1,1-Dichloroethylene and Groundwater

1,1-Dichloroethylene

1,1-Dichloroethylene (also known as 1,1-dichloroethene and vinylidene chloride) is an industrial chemical that is not naturally found in the environment. It is commonly used to make many different types of plastics, food packaging, carpet backings, coatings for pipes and adhesive products.

1,1-Dichloroethylene in Minnesota Waters

1,1-Dichloroethylene has only been found in groundwater in Minnesota. It has been detected in groundwater at a maximum level of 11 µg/L*.[1] It is unlikely to be detected in surface water because it quickly evaporates into the air.[2]

1,1-Dichloroethylene is rarely detected in Minnesota drinking water. Since 2010, it has been detected at a maximum level of 1.2 µg/L.[3]

*One microgram per liter (µg/L) is the same as one part per billion (ppb).

MDH Guidance Value

Based on available information, MDH developed a guidance value of 200 parts per billion (ppb) for 1,1-dichloroethylene in drinking water. 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. A person drinking water at or below the guidance value would be at little or no risk for harmful health effects.

Potential Health Effects

In animal studies, eating or drinking 1,1-dichloroethylene caused effects in the liver. There is not enough evidence to determine whether 1,1-dichloroethylene causes cancer in animals or humans.

Potential Exposure to 1,1-Dichloroethylene

You may be exposed to 1,1-dichloroethylene if you live near locations where it is produced, used, or disposed. Improper disposal of 1,1-dichloroethylene at landfills can potentially contaminate groundwater.[4] You can be exposed if you shower in, bathe in, cook with, or drink water that contains 1,1-dichloroethylene.[4]

You can be exposed to low levels of 1,1,-dichloroethylene from food that was wrapped in plastic or stored in some plastic containers.[4] You can reduce your exposure by limiting your use of plastic wrap on food and limiting your purchases of food wrapped in plastic or stored in plastic containers.[4]

1,1-Dichloroethylene in the Environment

1,1-Dichloroethylene can enter the environment through spills and waste disposal. It may enter air when it is used to make industrial and consumer products. It may also form in the environment as a byproduct of other chemicals that have broken down.[4] It often evaporates into air, but can enter the soil and groundwater. 1,1-Dichloroethylene takes a long time to break down in groundwater, but will usually break down in air in a couple days.[2,4] Wastewater treatment plants are usually very effective at removing it from water during treatment before it enters the environment.[2]

Potential Environment Impacts of 1,1-Dichloroethylene

1,1-dichloroethylene is not highly toxic to aquatic organisms, and it is unlikely to be found in surface waters because of its rapid evaporation. Due to its low toxicity and minimal exposure of aquatic life, 1,1-dichloroethylene is not likely to impact aquatic organisms.

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. National Water Quality Monitoring Council. 2016. Water Quality Portal. https://www.waterqualitydata.us/portal/. Accessed March 2019
2. Hazardous Substances Databank (HSDB). 2019. https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
3. Minnesota Drinking Water Information System (MNDWIS). 2019. Accessed March 2019.
4. ATSDR. 1994. Toxicological Profile for 1,1-Dichloroethene https://www.atsdr.cdc.gov/toxprofiles/tp39.pdf

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