PFAS Exposure Assessment Community Summary

Berkeley County, West Virginia near Shepherd Field Air National Guard Base

INFORMATION TO PROTECT OUR COMMUNITIES

The Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) conducted exposure assessments (EAs) in communities that were known to have PFAS in their drinking water and are near current or former military bases. The EAs provide information to communities about levels of PFAS in their bodies and can provide guidance to help people reduce or stop exposure. This document summarizes the exposure assessment results from in and around the City of Martinsburg in Berkeley County, West Virginia, near Shepherd Field Air National Guard Base. The full exposure assessment report is available at https://www.atsdr.cdc.gov/pfas/activities/assessments/sites/berkeley-county-wv.html.

Why did we select the Berkeley County EA site?

When selecting EA sites, ATSDR considered the extent of PFOA and PFOS contamination in drinking water supplies, the duration over which exposure may have occurred, and the number of potentially affected residents. The Berkeley County EA site was one of several sites nationwide identified with PFAS drinking water contamination from use of products such as aqueous film forming foam (AFFF).

The Shepherd Field Air National Guard Base previously used AFFF containing PFAS for its firefighter training, possibly as early as the 1970s. Over time, the PFAS from the AFFF entered the ground, moved into the groundwater to offsite locations, and affected the City of Martinsburg's Big Springs well located downgradient of the Base. This well supplies water to customers from both the City of Martinsburg and the Berkeley County Public Service Water District (PSWD).

In May 2016, the City of Martinsburg removed its Big Springs well from service. They installed a treatment system and brought the Big Springs well back online in December 2017.The City of Martinsburg now conducts routine monitoring to ensure treatment is effectively removing PFAS.

Based on the information ATSDR has reviewed, the City of Martinsburg and the Berkeley County PSWD public drinking water supplies currently meet the U.S. Environmental Protection Agency's (EPA) 2016 health advisory (HA) for PFAS in drinking water. At this time, ATSDR does **not** recommend community members who get their water from the City of Martinsburg or Berkeley County PSWD use alternative sources of water.

What are PFAS?

PFAS (or "per- and polyfluoroalkyl substances") are a family of man-made chemicals that have been used in industry and consumer products since the 1950s.

PFAS do not occur naturally but are widespread in the environment. Most PFAS (including PFOA, PFOS, PFHxS, and PFNA) are either very resistant to breaking down or degrade into other PFAS that do not degrade further. Certain PFAS will therefore remain in the environment indefinitely. Some studies have shown that PFAS exposure may harm human health.

How was the testing conducted?

ATSDR invited all Berkeley County residents living near Shepherd Field Air National Guard Base who met eligibility criteria to participate in the EA. Household residents must have

1. lived within the sampling area and received their drinking water from by the City of Martinsburg or the Berkeley County PSWD) for at least 1 year before May 19, 2016, (these residents have the greatest likelihood of past exposures to PFAS via the public drinking water supplies),
2. been greater than three years old at the time of sample collection, and
3. not been anemic or had a bleeding disorder that would prevent giving a blood sample.

Households with private wells were not eligible for participation. Measuring PFAS in the blood of people from selected households allows us to estimate exposure from consumption of public drinking water for the entire community in the affected area, even those who were not tested.

In September and October 2019, ATSDR collected samples and other information from participants.

ATSDR analyzed data from 275 people, including children from 165 households

Everyone completed a questionnaire, and most people provided blood and urine samples. The serum portion of the blood was analyzed for PFAS.

ATSDR collected samples of tap water and dust from some homes.

ATSDR sent each participant their individual results in May 2020.

Key Takeaways

- Levels of PFHxS in the blood of Berkeley County EA participants were 2.5 times higher than national levels. Other PFAS measured in blood (PFOS, PFOA, PFNA, and PFDA) were similar to or detected too infrequently to compare to national averages.
- Elevated blood levels of PFHxS may be linked with past drinking water contamination.
- Some demographic and lifestyle characteristics were linked with higher PFAS blood levels.
- All tap water samples collected during the EA in 2019 met the EPA's health advisory for PFAS in drinking water.

