

Health Consultation

Public Comment Version

Per and Polyfluoroalkyl Substances (PFAS) in the Pease Tradeport Public Water System

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PORTSMOUTH, NEWINGTON, AND GREENLAND, NEW HAMPSHIRE

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Summary

Introduction

In April 2015, the U.S. Air Force asked the Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate past and current exposures to per- and polyfluoroalkyl substances (PFAS) in the Pease Tradeport public water system (PWS). The Pease Tradeport PWS serves the Pease International Tradeport and the New Hampshire Air National Guard base at the former Pease Air Force Base (AFB). The source of PFAS in the Pease Tradeport PWS is assumed to be from aqueous film-forming foam (AFFF) used on the former Pease AFB, now known as the Pease International Tradeport. This evaluation focuses on exposures to persons who worked at the Pease International Tradeport and children who attended the two childcare centers at the Pease International Tradeport from 1993 to present. However, ATSDR acknowledges that exposures to military and base personnel could have occurred before 1993 through drinking water and other sources.

Scientific information suggests an association between perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) exposure and various health endpoints, including effects on serum lipids, immune responses, fetal growth and development, and the liver. Several other PFAS were detected in the water, some of which have similar health endpoints as PFOA and PFOS (see Appendix A, Table A-1).

The Harrison, Haven, and Smith wells provided water to the Pease Tradeport PWS. The wells were sampled and analyzed for several PFAS in April and May 2014 [CB&I 2015]. PFAS were found in each of the wells. At that time, only the Haven well, where the maximum concentration of PFOS was 2.5 µg/L, exceeded the U.S. Environmental Protection Agency's (EPA) provisional health advisory level of 0.2 micrograms per liter (µg/L) for PFOS. The Haven well, located near the middle of the Pease AFB airstrip, was shut down on May 12, 2014, immediately after the results were known. Since the Haven well was shut down, the Harrison and Smith wells have continued to provide water for the Pease Tradeport PWS, supplemented by water from the City of Portsmouth PWS (ID 1951020).

Drinking water sampling from June 2014 through May 2017 indicated that the maximum detected PFOS concentration was equal to ATSDR's health based comparison value (HBCV) at the New Hampshire Department of Environmental Services (NHDES) office and above the HBCV at the water treatment plant. The treatment consists of corrosion control and then it is mixed to provide drinking water. There were no exceedances of any other PFAS at any other sampling locations, which included two childcare centers and a fire station [City of Portsmouth 2017a]. A water treatment system to remove PFAS from the Smith and Harrison wells began operating on September 23, 2016. Tests of the treated water collected in October and November 2016 did not detect either PFOS or PFOA. Detection limits for PFAS typically range from 0.0026 µg/L for PFOS to 0.0046 µg/L for PFOA [Walton R. (Air Force Civil Engineer Center-BRAC Program

Management Division) email to Gary Perlman (ATSDR), February 22, 2018, with datasheets, including Maxim Laboratory PFAS detection limits]. A few other PFAS occasionally were detected at very low concentrations. Both PFOA and PFOS were below EPA's lifetime health advisory in all samples analyzed since June 2014.

ATSDR evaluated PFAS exposures in the Pease Tradeport PWS for two timeframes. The first timeframe included the time when the Haven well was operational (1993 to May 2014). The second included the time when the Haven well was shut down (June 2014 to the present).

Conclusions

After reviewing the available information, considering all factors that may contribute to the health effects of PFAS exposures, ATSDR reached three conclusions. ATSDR's conclusions are limited by several uncertainties relating to the human health risks from PFAS exposures. Because of these uncertainties, ATSDR used a conservative approach, including several lines of evidence (see Summary of Public Health Implications for details) to evaluate the public health implications of past PFAS exposure to the Pease Tradeport PWS.

Conclusion 1

Drinking water exposures from the Pease Tradeport PWS from 1993 to May 2014, before the Haven Well was shut down, could have increased the risk for harmful health effects to Pease International Tradeport workers and children attending the childcare centers. Other sources of PFAS exposure (e.g., from food and consumer products) to users of the Pease Tradeport PWS could increase the risk of harmful effects beyond the risk from the drinking water exposures alone. The cancer risk from past exposure to all PFAS in the Pease Tradeport PWS is uncertain.

Basis for Conclusion

The estimated exposure doses for PFOA, PFOS, and perfluorohexane sulfonic acid (PFHxS) from consuming the water were below effect levels found in animal studies but were well above their respective ATSDR provisional minimal risk levels (MRL), indicating a potential for concern, especially for developmental and immune effects for exposure to PFOS. Scientific information suggests an association between PFOA, PFOS, and PFHxS exposure and various health endpoints, including effects on serum lipids (not for PFHxS), immune responses, development, and the liver. The combined exposures to a mixture of PFOS, PFOA, PFHxS, and perfluorononanoic acid (PFNA) could have increased the risk for developmental and immune effects above what might be expected from exposure to any of these PFAS alone. For other PFAS associations and health endpoints, however, the scientific information is far less certain. Food, consumer products, and mixtures of PFAS in the drinking water are all possible contributors to a person's overall PFAS exposure and body burden. Testing of exposed persons from the Pease Tradeport PWS by the New Hampshire Department of Health and Human Services (NH DHHS) indicate that PFOA, PFOS, and PFHxS blood levels are elevated as compared to national averages. Some pre-existing risk factors could increase the risk of harmful effects (see the Public Health Implications Section for details).

