Merrimack Village District
Community Exposure Assessment Summary Report

Purpose of the MVD Community Exposure Assessment.

The New Hampshire Department of Health and Human Services (DHHS) launched the Merrimack Village District (MVD) Community Exposure Assessment in 2016 to evaluate exposure to perfluorochemicals (PFCs) among residents served by the MVD public water system. In March 2016, perfluorooctanoic acid (PFOA) was discovered in several southern NH communities initially around the Saint-Gobain Performance Plastics facility in Merrimack, including in groundwater wells that feed into the MVD system. The MVD public water system serves residents of Merrimack and Bedford and is supplied by multiple individual wells that are combined prior to delivery of residential drinking water. Two MVD supply wells (wells 4 & 5) were taken offline in June 2016 when they tested above 70 nanograms per liter (ng/L), which is the Lifetime Health Advisory Level set by the U.S. Environmental Protection Agency. MVD water supply wells are currently providing drinking water below the Health Advisory Level.

DHHS initiated the MVD Community Exposure Assessment in response to concerns by MVD customers and Merrimack and Bedford town officials. The Community Exposure Assessment tested the blood (serum) of 217 randomly selected MVD customers. Results from this assessment provide residents with information about levels of PFOA exposure in the community. DHHS thanks MVD residents, and local and state officials for their engagement on this environmental health project. This project provides residents, town officials, and DHHS with valuable information about the approximate levels of PFC exposure among MVD customers.

Summary of the MVD Community Exposure Assessment.

The MVD Community Exposure Assessment sought to include 200 customers, a sufficiently large enough sample size to be representative of the entire drinking water system and comparable to other populations. A total of 217 individuals participated in the MVD Community Exposure Assessment, representing 132 households. A random sampling of 900 households within the MVD system were invited to participate until 200 individuals were included. All participants were required to register online, complete an exposure assessment survey, and have a blood sample drawn at a participating blood draw center.

PFOA is the main PFC contaminant of interest within the MVD public water system and will be the focus of this summary report. However, the PFC blood test measures individual exposure to 11 different PFCs. Concentrations are measured in micrograms per liter (µg/L). PFOA was detected in 100% of samples. Perfluoroctane sulfonic acid (PFOS) was also detected in 100% of samples, perfluorohexane sulfonic acid (PFHxs) was detected in 94% of samples, and perfluorononanoic acid (PFNA) was detected in 66% of samples. Exposure levels of PFOS, PFHxS, and PFNA among MVD participants were similar to levels found in the general U.S. population. Additional PFCs were reported in less than 15% of MVD blood samples. Each participant in the MVD Community Exposure Assessment received a personalized report of their test results for all 11 PFCs. Below is a summary of PFOA concentrations from all residents in the MVD Community Exposure Assessment as well as data from the general U.S. population. See page 4 for a list of key terms.

Overall PFOA Concentration in the MVD Community Exposure Assessment.

	PFOA Serum Concentration (µg/L)
Median Concentration (50th Percentile)	3.9
5th Percentile	1.6
95th Percentile	10.2
Geometric Mean	3.9
U.S. Population (2013-2014) Geometric Mean	1.9
U.S. Population (2013-2014) 95th percentile	5.6

How do PFOA concentrations vary across MVD residents?

PFOA serum concentrations varied across MVD residents, ranging from less than 3.0 µg/L in 62 individuals to greater than or equal to 7.0 µg/L in 30 individuals. More than 70% of residents reported a PFOA concentration less than 5.0 µg/L.

Number of People (n)	PFOA Serum Concentration (µg/L)
62	Less than 3.0 µg/L
89	3.0 – 4.9 µg/L
36	5.0 – 6.9 µg/L
30	Greater than or equal to 7 µg/L

How do PFOA concentrations vary by age and gender?

The average PFOA serum concentration among males and females was 4.1 µg/L and 3.8 µg/L, respectively. This difference is not statistically significant. This means that there might not be any real difference in PFOA concentration between males and females.

The average PFOA serum concentration increases with age. The concentration increases from 3.2 µg/L in 0-19 year olds to 4.8 µg/L in those 60 years old and greater. This difference is statistically significant. This means that there is a real difference in PFOA serum concentrations across age groups.

	Number of People (n)	PFOA Serum Concentration Geometric Mean (µg/L)
All Participants	**217**	**3.9**
Males	107	4.1
Females	110	3.8
Ages 0 to 19	32	3.2
Ages 20 to 39	19	2.8
Ages 40 to 59	79	3.6
Ages 60+	87	4.8

How do PFOA concentrations vary by residential history?

The average PFOA serum concentration is not statistically different between those that lived at a residence within the MVD system for fewer than 10 years compared to those that lived at a residence for 10 years or more. This means that there does not appear to be a real difference in PFOA serum concentrations between residents based on their length of residence.

