

Hoosick and Petersburg Area PFOA Biomonitoring: Group-Level Results for Round 2

The New York State Department of Health (NYSDOH) offered two rounds of free blood testing to interested community members in the Hoosick and Petersburg areas. This information sheet shows group-level results for Round 2 blood testing. It also provides group-level information about changes in PFOA results from Round 1 to Round 2. Testing for both rounds were conducted by the NYSDOH Wadsworth Center laboratories.

- The 1st round of blood tests occurred from February to November 2016.
 - Round 1 included 3,411 people in the Hoosick and Petersburg areas.
 - Group-level results for Round 1 were shared in previous information sheets (NYSDOH, 2017; NYSDOH, 2018; see page 5 for hyperlink for both).
- The 2nd round of blood tests occurred from June 2018 to March 2019.
 - The timeframe for Round 2 began about two and one-half years after most people’s exposures to PFOA from drinking water ended.
 - A total of 685 people participated in Round 2.

By comparing each person’s Round 1 PFOA level to their Round 2 level, NYSDOH calculated each person’s PFOA rate of decline. That rate of decline is usually expressed in terms of half-life, which is the estimated length of time it takes for the PFOA level to go down by half after exposures have ended. Several other studies have estimated PFOA half-lives in other groups of people (Olsen et al, 2007; Li et al, 2017). Based on results from those investigations, NYSDOH expected that the average blood PFOA half-life for Hoosick Falls adult residents would be about three years.

PFOA is the contaminant tested for in Round 1 for the Hoosick and Petersburg area because it was the type of PFAS (perfluoroalkyl and polyfluoroalkyl substance) measured at the highest levels in public drinking water. Some other types of PFAS were found in some drinking water samples, but not consistently, and when found, levels were just slightly above the detection limit. To provide participants with additional information, five types of PFAS were added to Round 2 testing, for a total of six PFAS. The six types tested in Round 2 are listed below.

Full chemical names and acronyms of PFAS measured in people’s blood	
PFAS	Acronym
Perfluorobutane sulfonic acid	PFBuS
Perfluoroheptanoic acid	PFHpA
Perfluorohexane sulfonic acid	PFHxS
Perfluorononanoic acid	PFNA
Perfluorooctane sulfonic acid	PFOS
Perfluorooctanoic acid	PFOA

Round 2 Blood Testing Results:

Three tables and one figure provide additional details about the Round 2 results. Some results are presented specifically for people who were served by Hoosick Falls public water, as this group of people were exposed to similar levels of PFAS in drinking water. People served by private wells had varying levels of exposure depending on the specific levels in their individual wells. The number of Round 2 participants served by the Petersburg public water supply was too small for results for that group to be provided separately in this information sheet.

Table 1 provides Round 2 blood levels for six types of PFAS for participants served by the Hoosick Falls public water supply. Table 1 shows that Hoosick Falls participants continue to have PFOA levels that are higher than the general U.S. population. Group-level results for the five additional types of PFAS tested in Round 2 show that Hoosick Falls residents have levels that are very similar to levels in the general U.S. population.

Table 1. PFAS blood levels: Round 2 levels for participants served by Village of Hoosick Falls water (N=337), and, for comparison, the general U.S. population age 12 and up					
PFAS	Participants served by Hoosick Falls public water			U.S. population 2015-2016	
	% of samples with PFAS detected	Geometric mean (mcg/L)	95th percentile (mcg/L)	Geometric mean (mcg/L)	95th percentile (mcg/L)
PFBuS	0%	*	**	*	**
PFHpA	0.3%	*	**	*	0.20
PFHxS	88%	1.1	3.0	1.18	4.90
PFNA	61%	0.6	1.4	0.577	1.90
PFOS	99%	4.8	14.4	4.72	18.3
PFOA	99%	37.5	166.0	1.56	4.17

Notes to Table 1:

These 337 participants participated in both Round 1 and Round 2 and were served by the Hoosick Falls public water supply at the time of Round 1.

mcg/L = micrograms per liter: A microgram per liter equals one part per billion.

Geometric mean: Geometric means are a way of calculating the middle level. They are used to prevent the highest and lowest values from distorting the estimate of a middle level. In most published studies of blood concentrations, the geometric mean is used.

95th percentile: 95 out of every 100 people in the U.S. had results below this level.

