PFOS and Groundwater

PFOS

Perfluorooctane sulfonic acid (PFOS) 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 commonly used in a wide range of industrial processes and is found in many consumer products.

PFOS 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 PFOS and products containing PFOS, but production was phased out in 2002.[1] PFOS production has been phased out nationwide, but continues in other countries. Products containing PFOS may be imported into the United States.

PFOS in Minnesota Waters

PFOS 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 PFOS occurred. PFOS has been detected in sources of public drinking water at levels up to 1.4 ppb.[2] MDH and MPCA routinely sample drinking water in affected areas for PFOS and other PFAS chemicals.

The Minnesota Pollution Control Agency (MPCA) has detected PFOS in surface waters around the state. PFOS has been detected in the Mississippi River in the Twin Cities metro area at levels up to 0.15 parts per billion (ppb).[3] Detections were more common at sites immediately downriver from an industrial facility with historical PFOS use or disposal.

MDH Guidance Value

Based on available information, MDH developed a guidance value of 0.015 ppb for PFOS 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 health effects from PFOS and other PFAS in workers, people living in communities with PFOS in their drinking water, and the general public. In some studies, higher levels of PFOS 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 PFOS exposure included reduced immune response and decreased hormone levels (thyroid) as well as developmental changes such as decreased body weight and changes in energy metabolism in young, developing animals. Changes in liver function and liver weight as well as adrenal gland weight and levels of associated hormones were observed in adult animals.

Potential Exposure to PFOS

Due to widespread use and persistence in the environment, almost everyone has a small amount of PFOS in their body, but this does not necessarily indicate a risk to your health. Large-scale biomonitoring programs show that PFOS levels in people's blood are declining.[4]

You can be exposed to PFOS through the use of consumer products, occupational exposure, eating contaminated food, or drinking contaminated water. PFOS 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 PFOS. 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 PFOS 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.

PFOS 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.

PFOS in the Environment

PFOS is persistent in the environment, meaning it does not break down easily in soil or water. How PFOS moves through soil is dependent on the makeup of the soil and its chemistry. In several areas of Minnesota, PFOS 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

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