

Metolachlor ESA/OXA and Drinking Water

Metolachlor ESA and Metolachlor OXA

Metolachlor ESA and metolachlor OXA are degradates of the common herbicide, metolachlor. Degradates are breakdown products that form when a pesticide changes in the environment. Degradates can have similar chemical properties to the original pesticide. Metolachlor is one of the top pesticides sold in Minnesota for agricultural use and is used on agricultural crops, including corn and soybeans, to control broadleaf weeds and grasses.

Metolachlor ESA and Metolachlor OXA in Minnesota Waters

Metolachlor ESA and OXA concentrations in Minnesota waters have been monitored since the 1990s. The Minnesota Department of Agriculture (MDA) detected metolachlor ESA in 74 percent of surface water samples in 2016 with a maximum detected concentration of 4.21 micrograms per liter ($\mu\text{g/L}$).^{*} In the same study, metolachlor OXA was detected in 77 percent of surface water samples, with a maximum detected concentration of 1.55 $\mu\text{g/L}$. In groundwater, MDA detected metolachlor ESA in 83 percent of monitoring well samples, with a maximum concentration of 16.9 $\mu\text{g/L}$. Metolachlor OXA was detected in 39 percent of the same monitoring well samples, with a maximum concentration of 6.73 $\mu\text{g/L}$.¹

In a 2015 study of pesticides in community public water supplies, metolachlor ESA was detected in 68 of 108 source water samples from community public water supply wells at a maximum concentration of 3.69 $\mu\text{g/L}$. Metolachlor OXA was detected in 36 of 108 source water samples from community public water supply wells at a maximum concentration of 0.996 $\mu\text{g/L}$.² Both degradates were included in the Environmental Protection Agency (EPA) Second Unregulated Contaminant Monitoring Rule (UCMR 2) and were not detected in drinking water samples from any of the community public water systems that were sampled.³

^{*}One microgram per liter ($\mu\text{g/L}$) is the same as one part per billion (ppb).

MDH Guidance Values

Based on available information, MDH developed guidance values of 1,000 parts per billion (ppb) for metolachlor ESA and 1,000 parts per billion (ppb) for metolachlor OXA in drinking water. 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, exposure to metolachlor ESA caused changes in the liver, including increased liver weights and changes to liver enzymes. Exposure to metolachlor OXA caused changes to blood chemistry in laboratory animals. Neither degradate has been classified as a carcinogen. Both degradates are less toxic than the parent compound metolachlor.⁴

Potential Exposure to Metolachlor ESA and Metolachlor OXA

People may be exposed to metolachlor ESA and OXA from residues on food and from drinking water. Metolachlor ESA and OXA are not directly applied to fields. Individuals applying herbicides containing the parent compound metolachlor to agricultural fields should follow the label instructions, use proper

equipment, and take precautions to avoid bringing residues into the home to prevent exposure. Metolachlor is not used in residential settings.

Metolachlor ESA and Metolachlor OXA in the Environment

Metolachlor enters the environment when it is applied as an herbicide to fields. Metolachlor ESA and OXA are formed when metolachlor breaks down in the environment. These degradates can move through soil and enter groundwater. They can also enter surface water from runoff after metolachlor is applied to an agricultural field.⁵ Metolachlor OXA and ESA are long-lasting in the environment and are more commonly detected than the parent compound, metolachlor.^{1,6}

Potential Environment Impacts of Metolachlor ESA and Metolachlor OXA

Although metolachlor ESA and metolachlor OXA are more commonly detected, their parent compound, metolachlor, is more toxic to aquatic plants and algae. Metolachlor is an herbicide designed to control plant growth, so plants and algae in surface water are mostly likely to be affected. In Minnesota surface waters neither metolachlor ESA or metolachlor OXA have been detected at concentrations that would negatively impact aquatic life, including aquatic plants.⁷

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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