



Maryland Department of Health

Health Advisory on Perfluorohexane Sulfonic Acid (PFHxS) in Drinking Water

What action is the Department taking?

Maryland Department of Health (MDH), out of an abundance of caution, is issuing a health advisory for Perfluorohexane Sulfonic Acid (PFHxS) in drinking water in concentrations at or above 140 parts per trillion (ppt, also shown sometimes as 140 nanograms/liter). This health advisory is based on the minimal risk level (MRL) recommendations from the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) for children. MDH recommends that where drinking water concentrations of PFHxS are demonstrated to be at or above 140 ppt, steps be taken to lower the concentration of PFHxS in drinking water for the population through either use of an alternate water source (like bottled water) or treatment of the water.

Why is the Department of Health issuing this Health Advisory?

In 2018, ATSDR proposed a minimal risk level (MRL) for PFAS, including PFHxS.¹ MRLs are not regulatory standards, but are used instead as a screening tool by agencies.⁴ ATSDR recommended a MRL for PFHxS in drinking water of 517 ppt for an adult, and 140 ppt for children.¹ MDH, together with MDE, has concluded that on the basis of the potential long-term health impacts and the ATSDR MRL, a health advisory for PFHxS drinking water concentrations at or above the proposed MRL is justified to protect vulnerable populations, most notably children.

What is PFHxS?

PFHxS is one of a group of chemicals collectively known as perfluoroalkyl substances (PFAS). PFHxS have been linked to a variety of childhood health effects, including effects on the liver and immune system.² In particular, PFHxS has been associated with a decrease in immunologic response to vaccines.³ In addition, there are indications that PFHxS can affect the thyroid gland and the level of thyroid hormones, notably thyroid stimulating hormone (TSH).⁴ The most recent U.S. Agency for Toxic Substances and Disease Registry (ATSDR) toxicologic profile for PFAS (2021) notes that the most sensitive target organs for PFHxS were the liver and thyroid (p. 17).⁵

Where does PFHxS come from?

Sources of PFAS, including PFHxS, include release from manufacturing sites, industrial use, use and disposal of perfluoroalkyl-containing consumer products, fire/crash training areas, waste water treatment facilities, and from the use of contaminated biosolids. PFHxS has been found in consumer products, workplaces, foods (both packaged and in crops), and drinking water. It has also been found in some fish. Like most PFAS, PFHxS can be carried through rainwater run-off and enter surface water or move through the soil and into underground sources of drinking water.

They are not easily broken down by sunlight or other natural processes, and can persist in the environment for many years.⁴

Why is this Health Advisory being issued now?

The Maryland Department of the Environment (MDE), with the analytic support of the Maryland Department of Health Laboratories Administration, has recently begun testing and assessing drinking water and surface waters resources throughout the state. More information about the testing program and locations can be found at the MDE web page, “Maryland and PFAS” (<https://mde.maryland.gov/PublicHealth/Pages/PFAS-Landing-Page.aspx>).

How do I know whether I have been exposed to PFHxS?

PFHxS, like other PFAS, can be found in low concentrations in the blood of most people, including children, in the United States. The concentration of PFHxS in people tested through the National Health and Nutrition Examination Survey has decreased by 22% over the past decade’s surveys, from 2.13 micrograms per liter (µg/L) in the 1999-2000 survey, to 1.66 µg/L in the 2009-2010 survey.⁶ There is no routine clinical diagnostic testing available for PFHxS, and MDH is not recommending that health care providers test individuals for exposure, since the test results do not indicate any clinical diagnosis, nor is there any indication for any treatment based on a level of PFHxS.

How do I know if my water has been tested?

PFHxS is not routinely tested in the United States, and only recently have federal and state agencies been testing drinking water sources across the country to understand where PFAS may be found. PFAS testing is not required for private wells or regulated water supplies.

What should I do if I have PFHxS in my drinking water?

The presence of PFHxS in drinking water is not an urgent health concern, but MDH has concluded that PFHxS exposure should be reduced below the ATSDR MRL to prevent long-term health risks to people, especially children. If water is used to prepare infant formula by people whose drinking water has PFHxS at or above the ATSDR MRL of 140 ppt, the formula should be prepared only with treated or bottled water. PFHxS can transfer from a mother to her infant during pregnancy and to an infant through breastmilk. However, MDH recommends that women currently breastfeeding, and pregnant women who plan to breastfeed, continue to do so. Breastfeeding is important for the short and long term health of both a mother and infant and is recommended by doctors and other health professionals.

Can I boil the water to get rid of the PFHxS?

Treatment for PFAS in drinking water, including PFHxS, requires technologies like activated carbon, ion exchange, nanofiltration or reverse osmosis.⁷ Boiling water does not remove or inactivate PFHxS or other PFAS. Homeowners and water system operators who are affected by PFHxS concentrations at or above the MRL should consult with MDE or a water consultant to understand what treatment options may be appropriate and available.

Can I wash dishes, bathe, water plants (ornamental, edible), other uses with the water?

Yes. It is through drinking water that PFHxS exposure is significant, not through these other uses.

Who can I call if I have questions?

People who have been notified that PFHxS, has been identified in their drinking water sources may contact their water supplier or the Maryland Department of the Environment, at (410) 537-3000.

¹ U.S. Agency for Toxic Substances and Disease Registry. 2018. "ATSDR's Minimal Risk Levels (MRLs) and Environmental Media Evaluation Guides (EMEGs) for PFAS" Accessible at:
<https://www.atsdr.cdc.gov/pfas/resources/mrl-pfas.html>.

² U.S. Agency for Toxic Substances and Disease Registry . 2018. Toxicological Profile for Perfluoroalkyls: Draft for Public Comment. Retrieved from Atlanta (GA): ATSDR, Division of Toxicology and Human Health Sciences. Accessible at:
<https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf>

³ von Holst H, Nayak P, Dembek Z, Buehler S, Echeverria D, Fallacara D, John L. Perfluoroalkyl substances exposure and immunity, allergic response, infection, and asthma in children: review of epidemiologic studies. *Heliyon*. 2021 Oct 12;7(10):e08160. doi: 10.1016/j.heliyon.2021.e08160. eCollection 2021 Oct. PMID: 34712855

⁴ Ballesteros V, Costa O, Iñiguez C, Fletcher T, Ballester F, Lopez-Espinosa MJ. Exposure to perfluoroalkyl substances and thyroid function in pregnant women and children: A systematic review of epidemiologic studies. *Environ Int*. 2017 Feb;99:15-28. doi: 10.1016/j.envint.2016.10.015. Epub 2016 Nov 22. PMID: 27884404

⁵ U.S. Agency for Toxic Substances and Disease Registry (ATSDR). 2021. Toxicological profile for Perfluoroalkyls. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. DOI: 10.15620/cdc:59198.
<https://www.cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=1117&tid=237>

⁶ U.S. Centers for Disease Control and Prevention (CDC). 2017. "Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables, January 2017, Volume One." Retrieved from
https://www.cdc.gov/exposurereport/pdf/FourthReport_UpdatedTables_Volume1_Jan2017.pdf. Accessed November 7, 2021.

⁷ U.S. Environmental Protection Agency. "Treating PFAS in Drinking Water." Accessible at:
<https://www.epa.gov/pfas/treating-pfas-drinking-water>.