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

** 95th percentile was below the limit of detection. Below LOD means no level was detected or it was detected at a level so low it could not be quantified.

Source: The general U.S. population data are from the National Report on Human Exposure to Environmental Chemicals, Updated Tables, January 2019. Available at:

<https://www.cdc.gov/exposurereport/>. Note: The most recent results are from 2015-2016, except for PFHpA and PFBuS with data from 2013-2014.

Round 1 Results compared to Round 2 Results:

Table 2 shows the group-level geometric means for the people with test results for PFOA for both Round 1 and Round 2, the percent reduction from Round 1 to Round 2, and the estimated half-lives. Round 1 and Round 2 blood PFOA levels and the specific length of time between the two blood sample collections for each individual were used to estimate the half-life for each participant. The half-lives shown in the table are the 50th percentile half-lives for the groups. This is roughly the average half-life of all participants.

Table 2. PFOA blood levels for participants tested in both Rounds 1 and 2, by drinking water source*		
	Participants served by Hoosick Falls public water (N=328)	Participants <u>not</u> served by Hoosick Falls public water (N=216)
Round 1 PFOA geometric mean	75.0 mcg/L	25.0 mcg/L
Round 2 PFOA geometric mean	40.0 mcg/L	15.2 mcg/L
Percent reduction, 50 th percentile	42%	37%
Estimated half-life, 50 th percentile	3.2 years	3.6 years

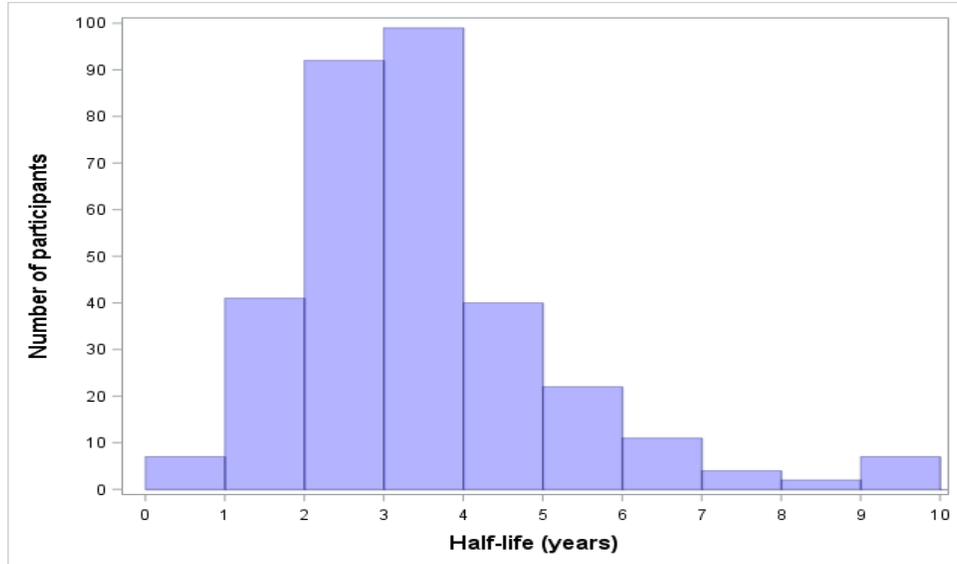
Notes for Table 2:

* About 2% of Hoosick Falls public water participants were excluded from this table and the half-life calculations because their PFOA level was at or below the 2015-2016 NHANES 95th percentile PFOA level of 4.17 mcg/L. About 22% of the participants not served by Hoosick Falls public water were excluded from this table because their levels were at or below the NHANES 95th percentile PFOA level of 4.17 mcg/L. (Most of these participants were served by private wells.) The reason for excluding people with the lowest PFOA levels is that these people did not show evidence of exposure from drinking water, so their levels would not be expected to go down sufficiently between Round 1 and Round 2 to estimate a half-life related to exposure reduction. A very small number of participants were excluded from this table because their Round 2 results did not show a decline in PFOA. Almost all of these people were in the group not served by Hoosick Falls public water, and almost all had PFOA levels that were slightly above the U.S. general population level.

Petersburgh Public Water Supply: For participants served by the Petersburgh public water supply, the 50th percentile half-life estimate is 3.2 years. Other summary levels for PFOA and the other analytes are not shown separately, as there were fewer than ten participants served by the Petersburgh public water supply who were tested in Round 2.

