



[Insert Date]

[Name]

Address

City, State, Zip code]

Dear [Insert Name],

Thank you for being a part of the CDC/ATSDR PFAS exposure assessment. We are grateful for the time and effort you gave to this project. We tested your blood and urine for per- and polyfluoroalkyl substances (PFAS). This letter is to give you your test results along with how they compare to measurements from others. You may share these results with your doctor if you would like – it's your choice, however we note that there are no clinical guidelines for interpreting PFAS blood and urine levels. Research to better understand the health effects associated with PFAS exposure is ongoing, but scientists are not currently certain of how PFAS levels in the blood can affect a person's health. More research is needed to clarify the risks posed by PFAS exposure.

The remainder of this letter summarizes the results of your blood and urine sample results. As a reminder, only a small subset of urine samples collected from study participants have been analyzed at this time. If your results are not provided in this letter, they were not randomly selected for the initial analysis of 10% of urine samples. Should ATSDR decide to analyze all urine samples based on the results of the initial 10% analysis, ATSDR will mail you a summary of your results at a later date.

The Results of Your Blood Test

Table 1 provides a list of all the specific PFAS that we measured in your blood. The table also lists the acronyms for the PFAS.

Table 2 shows the concentration of specific PFAS we found in your blood. Your result is in units of micrograms per liter ($\mu\text{g/L}$). One $\mu\text{g/L}$ equals one part per billion, equivalent to about one drop of ink in a large tanker ship. The table also compares your PFAS levels to people in the United States, namely, the geometric mean and 95th percentile values, when available.



Table 3 shows your results compared to results from other members in your community who also participated in this assessment. These are preliminary results for your community. Our final report will include a more detailed analysis.

The Results of Your Urine Test (Include only if urine sampling was conducted)

Table 4 provides a list of all the specific PFAS that we measured in your urine. The table also lists the acronyms for the PFAS.

Table 5 shows the concentration of specific PFAS we found in your urine. Your result is in units of micrograms per liter (µg/L). One µg/L equals one part per billion, equivalent to about one drop of ink in a large tanker ship. The table also shows range of PFAS levels for people in the United States, namely, the geometric mean and 95th percentile values, when available.

Table 6 shows your results compared to results from other members in your community who also participated in this assessment. These are preliminary results for your community. Our final report will include a more detailed analysis.

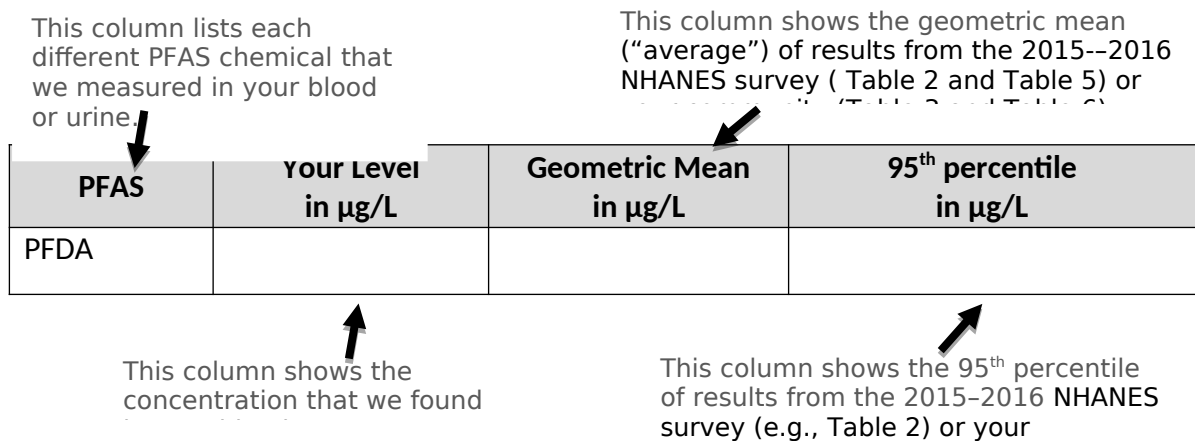
Suggestions for Interpreting the Results

The tables in this letter provide a lot of information. To fully understand all this information, it helps to know about a survey called NHANES (the National Health and Nutrition Examination Survey).

