

Aminomethylphosphonic Acid (AMPA) and Drinking Water

AMPA

AMPA* is a chemical that results when soil microbes breakdown glyphosate, a widely used herbicide that controls broadleaf weeds and grasses. AMPA can also form when plants or microbes in the intestines of animals metabolize glyphosate. Glyphosate is one of the most commonly used herbicides in Minnesota. Glyphosate has been used in agriculture, forestry, lawn-care, and gardening since 1974. Glyphosate is also used in some products to control aquatic plants.¹

The breakdown of certain types of phosphonates (found in some detergents) can also form AMPA.

AMPA in Minnesota Waters

The Minnesota Department of Agriculture (MDA) monitors surface water and groundwater for AMPA. In 2015, MDA detected AMPA in one of 81 surface water samples; the chemical was not detected in 2014 or 2013.² In 2016, the U.S. Geological Survey detected AMPA in Minnesota groundwater, with a maximum concentration of 0.09 µg/L. AMPA has not been detected in Minnesota drinking water, but it may be present in water that is used as a source of drinking water. Urban wastewater appears to be a major source of AMPA in surface water.³

MDH Guidance Value

Based on available information, MDH developed a guidance value of 1,000 parts per billion (ppb) for AMPA 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 have little or no risk for health effects.

Potential Health Effects

AMPA caused minor liver injury and urinary bladder effects in laboratory animals, in addition to decreased body weight gain during development.

Potential Exposure to AMPA

People may be exposed to small amounts of AMPA through their diet. AMPA can form in food crops treated with glyphosate, and AMPA may be more common in crops that have been genetically modified to be resistant to the effects of glyphosate.⁴ Studies show that the levels of AMPA in food are well below levels of health concern.⁵ People may be exposed to very low levels of AMPA in drinking water, but this exposure is likely to be lower than exposure from food.

AMPA in the Environment

AMPA is released into the environment through the breakdown of other chemicals. AMPA is frequently released through the breakdown of glyphosate. Some detergents may contain phosphonate additives

that degrade to AMPA and contribute to environmental levels, especially in urbanized areas.³ AMPA can form in the soil or inside plants treated with glyphosate. In soil, AMPA breaks down in a few weeks.⁶

Potential Environmental Impacts of AMPA

AMPA has been detected in only one surface water sample since monitoring began in 2013. The concentration of AMPA in the sample was significantly lower (several orders of magnitude) than the concentrations expected to impact aquatic life. AMPA is not as toxic to aquatic organisms as glyphosate.

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.

*AMPA, the glyphosate degradate, should not be confused with the neurotoxic chemical alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionate, which also has the acronym AMPA.

References

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