Distribution of Half-Lives: While most people's blood PFOA half-lives were close to three years, some people's estimated half-lives were shorter and some were longer. **Figure 1** shows the distribution of half-lives for PFOA for the 328 participants (described in Table 2) who were served by the Hoosick Falls public water supply. About 60% of this group of participants have an estimated half-life between 2 and 4 years. See Page 6 for a figure showing how an estimated three-year half-life predicts the pace of blood level reductions over time.

Figure 1: Half-life estimates for PFOA for participants served by Hoosick Falls public water, N=328*



*Half-life estimates were calculated for individuals whose Round 1 test exceeded the 2015-2016 NHANES 95th percentile PFOA level of 4.17 mcg/L and Round 2 test showed a decline in PFOA level.

Age and Gender Differences: Age and gender are known to play a role in how fast PFOA levels decline over time. **Table 3** shows estimated half-lives, by age and gender, for the 544 participants in Round 1 and Round 2 for whom half-lives were calculated. Males had slightly longer half-lives than females. Estimated half-lives steadily increase with age. Children, ages 0-17 years, had the shortest estimated half-life of 2.2 years. The oldest participants, 60 years and older, had the longest estimated half-life of 3.6 years.

Ongoing research seeks to identify factors that speed up or slow down PFOA elimination. There is evidence that menstruation, blood donation, and breastfeeding tend to increase blood PFOA elimination and thus decrease blood PFOA half-life. There appear to be additional factors that influence blood PFOA half-life, factors that are not yet well-understood, and this makes it difficult to predict or explain half-life for an individual.

	Number of participants	Half Life (Years)
		50 th percentile
Age Group		
0-17 years	38	2.2
18-39 years	54	2.7
40-59 years	159	3.3
60 and older	293	3.6
Gender		
Female	282	3.1
Male	262	3.6

*Half-life estimates were calculated for individuals whose Round 1 test exceeded the 2015-2016 NHANES 95th percentile PFOA level of 4.17 mcg/L and Round 2 test showed a decline in PFOA level.

Summary of Findings:

1. Round 1 versus Round 2 blood PFOA comparisons show PFOA levels have gone down for the group of participants as a whole by approximately 40%.
2. The blood PFOA half-life estimate for people served by Village of Hoosick Falls public water supply is approximately 3.2 years, which is similar to the expected half-life based on other studies.
3. Round 2 blood PFOA results show that Hoosick Falls residents continue to have levels that are higher than the general U.S. population.
4. Group-level results for the five additional types of PFAS tested in Round 2 show that Hoosick Falls residents have levels that are very similar to levels in the general U.S. population.

Additional information on Round 1 blood testing in the Hoosick Falls and Petersburg areas:

New York State Department of Health. INFORMATION SHEET: Hoosick Falls Area PFOA Biomonitoring Group-Level Results. June 2018.

<https://www.health.ny.gov/environmental/investigations/hoosick/docs/infosheetgrouplong.pdf>

New York State Department of Health. INFORMATION SHEET: PFOA biomonitoring group-level results: Summary of findings for Petersburg area participants. December 2017.

https://www.health.ny.gov/environmental/investigations/drinkingwaterresponse/docs/petersburgh_final_group_results_dec_2017.pdf

Publications with detailed information on blood PFOA half-lives measured in various groups:

Olsen GW, Burriss JM, Ehresman DJ, Froehlich JW, Seacat AM, Butenhoff JL, Zobel LR. 2007. Half-life of serum elimination of perfluorooctanesulfonate, perfluorohexanesulfonate, and perfluorooctanoate in retired fluorochemical production workers. *Environ Health Perspect.* Sep;115(9):1298-305.