Every year, the CDC examines about 5,000 people from across the country. As part of the survey, CDC takes blood and urine samples and tests them for chemicals including PFAS. The NHANES blood and urine tests for PFAS chemicals come from a representative sample of members of the U.S. population.

Having a representative sample of the U.S. population means NHANES helps CDC estimate, for example, the levels of PFAS in the U.S. population. That is how we can compare the results of your blood and urine tests to reference values for people in the United States.

Now, let’s talk about interpreting your results presented in Tables 2, 3, 5, and 6. The diagrams below can help you understand the data we are giving you.





A couple of important notes:

- If your PFAS result is in **bold**, then it is higher than the 95th percentile. When comparing to the U.S. population, this means that your result is higher than what is measured in most people in the United States. When comparing to your community, this means that your result is higher than that measured in most people living in your community.
- If your result is not in bold, then it is lower than 95th percentile and is lower than what is measured in either most people in the United States or most people in your community.

PFAS	Acronym
perfluorodecanoic acid	PFDA
perfluorohexane sulfonic acid	PFHxS
perfluorononanoic acid	PFNA
total perfluorooctanoic acid	PFOA
ammonium perfluorooctanoate	n-PFOA
mixture of perfluoro-5-methylheptanoic acid isomers	Sb-PFOA
total perfluorooctane sulfonic acid	PFOS
sodium perfluoro-1-octanesulfonate	n-PFOS
mixture of sodium perfluoro-5-methylheptane sulfonate isomers	Sm-PFOS
N-methyl perfluorooctanesulfonamidoacetic acid	MeFOSAA
perfluoroundecanoic acid	PFUnA

Table 1: List of PFAS measured in blood and corresponding acronyms



Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

Table 2: Your PFAS blood levels compared to what has been measured in the general U.S. Population

PFAS	Your Level in µg/L	U.S. Population (all ages) Geometric Mean in µg/L ^a	U.S. Population (all ages) 95 th percentile in µg/L ^a
PFDA	[insert level]	[insert value]	[insert value]
PFHxS			
PFNA			
PFOA ^b			
n-PFOA			
Sb-PFOA			
PFOS ^b			
n-PFOS			
Sm-PFOS			
MeFOSAA			
PFUnA			

Note: U.S. Population results above from NHANES 2015-2016.

ND - Not detected (limit of detection = 0.1 µg/L)

* Geometric mean was not calculated because not enough people had results that were detectable.

**95th percentile was below the limit of detection, 0.1 µg/L.

^aSource: CDC. Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables, January 2019. Available at: <https://www.cdc.gov/exposurereport/>

^bPFOA was calculated by adding n-PFOA and Sb-PFOA results. PFOS was calculated by adding n-PFOS and Sm-PFOS results. When one ND and one measured value are reported, a value of 0.07 µg/L is substituted for ND values, which equals 0.1 µg/L (the limit of detection) divided by the square root of two.

Table 3: Your PFAS blood levels compared to other people who participated in this assessment from [insert community name]

PFAS	Your Level (µg/L)	Geometric Mean in your Community in µg/L ^a	95 th Percentile in your Community in µg/L ^a
PFDA	[insert level]	[insert value]	[insert value]
PFHxS			
PFNA			
PFOA ^b			
n-PFOA			
Sb-PFOA			
PFOS ^b			
n-PFOS			
Sm-PFOS			
MeFOSAA			
PFUnA			

ND- Not detected (limit of detection = 0.1 µg/L)
 * Geometric mean was not calculated because not enough people had results that were detectable.
 **95th percentile was below the limit of detection, 0.1 µg/L.

^a The statistics shown here are based on results from XX participants in your community.

^b PFOA was calculated by adding n-PFOA and Sb-PFOA results. PFOS was calculated by adding n-PFOS and Sm-PFOS results. When one ND and one measured value are reported, a value of 0.07 µg/L is substituted for ND values, which equals 0.1 µg/L (the limit of detection) divided by the square root of two.

(Only include Tables 4-6 if urine sampling was conducted.)

