hydro-EVE, PMPA, and PFNS) in the blood of any participants. This means that either these PFAS were not present in the blood samples or they were present at levels too low for us to measure with our instrument.
How did our results compare with the US population?

The median levels of five PFAS (PFHxS, PFHpS, PFOA, PFOS, and PFNA) were higher in the blood samples from the Fayetteville area than in estimated levels for the US population. The median is the number in the middle of the data. Half the people have a blood level above the median, and half the people have a blood value below the median. Every year, the Centers for Disease Control and Prevention (CDC) conducts a survey called NHANES (the National Health and Nutrition Examination Survey). NHANES collects blood samples and medical information from people across the United States. The blood samples are analyzed for some PFAS. We used the NHANES PFAS results from 2017-2018 as a comparison for the 2019 results from the GenX Exposure Study (see Figure 3).

Figure 3 Median blood concentrations in 153 GenX Exposure Study participants, Fayetteville area, NC, 2019, and 1,929 participants in CDC’s NHANES survey, 2017-2018
What can and can’t these PFAS blood results tell you?

These results can tell you how much PFAS was present in your blood on the day that you provided the sample. However, we don’t know how levels change over time. PFAS that we did not find in blood could still be present somewhere else in the body.

Some of the PFAS we tested for in blood have been released to the environment by the Fayetteville Works fluorochemical manufacturing facility, and some of the PFAS have many possible sources. We don’t know exactly what exposure (for example, through drinking water, air, food, or something else) led to the presence of PFAS detected in blood.

This small group of 153 people may not be representative of the full range of people exposed to PFAS from Fayetteville Works. Since we recruited people in February 2019, many more wells in the region have been found to be contaminated with PFAS (https://deq.nc.gov/news/key-issues/genx-investigation/groundwater#private-well-sample-results)

In this study, we are reporting concentrations for many PFAS that have not been measured by other researchers before. We are confident that what we found is present. However, the exact concentration may be somewhat different due to limitations of the testing method. For PFO5DA and PEPA as well as other PFAS measured infrequently, we did not have commercially available, analytical standards for the testing. To get an accurate measurement, researchers need analytical standards with known concentrations of the PFAS they are measuring. Results for those PFAS without commercially available, analytical standards are estimates only. The limitations we have in our testing method are likely to be the same limitations other labs are facing.

While scientific research on PFAS is growing, for now these PFAS blood results cannot tell you:

- If a current health problem is related to the PFAS levels found in your body
- If the PFAS levels in your body will have negative health effects now or later in life
What is the GenX Exposure Study doing next?

We are increasing the number of participants in the GenX Exposure Study to understand the impact of PFAS throughout the Cape Fear River Basin, NC. We have recruited new participants in the Fayetteville area, and the Wilmington and Brunswick County areas, and we will be recruiting people from Pittsboro, NC, in November 2021. With these samples, we will measure PFAS and will evaluate how PFAS may be impacting human health in the region.

Your blood results

Your blood results are presented on the following pages. Currently, there are no health advisory levels for PFAS in blood. You should not compare your blood result with health advisory levels for PFAS in drinking water (for example, 70 ng/L for PFOA and PFOS and 140 ng/L for GenX).

We will host a community meeting to discuss these results. This meeting will be held on November 10, 2021, 6-8pm, at the Hope Mills Recreation Center (5766 Rockfish Road, Hope Mills, NC 28348). You can also join the meeting on Zoom. The details will be posted on our study website (https://genxstudy.ncsu.edu/). If you have questions about the GenX Exposure Study, please contact our study office by phone (855-854-2641) or email (genx-exposure-study@ncsu.edu).

We thank you for your participation in the GenX Exposure Study.

Sincerely,
Jane Hoppin, ScD
GenX Exposure Study, Principal Investigator
Below are your blood results for February 2019. We detected 8 of 26 PFAS we tested for in your blood sample. For 12 PFAS detected in more than 10% of blood samples, we are showing where your sample is compared with other samples collected in the Fayetteville area in 2019 and the median. The concentration units are ng/mL (or parts-per-billion) for all PFAS but the concentration range (the minimum and maximum values) is not the same for all PFAS. ND means “non-detect”. A non-detect is a sample where we did not measure the PFAS above the reporting limit of our testing method.
For two PFAS (PFO5DoA and PEPA) shown below, we do not provide specific concentrations. This is because we did not have commercially available, analytical standards for the testing of these two PFAS. To get an accurate measurement, researchers need analytical standards with known concentrations of the PFAS they are measuring. Therefore, we only show where your sample is compared with others and the median.

**February 2019 Blood Results**

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**PFO5DoA**

- Median: [Graphical representation of median]
- Your sample: [Graphical representation of your sample]

(100 ND)

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**PEPA**

- Median: [Graphical representation of median]
- Your sample: [Graphical representation of your sample]

(120 ND)