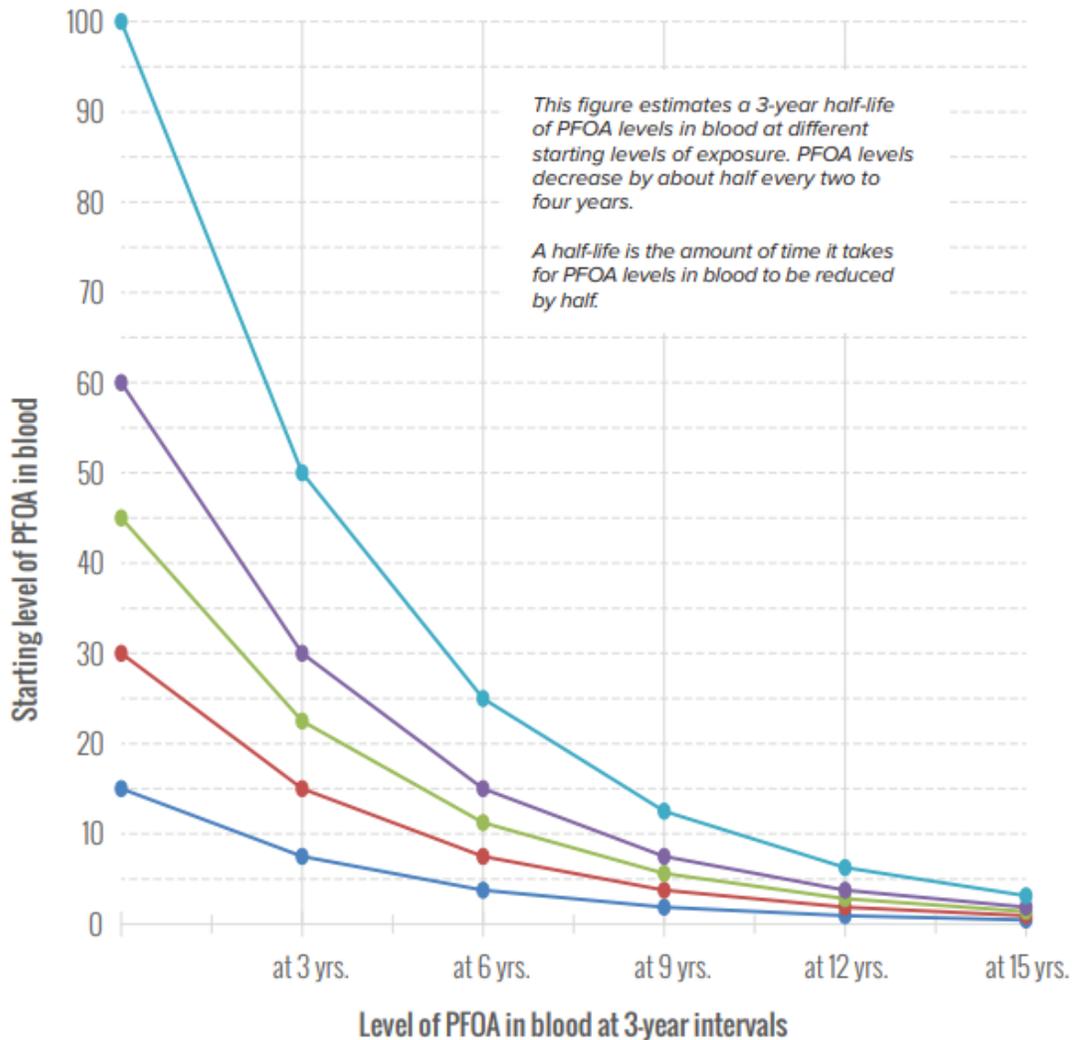
Li Y, Mucs D, Scott K, Lindh et al. 2017. Half-lives of PFOS, PFHxS and PFOA after end of exposure to contaminated drinking water. Technical Report no. 2:2017. The Sahlgrenska Academy Institute of Medicine, Gothenburg, Sweden.

Vermont Department of Health. 2017. Exposure to Perfluorooctanoic Acid (PFOA) in Bennington and North Bennington, Vermont: Results of Blood Testing and Exposure Assessment.

http://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_PR_PFOA_Report.pdf

How Long it Might Take for PFOA Blood Levels to Decline

Assumes a 3-year half-life (Micrograms per Liter)



Bartell SM, Calafat AM, Lyu C, et al. 2010. Rate of decline in serum PFOA concentrations after granular activated carbon filtration at two public water systems in Ohio and West Virginia. Environ Health Perspect. 118(2):222-8

For Additional Information:

If you have questions about blood PFOA elimination, or blood PFOA half-lives, please contact the New York State Department of Health biomonitoring team:

NYSDOH, Center for Environmental Health, Bureau of Environmental and Occupational Epidemiology, Corning Tower, Albany NY 12237; 518-402-7950 or BEOE@health.ny.gov