PFAS	Acronym
perfluorobutane sulfonic acid	PFBS
perfluoroheptane sulfonic acid	PFHpS
perfluorohexane sulfonic acid	PFHxS
total perfluorooctane sulfonic acid	PFOS
sodium perfluoro-1-octanesulfonate	n-PFOS
mixture of sodium perfluoro-5-methylheptane sulfonate isomers	Sm-PFOS
perfluorobutanoic acid	PFBA
perfluoropentanoic acid	PFPeA
perfluorohexanoic acid	PFHxA
perfluoroheptanoic acid	PFHpA
total perfluorooctanoic acid	PFOA
ammonium perfluorooctanoate	n-PFOA
mixture of perfluoro-5-methylheptanoic acid isomers	Sb-PFOA
perfluorononanoic acid	PFNA
perfluorodecanoic acid	PFDA
perfluoroundecanoic acid	PFUnA
hexafluoropropylene oxide dimer acid	HFPO-DA (GenX)
4,8-dioxa-3H-perfluorononanoic acid	DONA
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS

Table 4: List of PFAS measured in urine and corresponding acronyms

Table 5: Your PFAS urine levels compared to what has been measured in the general U.S. Population

PFAS	Your Level in µg/L	U.S. Population (all ages) Geometric Mean in µg/L ^a	U.S. Population (all ages) 95 th percentile in µg/L ^a
PFBS	[insert level]	[insert value]	[insert value]
PFHpS			
PFHxS			
PFOS ^b			
n-PFOS			
Sm-PFOS			
PFBA			
PFPeA			
PFHxA			
PFHpA			
PFOA ^b			
n-PFOA			
Sb-PFOA			
PFNA			
PFDA			
PFUnA			
HFPO-DA (GenX)			
DONA			
9Cl-PF3ONS			

Note: Above results from NHANES 2013–2014.
 ND - Not detected (limit of detection = 0.1 µg/L)
 * Geometric mean was not calculated because not enough people had results that were detectable.
 **95th percentile was below the limit of detection, 0.1 µg/L.

^a Source: Calafat, A., Kato, K, Hubbard, K., et al (2019). Legacy and alternative per- and polyfluoroalkyl substances in the U.S. general population: Paired serum-urine data from the 2013–2014 National Health and Nutrition Examination Survey. Environment International, 131.

^bPFOA was calculated by adding n-PFOA and Sb-PFOA results. PFOS was calculated by adding n-PFOS and Sm-PFOS results. When one ND and one measured value are reported, a value of 0.07 µg/L is substituted for ND values, which equals 0.1 µg/L (the limit of detection) divided by the square root of two.

Table 6: Your PFAS urine levels and the range of PFAS urine levels found in other people in your community who were tested.

PFAS	Your Level in µg/L	Range of levels in your community (10% of study participants) in µg/L
PFBS	[insert level]	[insert minimum result or ND and maximum detected concentration]
PFHpS		
PFHxS		
PFOS ^a		
n-PFOS		
Sm-PFOS		
PFBA		
PFPeA		
PFHxA		
PFHpA		
PFOA ^a		
n-PFOA		
Sb-PFOA		
PFNA		
PFDA		
PFUnA		

HFPO-DA (GenX)		
DONA		
9Cl-PF3ONS		
ND - Not detected (limit of detection = 0.1 µg/L)		

^aPFOA was calculated by adding n-PFOA and Sb-PFOA results. PFOS was calculated by adding n-PFOS and Sm-PFOS results. When one ND and one measured value are reported, a value of 0.07 µg/L is substituted for ND values, which equals 0.1 µg/L (the limit of detection) divided by the square root of two.

What about Your Exposure? [Include only one category below]

Results from your blood sample:

[Use for letters when all results are below applicable NHANES and community reference values [i.e., 95th percentiles]]

- Your sample showed that your PFAS levels are within the values of what has been reported for people living in US and in the [insert community name] community.
- Please see the included handouts for more information about PFAS and how to reduce your exposure.

[Use for results when at least one PFAS was measured above applicable NHANES and community-specific reference values [i.e., 95th percentiles]]

- While your results were above the 95th percentile for people living in the United States for [insert list of PFAS chemical names for which the participant's results were above the NHANES 95th percentile] and above the 95th percentile in the [insert community name] for [insert list of PFAS chemical names for which the participant's results were above the community 95th percentile], it is important to remember that scientists do not know what these levels mean for your health.
- Please see the included handouts for more information about PFAS and how to reduce your exposure.

