Bromodichloromethane and Groundwater

Bromodichloromethane

Bromodichloromethane (BDCM) belongs to a group of chemicals called trihalomethanes. Trihalomethanes are byproducts of water disinfection.

Water disinfection destroys or inactivates bacteria and other harmful microorganisms that can make people sick. Water disinfection is essential to keeping our waters safe for recreation and drinking. Disinfection has prevented thousands of deaths in Minnesota from waterborne diseases.

In the past, BDCM was used as a flame retardant and fire extinguisher fluid, as well as a solvent. Currently, chemical plants make a small amount of BDCM for industrial use.[1]

Bromodichloromethane in Minnesota Waters

BDCM has been detected in Minnesota groundwater at levels up to 11 µg/L. There have been a limited number of detections in Minnesota surface water, primarily near landfills. Surface water levels of BDCM were approximately 1 µg/L.

BDCM can form as a byproduct of water disinfection, so it can be found in drinking water even if it is not found in the source water or the local environment. BDCM has been detected in Minnesota drinking water at concentrations between 0.2 µg/L and 56 µg/L.[2]

The US Environmental Protection Agency (EPA) does not have a maximum contaminant level (MCL) for BDCM alone in drinking water, but does have an MCL of 80 µg/L for total trihalomethanes (all trihalomethanes added together, including BDCM) in public water supplies.[3] EPA set the MCL for total trihalomethanes after weighing the health benefits of water disinfection with the smaller risk of exposure to disinfection byproducts.

*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 3.0 ppb for BDCM in water. MDH does not use guidance values to regulate water quality, but they may be useful in situations for 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

BDCM is designated as "likely to be carcinogenic to humans"[3] based on animal studies and studies in humans exposed to total trihalomethanes. Exposure to BDCM has the potential to increase your risk of certain types of cancer. In addition, animal studies show that BDCM affects the liver, the spleen and immune system, and the hormones necessary to maintain pregnancy.

Potential Exposure to Bromodichloromethane

Most of your exposure to BDCM is from drinking water that has been chlorinated to destroy harmful microorganisms. Point-of-use filtration devices can be used to lower BDCM levels in drinking water,[4] as can storing the water in open air before drinking.[5]

You can also inhale BDCM that has evaporated from water during activities like showering or swimming.

Bromodichloromethane in the Environment

BDCM does not bind to soils and can move through the environment to water sources. BDCM is highly volatile and evaporates easily. Most BDCM in water will evaporate into the air as a gas. In groundwater, where evaporation does not take place, BDCM can be broken down by bacteria within days.[1]

Potential Environment Impacts of Bromodichloromethane

There is little information about effects of BDCM on aquatic organisms, but the available data indicate that tested organisms are not sensitive to BDCM at concentrations likely to be observed in our environment.

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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