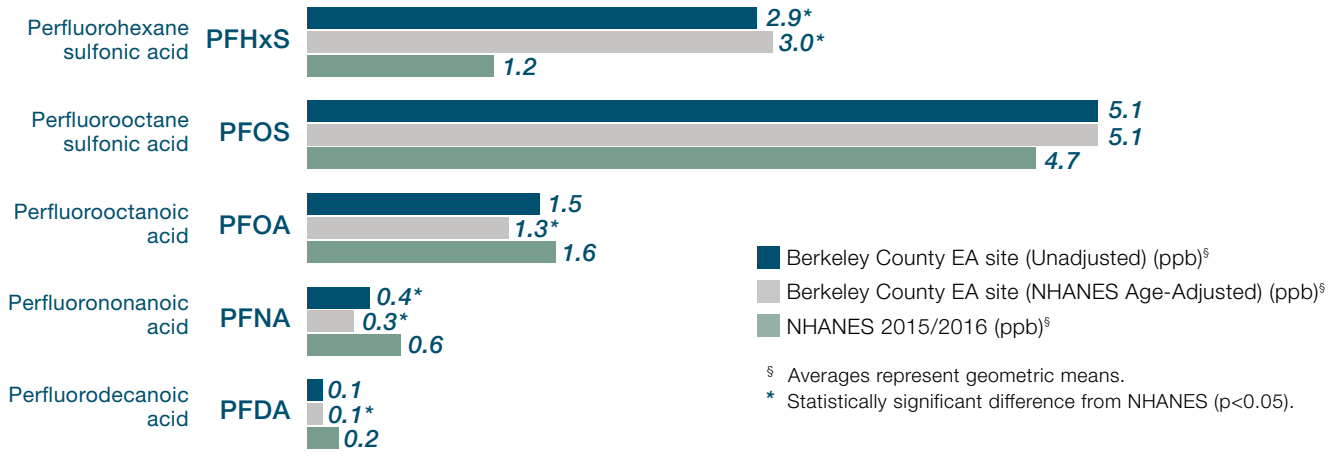
What did we learn about PFAS levels in blood?

Of the seven PFAS tested at the Berkeley County EA site, five PFAS were detected in more than 74% of the blood samples collected: PFHxS, PFOS, PFOA, PFNA, and PFDA.

The average blood level of one PFAS (PFHxS) in the Berkeley County EA site participants was higher than the national average.

Since 1999, the National Health and Nutrition Examination Survey (NHANES) has measured PFAS levels in blood in the U.S. population. PFAS levels are shown to be age dependent and tend to increase with age in part due to longer periods of exposure. ATSDR adjusted blood levels of EA participants at the Berkeley County EA site for age to enable meaningful comparison to the NHANES dataset. **After adjusting for the effects of age, PFHxS remained elevated compared to levels nationwide***. Age-adjusted averages are more representative of the Berkeley County EA site community.

Berkeley County EA site average PFAS blood levels compared to national averages§



*ATSDR initially reported PFOS levels were above national average; after statistical analysis this difference was not observed.

Elevated blood levels of PFHxS at the Berkeley County EA site may be linked with past contamination of the public drinking water systems.

PFHxS was first detected in the City of Martinsburg's Big Springs well in 2014. It is likely that contamination began earlier, but no data are available before 2014. This contaminated well also supplied water to the Berkeley County PWSD. By December 2017, the City of Martinsburg and Berkeley County PWSD drinking water met the EPA's HA for PFOA and PFOS. There were over 3 years and 5 months between the reduction of exposure via contaminated drinking water and the collection of the EA blood samples. Because of the long half-lives of PFAS in the human body, past drinking water exposures may have contributed to the EA participants' blood levels. Typically, participants who had greater blood PFHxS levels also had greater blood PFOS and blood PFOA levels. This correlation suggests a common exposure source, such as the City of Martinsburg or Berkeley County PSWD public water supply, though other sources of exposure may also have contributed to the observed blood levels.

Participants who lived in the City of Martinsburg service area had 60% higher PFHxS blood levels than those who lived in the Berkeley County PSWD service area.

Both water systems used contaminated water from the Big Springs well. It was mixed with uncontaminated water from other parts of the system. It is possible that more uncontaminated water was mixed into the Berkeley County PSWD. ATSDR used statistical models to study relationships between various demographic and lifestyle characteristics of the tested residents. The models showed that, in general

Blood levels of PFHxS, PFOS, and PFOA varied by age.

In females, blood levels increase by 1.5% to 2.4% for every year of age.

In males, blood levels of PFHxS decreased by 0.5% but increased for PFOS and PFOA by 0.2% for every year of age.

Males had higher blood levels of PFHxS, PFOS, and PFOA than females.

The difference between males and females was larger in younger people.

Long-time residents have higher PFHxS blood levels.

PFHxS increased by 5.3% for every additional year an adult participant lived in Berkeley County EA site.

Participants who reported **donating blood at least once a year had 31% lower blood levels of PFOS** than participants who never reported donating blood.

LIMITED DATA

Participants with a reported **history of kidney disease had PFOS blood levels that were 27% lower** than those who did not.

LIMITED DATA

What did we learn about exposure in children?

Because of the small number of child participants, associations between blood PFAS levels and many variables could not be examined. Any observations in children are noted in the report, but in most cases ATSDR was not able to draw strong conclusions. ATSDR will gather the data from children across all exposure assessment sites and provide a detailed analysis. A report will be available to all communities.

What did other testing find at the Berkeley County EA site?

Only one PFAS (PFBA) was detected in urine; it was detected at low concentrations.

All tap water samples collected during the EA in 2019 met the EPA's HA for PFAS in drinking water.

