Acetochlor ESA and Drinking Water

Summary

Acetochlor ethanesulfonic acid (ESA) is an herbicide breakdown product (degradate) that has been detected in Minnesota water. Detections of acetochlor ESA in Minnesota groundwater and surface water have been below the Minnesota Department of Health (MDH) guidance value of 300 micrograms per liter (parts per billion [ppb]). Minnesotans are not likely to experience harmful health effects from the levels of acetochlor ESA found in the environment.

Acetochlor ESA

Acetochlor ESA is a breakdown product of an herbicide called acetochlor. Large amounts of acetochlor are used in U.S. agriculture. Acetochlor is widely used on corn crops in Minnesota and sometimes on soybean crops.[1] Minnesota Department of Agriculture (MDA) sales data show acetochlor sales increased in Minnesota between 2009 and 2014.[2]

Acetochlor ESA in Minnesota Waters

MDA detected acetochlor ESA in about one third of the routine groundwater samples it collected from 2012 through 2015. The highest level of acetochlor ESA MDA detected was 44.3 ppb.[3] MDA has detected acetochlor ESA in surface water at levels up to 4.8 ppb.[4]

Some drinking water systems were tested for acetochlor ESA as a part of a one-time monitoring effort between 2008 and 2010 (Unregulated Contaminant Monitoring Rule 2). Acetochlor ESA was not detected in any of the 59 samples collected.[5] In a 2015 study of wells considered to be at high risk of pesticide contamination, acetochlor ESA was detected in 21 community public drinking water system wells at levels up to 1.5 ppb.[6]

MDH Guidance Value

Based on available information, MDH developed a guidance value of 300 ppb for acetochlor ESA in drinking water. A person drinking water at or below the guidance value would have little or no risk of harmful health effects.

Potential Health Effects

There are limited laboratory studies about the potential health effects of acetochlor ESA. Both short-term and longer-term animal studies showed that exposure to acetochlor ESA led to changes in thyroid hormones and high doses affected the male reproductive system. Longer-term animal studies also showed changes in overall body weight. Based on animal studies, acetochlor ESA appears less potent than the parent compound acetochlor.

Potential Exposure to Acetochlor ESA

You may come in contact with small amounts of acetochlor ESA by drinking contaminated water. The amount of acetochlor ESA in drinking water is not likely a health risk for Minnesotans.

Acetochlor ESA in the Environment

Acetochlor ESA enters the environment when its parent compound, acetochlor, breaks down. Acetochlor enters the environment when it is used for weed control on agricultural crops, such as corn, potatoes, sugar beets, and sunflowers. Once in the soil, acetochlor ESA can move easily through soil. It takes a few days to weeks for acetochlor ESA to biodegrade.

Potential Environment Impacts of Acetochlor ESA

Because acetochlor is an herbicide designed to control plant growth, terrestrial and aquatic plants and algae are most likely to be impacted by acetochlor ESA in the environment. Acetochlor ESA is considerably less toxic to aquatic organisms than its parent compound acetochlor. Based on concentrations of acetochlor ESA detected in Minnesota, we do not expect to see harmful effects on 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 drinking water. 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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5. US EPA. 2016. Occurrence Data for the Unregulated Contaminant Monitoring Rule. (https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#2).
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