	Number of People (n)	PFOA Serum Concentration Geometric Mean (µg/L)
All Participants	**217**	**3.9**
Lived at residence < 10 years	38	3.7
Lived at residence ≥ 10 years	163	4.0

How do PFOA concentrations vary based on water consumption?

The average PFOA serum concentration increases based on the number of cups of water consumed per day from 3.2 µg/L for those who drank 0-3 cups per day to 4.7 µg/L for those who drank 8 or more cups per day. This difference is statistically significant. This means that there is a real difference in PFOA serum concentrations associated with increased water consumption.

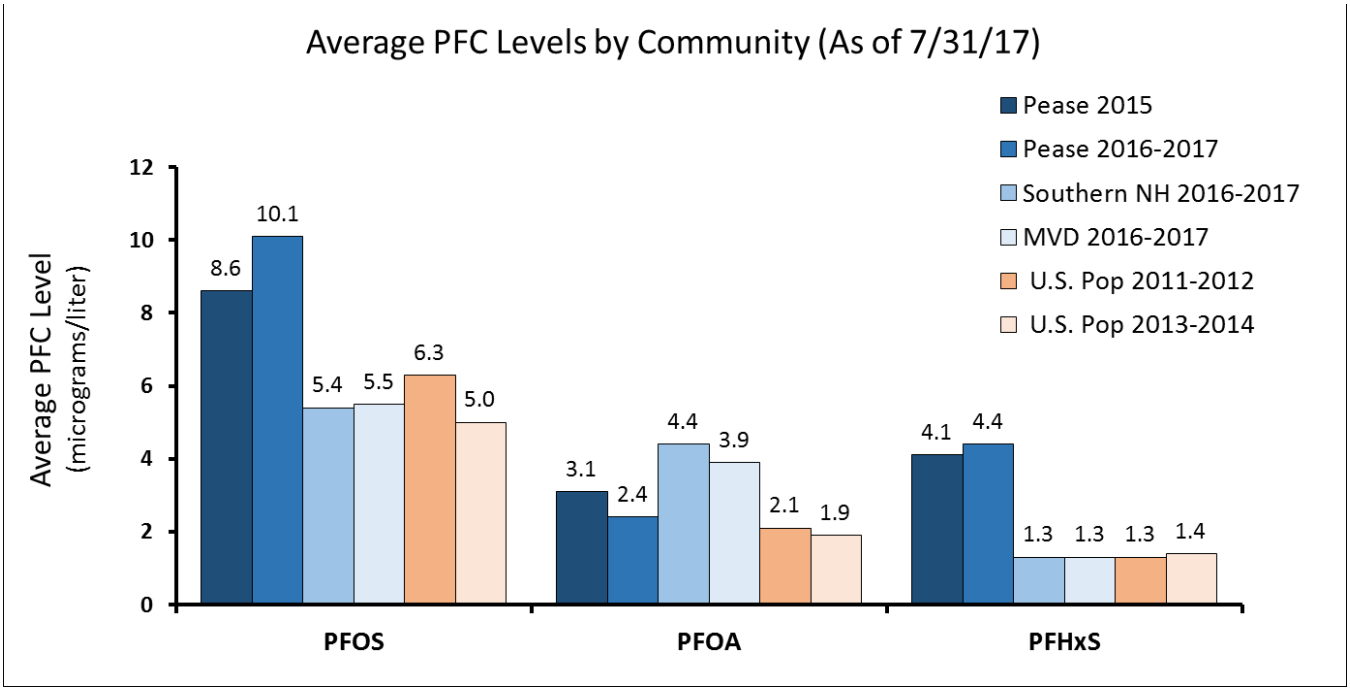
	Number of People (n)	PFOA Serum Concentration Geometric Mean (µg/L)
All Participants	**217**	**3.9**
0 to 3 cups of tap water per day	54	3.2
4 to 7 cups of tap water per day	87	3.9
8 or more cups of tap water per day	70	4.7

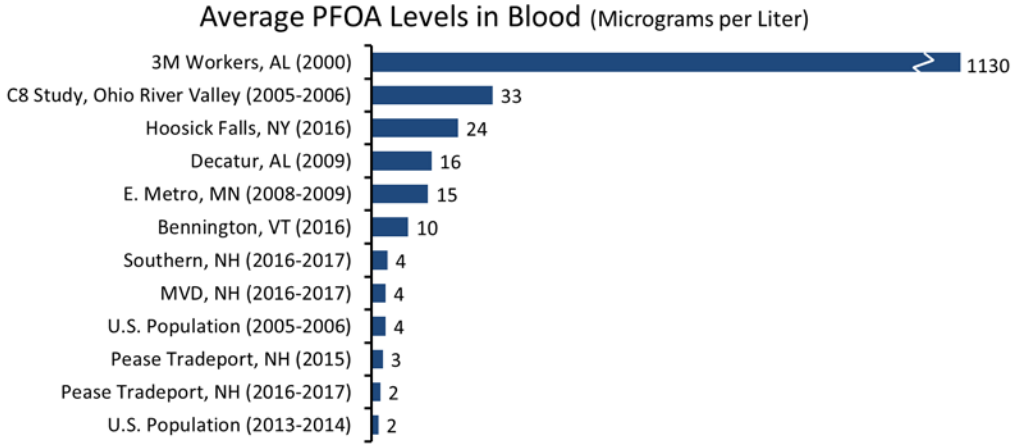
How do PFOA concentrations vary based on location?

