

Toluene and Groundwater

Toluene

Toluene is a clear liquid that occurs naturally in crude oil. It is included in a group of chemicals often associated with petroleum known as BTEX, which stands for benzene, toluene, ethylbenzene, and xylenes. The chemicals in BTEX are commonly found in gasoline and petroleum products. Manufacturers also use toluene to make paints, polishes and lacquers, adhesives, nylon, plastics, and other chemicals.¹

Toluene in Minnesota Waters

At locations with known groundwater contamination, toluene has been detected in approximately 17 percent of samples, with a maximum concentration of 22,000 µg/L.² In groundwater not known to be impacted by a contamination source, toluene has been detected in approximately one percent of samples, with a maximum concentration of 0.35 µg/L.² In surface water, toluene has been detected in approximately 23 percent of samples, with a maximum concentration of 0.61 µg/L.³

Toluene has been detected in approximately two percent of 9,852 drinking water samples collected in the last 10 years, with a maximum detection of 140 µg/L.⁴ Only one detection in the last ten years was above the MDH health-based guidance value of 70 µg/L. All detections have been below the Safe Drinking Water Act limit of 1,000 µg/L.

*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 70 µg/L for toluene 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, nervous system effects (mild behavioral changes and changes in brain chemistry) and changes in immune response (immunosuppression) were observed. Animals who were exposed for more than 30 days showed additional effects to the liver.

There is not enough data to assess whether eating or drinking toluene causes cancer in animals or people.

Potential Exposure to Toluene

The most common ways you may be exposed to toluene are from breathing it in. Toluene may be in the outdoor or indoor air from gasoline emissions, tobacco smoke, and use of products that contain toluene. People that smoke or work in an industry that uses gasoline, paints and varnishes, or other products that contain toluene may be exposed to higher levels of toluene than most people.¹

Toluene is not found in drinking water very often and is not likely to be found in food.

Using Toluene Safely

You can reduce your exposure to toluene by quitting smoking, not being around people who smoke, limiting your exposure to vehicle emissions in heavy traffic, and following all directions when refilling your vehicle with gasoline. If you handle gasoline or other products like paint, paint thinners, polishes, and adhesives, always follow the directions and use in a well-ventilated area. Properly store gasoline and other products out of the reach of children.

Toluene in the Environment

Toluene mainly enters the environment from spills or leaks at locations where it is manufactured, used, or stored.¹ Toluene easily moves into the air from water and soil. Once in the soil, it can also enter groundwater. In groundwater, it normally takes a few days to weeks to break down.¹ Microorganisms help break down toluene in the soil.^{4,5}

Potential Environment Impacts of Toluene

Toluene enters the environment primarily from petroleum releases. Known detections of toluene are most often dealt with through remedial actions in efforts to avoid its migration to groundwater and surface water. Minnesota has a water quality standard for toluene to protect aquatic life, and measured surface water concentrations have not exceeded this standard.

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. ATSDR. 2017. Toxicological Profile for Toluene. <https://www.atsdr.cdc.gov/ToxProfiles/tp56.pdf>
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4. Minnesota Drinking Water Information System (MNDWIS). 2010. Accessed August 2019.
5. Hazardous Substances Data Bank (HSDB). 2019. <https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>

Minnesota Department of Health
Health Risk Assessment Unit
PO Box 64975, St. Paul MN 55164
651-201-4899
health.risk@state.mn.us
www.health.state.mn.us



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