[Use for results when all PFAS are below applicable NHANES reference values, but at least one PFAS is above community reference values]

- Your results were below the 95th percentile for people living in the United States but above the 95th percentile in the [insert community name] for [insert list of PFAS chemical names for which the participant's results were above the community 95th percentile]. It is important to remember that scientists do not know what these levels mean for your health.
- Please see the included handouts for more information about PFAS and how to reduce your exposure.

[Use for results when at least one PFAS is above applicable NHANES reference values, but when all PFAS are below community reference values]

- Your results were below the 95th percentile for people living in the [insert community name] but above the 95th percentile for the United States for [insert list of PFAS chemical names for which the participant's results were above the NHANES 95th percentile]. It is important to remember that scientists do not know what these levels mean for your health.
- Please see the included handouts for more information about PFAS and how to reduce your exposure.

Results from your urine sample (only included if urine samples were analyzed):

[Use for letters when all urine results are below available NHANES reference values [i.e., 95th percentiles]]

- Your sample showed that your PFAS levels are within the values of what has been reported for people living in the United States.
- Please see the included handouts for more information about PFAS and how to reduce your exposure.

[Use for letters when at least one PFAS was measured in urine above applicable NHANES reference values [i.e., 95th percentiles]]

- While your results were above the 95th percentile for people living in the United States for [insert list of PFAS chemical names for which the participant's results were above the NHANES 95th percentile], it is important to remember that scientists do not know what these levels mean for your health.
- Please see the included handouts for more information about PFAS and how to reduce your exposure.

What Do These Results Mean to Your Health?

These results tell you how much PFAS is currently present in your body from all sources combined, such as water, food, and other environmental sources. You can compare your results with others from your community and also with people across the United States.

Although a number of scientific studies have been completed, outcomes of these studies have not been consistent and additional factors still need to be considered. More research is needed to fully understand the possible negative health effects related to PFAS exposure. As of today, studies in humans and animals have shown that some PFAS may:

- Interfere with the body's natural hormones;
- Increase cholesterol levels;
- Affect the immune system; and

- Increase the risk of some cancers.

While numerous studies have examined possible relationships between levels of PFAS in blood and harmful health effects in people and animals, most of these studies analyzed only a small number of chemicals in the PFAS family. To date, scientists have learned that not all PFAS have the same health effects.

Some (but not all) PFAS build up in the human body. The levels of many PFAS go down slowly over time once exposure stops. Scientists are studying how different amounts of PFAS in the body over time might affect human health. In addition, investigators are actively studying whether being exposed to multiple PFAS chemicals at the same time have health effects that are additive.

It is important to remember that the likelihood of adverse health effects depends on several factors, such as the concentration of PFAS, as well as the frequency and duration of exposure. More frequent exposure can increase risk. Higher concentration and length of time exposed can lead to increased risk.

PFAS are a complex group of chemicals and there is still a lot to learn about how they may affect health. Your participation in this study, when combined with others, may eventually help us better understand any potential health risks from PFAS exposure in the future.

Next Steps

Please call CAPT Tarah Somers at 617-918-1493 to discuss any questions you may have. Your personal test results will be kept private. ATSDR will analyze all the data from your community to determine what they tell us about exposure in the community and will provide a more detailed analysis in our final report. Your results may be combined with other participants in your community and used in the report; however, no one will be able to identify you.

More Information

- If you or your doctor have any medically related questions about these results or wish to further discuss these results, please contact CAPT Tarah Somers RN, MSN/MPH by phone at 617-918-1493 or email at tvs4@cdc.gov. Please also refer to the enclosed clinician guidelines for additional information.
- For additional information about PFAS from the CDC and the Agency for Toxic Substances and Disease Registry, please visit: <http://www.atsdr.cdc.gov/pfas/index.html>.
- For additional information about PFAS from the U.S. Environmental Protection Agency, please visit: <https://www.epa.gov/PFAS>.

Thank you again for being part of the PFAS assessment.



Bradley P. Goodwin, PhD
LT, U.S. Public Health Service