Location	Number of People (n)	PFOA Serum Concentration Geometric Mean (µg/L)
All Participants	**217**	**3.9**
≤ 1.5 miles from Saint Gobain and Wells 4 & 5	13	6.3
≤ 1.5 miles from Wells 4 & 5 Only	21	3.7
≤ 1.5 miles from Saint Gobain Only	20	5.9
> 1.5 miles from Saint Gobain and Wells 4 & 5	161	3.6

Average PFOA concentrations varied based on geographic location. The average PFOA serum concentration was 6.3 µg/L for those within 1.5 miles from Saint Gobain and Wells 4 & 5; it was 3.7 µg/L for those within 1.5 miles of Wells 4 & 5 only; it was 5.9 µg/L for those within 1.5 miles of Saint Gobain only; and it was 3.6 µg/L for those beyond 1.5 miles of Saint Gobain and Wells 4 & 5. This difference is statistically significant. This means that the difference in PFOA concentration across locations is real and not due to chance. These patterns suggest a correlation with location; however, the number of people in the dataset is limited. NH DHHS and NH DES are working together to evaluate and understand this pattern.

How do PFOA concentrations from MVD residents compare to residents on private wells in Southern New Hampshire and in other exposed communities in NH and the U.S.?





Key Terms

PFC blood testing is not a diagnostic test and cannot tell someone whether they have or will have a health effect because of PFC exposure. The best way to understand PFC blood levels is to compare individual concentrations to other known population groups. Important terms include:

5th Percentile: A threshold value where 5% of samples in a group are below this value (i.e., the level at which a minority of participants tested below).

95th Percentile: A threshold value where 95% of samples in a group are below this value (i.e., the level at which a majority of participants tested below).

Geometric Mean: The average, or middle level, of a group..

Micrograms per Liter: Unit of measurement, sometimes labeled as µg/L or referred to as parts per billion or ppb.

Nanograms per Liter: Unit of measurement, sometimes labeled as ng/L or referred to as parts per trillion or ppt.

Statistically Significant: A "statistically significant" difference between groups (males vs. females) means we are very confident that the difference in levels between groups is real and not due to chance or random variation ($\alpha = 0.05$).

U.S. Population: A random sample of U.S. adolescents and adults with no known exposure to PFCs. Data comes from the National Health and Nutrition Examination Survey (NHANES). Information on NHANES can be found at: (https://www.cdc.gov/nchs/nhanes/index.htm)

Where can I get more information?

If after reading this report and reviewing the enclosed information you have additional questions about what your PFC blood levels might mean, you are encouraged to share these results with your healthcare provider as he/she is in the best position to monitor your health. We have provided information and clinical resources to healthcare providers to help them address your health concerns. Information for you and your healthcare provider is available on our website at: http://www.dhhs.nh.gov/dphs/pfcs/index.htm.

Representatives from the Northern New England Poison Center (NNEPC) are also available to discuss your PFC blood test results with both you and your healthcare provider. The NNEPC can be reached at 1-800-562-8236. Finally, the NH DHHS Public Inquiry Line is available for questions regarding the MVD Community Exposure Assessment or the laboratory testing process. NH DHHS can be reached at 603-271-4499.

Additional information on exposure levels in other NH communities is available in a Preliminary Report at: http://www.dhhs.nh.gov/dphs/pfcs/documents/pfc-2016-blood-test-results-sum.pdf.

Merrimack Village District Water Works Test results are available at: https://www4.des.state.nh.us/nh-pfas-investigation/?page_id=43

Cabot Preserve Test results are available at: https://www4.des.state.nh.us/nh-pfas-investigation/?page_id=110

Data and information are also presented on the NH Health WISDOM website at: https://wisdom.dhhs.nh.gov (see link on right side under "State Initiatives"). This information will allow you to compare your results to people tested in other community testing programs.

More information:
New Hampshire Department of Health and Human Services:
http://www.dhhs.nh.gov/dphs/pfcs/index.htm

New Hampshire Department of Environmental Services:
https://www4.des.state.nh.us/nh-pfas-investigation/