

# Manganese in Drinking Water Wells

## What is manganese?

Manganese is a naturally occurring element in the earth. It is commonly found with iron as mineral oxide coatings on the surface of soil and rock grains. When groundwater contacts these coatings, the oxides are dissolved and may be transported to your well in the groundwater. Iron and manganese are chemically similar and can cause similar problems.

## What are the effects of manganese?

Manganese is an essential nutrient at low doses, but elevated levels may be a health concern. The U.S. Environmental Protection Agency (EPA) develops health advisories to provide information on contaminants that can cause human health effects and are known (or anticipated) to occur in drinking water. Health advisories are intended to provide technical guidance to agencies and local officials and are set at levels that will protect people from all adverse health effects. Published health advisory levels are based on non-cancer health effects for specified exposure durations; one-day, ten-day, and lifetime.

**One-day and 10-day health advisories** are considered acute or short-term levels that are not expected to cause adverse effects for up to one or ten days of exposure. These health advisories are intended to protect a 10-kg (22 pound) child consuming 1 liter of water per day.

- For infants up to 6 months of age, EPA identified that water with manganese levels equal to or less than 0.3 mg/L for more than 10 days have shown no adverse health effects and can be used for making formula.
- For the general population, EPA identified that water with manganese levels equal to or less than 1.0 mg/L over a 10-day exposure has shown no adverse health effects.

**Lifetime health advisories** are considered chronic or long-term levels that are not expected to cause adverse effects after a lifetime of exposure. These health advisories are intended to protect a 70-kg (154 pound) adult consuming 2 liters of water per day.

- For the general population, EPA identified that water with manganese levels equal to or less than 0.3 mg/L over a lifetime exposure has shown no adverse health effects.

The [EPA health advisory](#) levels of 0.3 mg/L and 1 mg/L were set based upon typical daily dietary manganese intake levels not known to be associated with adverse health effects. This does not imply that intakes above these levels will necessarily cause health problems. As a precaution, the general population should consider limiting their consumption of drinking water when levels of manganese are above the EPA health advisory to decrease their exposures and to decrease the possibility of adverse neurological effects.

## How is manganese detected?

While iron can cause an orange or brown stain in sinks and in the laundry, manganese often results in a dense black stain or solid. You may see a black tint or particles in the water. It may look clear when it comes from the faucet but once exposed to air, turns a black color.

To determine if manganese is present, have your drinking water tested at a state certified laboratory. The amount of manganese in water is important to help you determine the type of treatment system you need to remedy the problem. It is recommended that drinking water have less than 0.05 mg/L of manganese. The Michigan Department of Environment, Great Lakes, and Energy's (EGLE) Drinking Water Laboratory analyzes for manganese and some private laboratories may perform the testing. Contact EGLE's Drinking Water Laboratory in Lansing at 517-335-8184 for more information.

## Treating manganese problems

Several methods are available for removing manganese from water. The most appropriate method depends on many factors, including the concentration and form of the manganese in the water, of manganese bacteria, and the volume of water you need to treat. It is recommended that the total iron, manganese, hardness, alkalinity and pH of the water be tested before purchasing equipment.

There are five main ways to treat water that has these contaminants:

1. Adding phosphate compounds
2. Using ion exchange (swapping out unwanted particles for safer ones)
3. Using oxidizing filters
4. Forcing air into the water (aeration) and then filtering it
5. Adding chemicals to oxidize the contaminants and then filtering them out

## More Information

- [Manganese in Michigan](#) (EGLE)
- [HEALTH EFFECTS - Toxicological Profile for Manganese](#) (NIH)
- [Common Drinking Water Quality Concerns in Michigan](#)

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