PFHxS and Groundwater

PFHxS

Perfluorohexane sulfonate (PFHxS) is one of a group of related chemicals known as perfluorinated alkylated substances (PFAS). These are also called perfluorochemicals (PFCs). This group of chemicals is used in a wide range of industrial processes and is found in many consumer products.

PFHxS has been used in stain-resistant fabrics, fire-fighting foams, food packaging, and as a surfactant in industrial processes. The 3M Company was once a major manufacturer of PFHxS and products containing PFHxS, but production was phased out in 2002.[1] PFHxS production has been phased out nationwide, but continues in other countries. Products containing PFHxS may be imported into the United States.

PFHxS in Minnesota Waters

PFHxS has been detected in groundwater in private drinking water wells and public drinking water systems in several parts of Minnesota where known industrial use or disposal of PFAS occurred. PFHxS has been detected in public drinking water at levels up to 0.57 parts per billion (ppb).[2] MDH and MPCA routinely sample drinking water in affected areas for PFHxS and other PFAS chemicals.

The Minnesota Pollution Control Agency (MPCA) detected PFHxS in the Mississippi River and urban lakes in the Twin Cities metro area at levels up to 0.15 parts per billion (ppb).[3,4] Detections were more common at sites immediately downriver from an industrial facility with historical PFAS use or disposal.

MDH Guidance Value

Based on available information, MDH developed a guidance value of 0.047 ppb for PFHxS in groundwater. A person drinking water at or below the guidance value would be at little or no risk for harmful health effects.

MDH does not use guidance values to regulate water quality, but they may be useful for situations in which no regulations exist. MDH develops guidance values to protect people who are most vulnerable to the potentially harmful effects of a contaminant, including those who may be exposed for long periods of time.

Potential Health Effects

Scientists continue to study whether PFHxS and other PFAS cause health problems in people. Most studies have been done on PFOS and PFOA, two different PFAS chemicals, and less information is available about PFHxS. In some studies, higher levels of PFOS and PFOA, chemicals related to PFHxS, in a person's body were associated with elevated cholesterol, changes to liver function, changes in thyroid hormone levels, and reduced immune response.

In laboratory animal studies, the most sensitive effects of PFHxS exposure included decreased thyroid hormone levels and changes in liver weight and function.

Potential Exposure to PFHxS

Due to widespread use and persistence in the environment, almost everyone has small amounts of PFHxS in their body, but this does not necessarily indicate a risk to your health. Large-scale biomonitoring programs show that PFHxS levels in people's blood are declining.[5]

You can be exposed to PFHxS through the use of consumer products, occupational exposure, eating contaminated food, or drinking contaminated water. PFHxS can be present on food crops, in packaged food items, or in the fish people catch and eat. MDH provides guidelines for eating fish, including fish caught in areas affected by PFAS. Ingestion of household dust can also be a significant source of exposure, especially for infants and young children.

For people living in areas affected by PFAS releases or disposal, drinking water may be a major source of exposure. MDH and MPCA have studied a number of sites in Minnesota with known PFAS releases. For more information on those locations, please visit Perfluoroalkyl Substances (PFAS) Sites in Minnesota (https://www.health.state.mn.us/communities/environment/hazardous/topics/sites.html). If water is used to prepare infant formula by people living in affected areas, it should be prepared only with treated or bottled water. Reverse osmosis and activated carbon filter treatment systems can reduce the levels of PFHxS in drinking water in your home. You may choose to use bottled water for drinking and cooking for a short time, but long-term bottled water use will be more expensive than installing a treatment system.

PFHxS transfers from a mother to infant during pregnancy and to an infant through breastmilk. 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.

PFHxS in the Environment

PFHxS is persistent in the environment, meaning it does not break down under natural conditions in soil or water. How PFHxS moves through soil is dependent on the makeup of the soil and its chemistry. In several areas of Minnesota, PFHxS has moved into groundwater.

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in drinking water sources and develops health-based guidance values for groundwater. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

References

1. US Environmental Protection Agency (EPA). 2017. "Fact Sheet: 2010/2015 PFOA Stewardship Program." Retrieved from https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program#mfg. Accessed April 2017.
2. Minnesota Drinking Water Information System (MNDWIS). 2017. Accessed March 2019.
3. Minnesota Pollution Control Agency (MPCA). 2013. "Perfluorochemicals in Mississippi River Pool 2: 2012 Update." Retrieved from https://www.pca.state.mn.us/sites/default/files/c-pfc1-21.pdf. Accessed April 2017.
4. Minnesota Pollution Control Agency (MPCA). 2008. PFCs in Minnesota's Ambient Environment: 2008 Progress Report. Retrieved from https://www.pca.state.mn.us/sites/default/files/c-pfc1-02.pdf.
5. 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 April 2017.

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