Minnesota Department of Health
HEALTH RISK ASSESSMENT

Dichlorofluoromethane and Drinking Water

Summary

Dichlorofluoromethane (DCFM) is a contaminant that has been found in drinking water in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for DCFM in drinking water using a similar chemical, chloroform.[3] Based on this value, some Minnesotans may be exposed to levels of DCFM that warrant water treatment.

Chemical

DCFM is an industrial chemical used as a propellant, refrigerant, fire extinguisher, and solvent. It is also commonly known by the brand name Freon®21. DCFM is a colorless liquid or gas with a sweet odor. When used, DCFM is released as a gas into the atmosphere, where it contributes to ozone depletion. Under an international agreement, the production and use of DCFM in the U.S. will be phased out and by 2030 will be completely banned.

Chemical in Minnesota Waters

The Minnesota Pollution Control Agency (MPCA) has detected DCFM in Minnesota groundwater at a maximum concentration of 1,000 ppb.[1] DCFM is most often found in water draining from landfills and at hazardous waste sites. DCFM is found in most landfill sites that are monitored by MPCA. MPCA has also detected DCFM in a few domestic wells that are close to contaminated landfill sites.[2]

MDH Guidance Value

There are no studies on the health effects of DCFM in drinking water. MDH selected a similar chemical, chloroform,[3] to develop a health based guidance value of 20 ppb for DCFM in drinking water. Based on available information DCFM is less toxic than chloroform, therefore, a person drinking water at or below this guidance value would have little or no risk of health effects.[4]

Potential Health Effects

Because DCFM evaporates quickly from water, the main health concerns are related to breathing it in. This can happen when using water in the home, such as for showering or washing dishes. There is some evidence from animal studies that inhaling DCFM, or ingesting similar chemicals, can damage the liver. However, levels at or below 20 ppb in drinking water are thought to be safe, even when showering or bathing.

Potential Exposure to Chemical

A person can be exposed to DCFM by drinking contaminated water. However, the most common exposure to DCFM is from breathing it in. DCFM dissolves in water and evaporates from water or soil into the air. A person can be exposed to DCFM that enters the air when contaminated water is used for showering, washing clothes and dishes, or other household activities. People with contaminated wells who want to reduce levels of DCFM in the home can filter their drinking water and should run fans or open windows when showering or bathing, running a dishwasher, or doing laundry.

Using Chemical Safely

People can reduce their exposure to DCFM by carefully following instructions when using equipment or products that contain DCFM, properly recycling or disposing of products that contain DCFM, filtering contaminated water to remove DCFM, and using fans or opening windows when using contaminated water to bathe, cook, or wash dishes or clothing.

Chemical in the Environment

DCFM can enter the environment when it is produced, transported, stored, or used. When products and equipment containing DCFM are disposed of in landfills, DCFM can be released into the air, soil, and groundwater. Spilled or leaked DCFM often moves from the soil into groundwater or surface water. It dissolves in water easily and moves quickly into the groundwater. While it can evaporate into the air from surface water and moist soil, DCFM does not break down rapidly in groundwater. Once in groundwater, it can stay for a long time, up to months or years.

Potential Environmental Impacts of Chemical

No studies were found that reported toxic effects of DCFM to aquatic organisms. However, if DCFM were to be released into the open water of a lake or stream, it would likely volatilize and not be present in high concentrations in water.

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in 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. MPCA. Interagency communication, 2014.
2. MPCA. Interagency communication, 2013.
3. MDH. Chloroform toxicological summary. 2017. http://www.health.state.mn.us/divs/eh/risk/guidance/gw/chloroform.pdf
4. MDH. Providing risk context for water contaminants with limited or no toxicity data. Poster Presentation.2015. http://www.health.state.mn.us/divs/eh/risk/ guidance/dwec/postersot2015.pdf

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