Epidemiologic data suggest a link between PFOA exposure and elevated rates of kidney, prostate, and testicular cancer. However, additional studies are needed to confirm the link between PFOA and other PFAS exposures and cancer to say they are the cause. Animals given PFOA have shown higher rates of liver, testicular, and pancreatic tumors. A causal link based on human studies between cancer and PFOS exposures remains uncertain. Animal studies have found limited, but suggestive evidence of PFOS exposure and increased incidence of liver, thyroid, and mammary tumors.

The EPA has developed a cancer slope factor (CSF) for PFOA based on testicular cancer from a rat study to evaluate the cancer risk. Based on these assumptions and assuming that the EPA CSF on testicular cancer from a rat study approximates the actual cancer risk for PFOA, then the estimated adult cancer risk from exposure to the maximum detected PFOA concentration in the public water supply system is 1.3×10^{-7} . This means that if 10 million people were similarly exposed, we might see an additional two cases of cancer. If the CSF approximates the actual cancer risk for PFOA, then the estimated cancer risk level is considered a very low risk. This estimated cancer risk must be viewed with caution because the EPA CSF has not been fully adopted and other cancers that were elevated in epidemiological studies of PFOA exposure were not evaluated. EPA does not have a CSF for PFOS or other PFAS. Therefore, ATSDR cannot calculate the estimated cancer risk from PFOS or other PFAS exposures and the actual cancer risk from all PFAS exposures from the Pease PWS is uncertain.

Next Steps

ATSDR will present this report and its findings and provide health education information related to PFAS in drinking water to affected residents, community members, and health professionals in the site area.

ATSDR is assessing the most appropriate and effective designs for a multi-site PFAS health study. Also, ATSDR is evaluating the best approach to complete exposure assessments in communities near current and former military bases. ATSDR is planning a "proof of concept" study of children and adults exposed to PFAS-contaminated drinking water at the Pease International Tradeport. The study will test procedures that may be used in a future multi-site study and evaluate associations between PFAS serum levels and biomarkers of effect (e.g., lipids, kidney function, and thyroid function) and specific diseases. ATSDR will ask study participants if they have been diagnosed with a cancer. However, to evaluate cancers effectively, the study would need to include several tens of thousands of study participants.

Conclusion 2

Consuming water containing low levels of PFAS from the Pease Tradeport PWS since June 2014 is not expected to cause harm to the public.

Basis for Conclusion

Except for one sample where PFOS was detected slightly above the ATSDR HBCV, data indicate that exposures were less than or equal to the ATSDR HBCVs, thereby indicating that no harmful effects are expected. In addition, exposures to children at the two childcare facilities were all below ATSDR HBCVs. Exposures to PFOS in the Pease Tradeport PWS since June 2014 are not above ATSDR provisional MRLs, thereby indicating that harmful non-cancer effects are unlikely. Further evaluation of the exposure to the mixture of PFOS, PFOA, PFHxS, and PFNA indicates that the risk for harmful developmental or immune effects is not likely to be more than what might be expected from exposure to any of these PFAS alone. Other PFAS were either below their HBCVs, maximally detected at low levels (single parts per trillion), or not detected.

Next Steps

The treatment system being added to the Pease Tradeport PWS will help protect consumers of the drinking water. Operation of this treatment system will reduce exposure to all PFAS contaminants. Treated water should continue to be sampled. The treatment system should be adjusted, as necessary, to prevent exposure above the EPA lifetime health advisory and to reduce exposure to other PFAS. As a prudent public health measure, ATSDR recommends that persons who have had long-term exposures to PFAS should be aware of ways to reduce exposures (see information available from <https://www.atsdr.cdc.gov/pfas/pfas-exposure.html> on ways to reduce exposures to all sources of PFAS).

Conclusion 3

Based on available scientific information, ATSDR concludes that the health and nutritional benefits of breastfeeding outweigh the risks associated with PFAS in breast milk.

Basis for Conclusion

Community members, particularly mothers who have historically been exposed to PFAS from the Pease Tradeport PWS, have expressed concern over the health implications of PFAS exposures to infants who breastfeed. Developmental effects are the most sensitive adverse health effects resulting from early life exposure to some PFAS. Studies have shown infants are exposed during pregnancy, through the mother to the fetus (maternal transfer), and occur to the nursing infant during breastfeeding. However, breastfeeding provides clear health and nutritional benefits, including protection from some illnesses and infections and reductions in the risks of developing asthma and sudden infant death syndrome. In general, the Centers for Disease Control and Prevention recommends breastfeeding, despite the presence of chemicals in breast milk. Given what we know about PFAS exposure, the benefits of breastfeeding outweigh any risks. However, the science on the health effects of PFAS exposure on mothers and children continues to expand. A woman's decision to breastfeed is an individual choice, made after consideration of many different factors (many unrelated to PFAS exposure) and in consultation with her healthcare providers. Information developed by ATSDR to guide doctors (see https://www.atsdr.cdc.gov/pfas/docs/pfas_clinician_fact_sheet_508.pdf) can aid in this decision-making process.

Next Steps

Considering the many health benefits of breastfeeding for mother and child, ATSDR recommends that nursing mothers continue to breastfeed. ATSDR recommends that a nursing mother who has specific concerns should consult her healthcare provider. ATSDR is available to consult with any healthcare provider, if needed.
