Manganese in Drinking Water

Manganese is a metal and one of the most abundant elements on the earth's surface. As a result, it is naturally present in air, soil and water. It is an essential nutrient normally present in the human body.

What are the sources of manganese?

- Naturally occurring in groundwater due to weathering of rock and soils
- Iron and steel manufacturing
- Dry-cell battery production
- Welding
- Leather textile production

What are the health effects of manganese?

The primary source of manganese for the general population is food. Intake from drinking water is considered a secondary source. Dermal (skin) exposure is considered minor. High occupational exposure, primarily through inhalation of dust or fumes, may be present for workers in certain industries.

Manganese absorbed from food and water is widely distributed throughout the body. Adverse health effects can be caused by either inadequate intake or overexposure. Manganese deficiency is rare because food sources containing manganese are common.

Inhaled manganese can be deposited in the lower airways for larger particles (dust) or deposited in the moist tissues of the nose for smaller particles (fumes). Dust inhalation can result in lung inflammation and impaired lung function. Inhaled manganese from fumes can be directly transported to the brain resulting in neurological disorder.

What are the drinking water guidelines for manganese?

The U.S. Environmental Protection Agency (EPA) has set a Drinking Water Health Advisory for manganese concentrations at or below 0.05 parts per million (ppm), which is equal to 50 parts per billion (ppb), based on staining and taste considerations. The national median level of manganese in drinking water is 10 ppb.

There is no regulated Maximum Contaminant Level (MCL) for manganese. However, the EPA has set a Lifetime Health Advisory (LHA), which is the concentration of a contaminant in drinking water that is not expected to cause harmful health effects over a lifetime of daily exposure. The LHA for manganese is 0.300 ppm.

What actions can well owners take to reduce risks associated with manganese?

Residents who use a private well as a drinking water source should have the well water tested for manganese contamination upon move-in; every 5-10 years; or as needed. Testing results will help determine if well owners need to take steps to limit manganese exposure from well water, such as installing a treatment system.

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December 2025

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