PFAS contamination in house dust was similar to that reported in other studies (with or without PFAS contamination).

What do these results mean for community members?

This PFAS EA has demonstrated that past exposures to PFAS in drinking water have impacted the levels of PFAS in people's bodies. PFAS are eliminated from the body over a long period of time. This allowed ATSDR to measure PFAS even though exposures through drinking water were mitigated, or lowered, years ago. PFAS found in a person's blood or urine means that exposure has occurred. The presence of PFAS in blood or urine does not tell us how, where, when, or for how long a person was exposed to PFAS. Exposure to PFAS does not mean adverse health effects will result, either now or in the future.

Although the exposure contribution from PFAS in drinking water at the Berkeley County EA site has been mitigated, there are actions community members and city and county officials can take to further reduce exposures to PFAS and protect public health.

Based on the recent PFAS drinking water test results from the City of Martinsburg and Berkeley County Public Service Water District, ATSDR does not recommend an alternate source of drinking water at this time.

What can community members do?

Become familiar with Consumer Confidence Reports (City of Martinsburg: https://www.cityofmartinsburg.org/residents/city-services/utilities; Berkeley County PSWD: https://www.berkeleywater.org/consumer-confidence-reports) for information on the quality of the water.

Private well owners living in the area affected by PFAS should consider having their wells tested for PFAS if testing has not been conducted before. Global public health organization NSF International has developed a test method to verify a water filter's ability to reduce PFOA and PFOS to below the health advisory levels set by the EPA. NSF International-approved devices can be found at: http://info.nsf.org/Certified/DWTU/ Click on "reduction devices" at the bottom of the page for PFOS and PFOA. To learn more about testing wells for PFAS visit: https://www.wvdhhr.org/phs/water/Fact%20Sheets/PrivateWellOwners-FourStepstoWaterWellSafety.pdf.

Nursing mothers should continue breastfeeding. Based on current science, the benefits of breastfeeding outweigh the risks for infants exposed to PFAS in breast milk.

When possible, eliminate or decrease potential exposure to PFAS in consumer products such as stain-resistant products, and food packaging materials. To learn more visit: https://www.fda.gov/food/chemical-contaminants-food/questions-and-answers-pfas-food.

Pay attention to advisories about food consumption, such as local fish advisories.

Discuss any health concerns or symptoms with your health care provider. Share results of PFAS blood testing with your health care provider and make them aware of ATSDR resources for clinicians https://www.atsdr.cdc.gov/pfas/resources/info-for-health-professionals.html. Follow the advice of your health care provider and the recommendations for checkups, vaccinations, and health screening tests.

Follow the advice of your child's health care provider and the recommendations for well child checkups, vaccinations, and health screening tests. Consult https://health.gov/myhealthfinder to help identify those vaccinations and tests.

Blood tests for PFAS are most useful when they are part of a scientific investigation or a health study like the exposure assessment. If you are concerned and choose to have your blood tested, test results will tell you how much of each PFAS is in your blood, but it is unclear what the results mean in terms of possible health effects. In addition, blood testing for PFAS is not a routine test offered by most doctors or health departments. If you would like to have your or your children's blood tested, talk to your health care provider and make them aware of ATSDR resources for clinicians https://www.atsdr.cdc.gov/pfas/resources/info-for-health-professionals.html.

For additional information about environmental exposures and children's health, contact the Pediatric Environmental Health Specialty Units, a nationwide network of experts in reproductive and children's environmental health (https://www.pehsu.net/).

What can the City of Martinsburg and Berkeley County do?

Operators of the municipal water system should continue to monitor concentrations of PFAS in drinking water delivered to the service areas to ensure that concentrations of PFAS remain below the EPA's HA for PFAS in drinking water.

Results of PFAS drinking water monitoring should continue to be shared with community members. (Consumer Confidence Reports for City of Martinsburg: https://www.cityofmartinsburg.org/residents/city-services/utilities; Consumer Confidence Reports for the Berkeley County PSWD, https://www.berkeleywater.org/consumer-confidence-reports)

All treatment systems to remove PFAS from the municipal drinking water in City of Martinsburg and Berkeley County PSWD should be maintained appropriately to ensure that PFAS concentrations remain below the EPA's HA in drinking water.

What will we do next?

ATSDR will hold a meeting to discuss the results and is available to answer questions from the community at any time.

When all of the exposure assessments are complete, we will prepare a report analyzing the data across all sites.

We are also reaching out to doctors, nurses, and other health care providers in your area to provide PFAS information. PFAS clinician guidance and continuing medical education can be found at https://www.atsdr.cdc.gov/pfas/resources/clinical-guidance.html.

About ATSDR

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency of the U.S. Department of Health and Human Services. https://www.atsdr.cdc.gov/

For More Information

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National Center for Environmental Health
Agency for Toxic Substances and Disease Registry

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