



**Bureau of Environmental Health
and Radiation Protection**

“Protect and improve the health of all Ohioans by preventing disease, promoting good health and assuring access to quality care.”

Manganese in Water

What is manganese?

Manganese (man'-guh - neez) is an element found in nature. Pure manganese is a silver metal that has no special smell or taste. But pure manganese often combines with other elements to form different manganese compounds.

Manganese is an essential (needed) nutrient that plays an important role in our health. Everyone comes in contact with small amounts of manganese in air, water, and food. Low levels of manganese are found in living things such as plants and animals. For nearly all people, food is the main source of manganese.

Manganese is also found in many types of rocks. Northeast Ohio rocks have naturally higher concentrations of the metals iron and manganese.

Can manganese make you sick?

A daily intake of manganese is needed for growth and good health in children and adults. Manganese is essential and aids in bone mineralization, protein formation and metabolic regulation. A diet that lacks the needed amount of manganese can result in serious illness that can lead to problems with blood clotting, skin disorders and metabolic disorders as well as interfering with normal growth, bone formation and reproduction (ATSDR, 2000).

In most situations, there is no need to reduce exposure to manganese because it is a needed nutrient. If the body comes in contact with higher levels of manganese than it requires, the excess will be naturally removed through the bodily function of waste removal. Children, as well as adults, who come in constant contact with high

levels of manganese and lose the ability to remove excess from their bodies, may develop nervous system problems.

Although manganese is a needed nutrient, you can get sick from breathing and eating or drinking (ingesting) high levels of manganese for long periods of time.

Getting sick will depend upon:

- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- General Health, Age, Lifestyle
- Young children, the elderly and people with chronic (on-going) health problems are more at risk to chemical exposures.

What are the health problems seen with exposure to high levels of manganese?

People with long-term exposure to manganese at very high levels may develop central nervous system (CNS) problems which look like Parkinson's disease. This syndrome is called "manganism."

CNS problems such as tremors and loss of muscle control have been associated with ingestion of drinking water with highly elevated levels of manganese (at or in excess of 14,000 ppb -- parts per billion) in a study of a human population in Japan and in a second study of elderly individuals in Greece who were drinking water with manganese levels of 1,800 to 2,300 ppb. However, other studies in Canada and Israel indicated no correlation between increased incidence of CNS disorders and ingestion of drinking water with similarly high levels of manganese (ATSDR, 2000).

Is there a medical test to show the levels of manganese in your body?

Yes. There are different tests to show levels of manganese in body fluids. Fluids such as blood, urine, and feces can measure levels of manganese. Scalp hair can also be used.

NOTE: These tests may show the amount of manganese in your body, but they will not be able to tell you whether you will experience health problems. Also, these tests will show the current levels of manganese in your body but will not be able to show the past levels. These tests also cannot tell you where the manganese came from.

Does manganese cause cancer?

There are no human cancer data available for manganese.

The Environmental Protection Agency (EPA) has determined that manganese is not a classifiable human carcinogen (does not cause cancer).



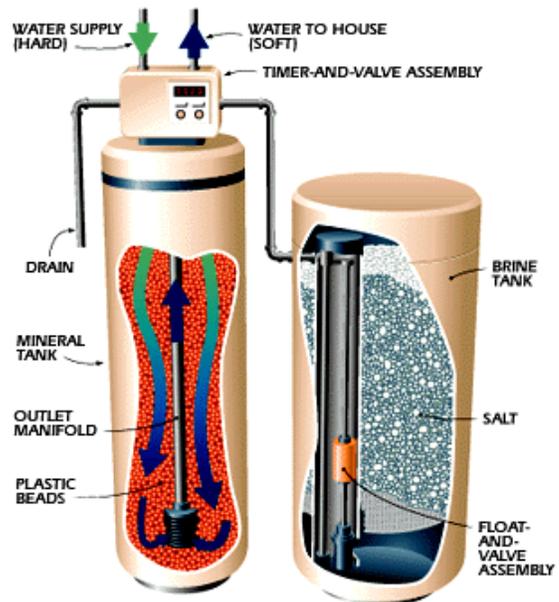
Manganese and other metals in Ohio well water

There are naturally-occurring elements (metals) that are a common part of groundwater (underground drinking water) across Ohio. Different geologies (soil-ground-earth) contain different levels of these metals. Groundwater-bearing sandstone layers in northeastern Ohio, such as the Massillon Sandstone and the Sharon Conglomerate, often have naturally high concentrations of the metals iron and manganese. Therefore, the higher levels of these metals detected in northeast Ohio area wells are likely natural in their origin, resulting from local geological and geochemical conditions.



How can you reduce manganese and other metals well water?

The most effective way to remove the naturally-occurring metals found in your private drinking water is to use a cation-exchange water softener system. Besides softening water, these systems also remove the iron from the water. As manganese is chemically similar to iron, these same cation-ion exchange water softener systems greatly reduce or remove manganese concentrations from the water as well.



Has the federal government made recommendations to protect human health?

The U.S. EPA has set a Secondary Maximum Contaminant Level (SMCL) for manganese in public water supplies of 50 ppb. NOTE: The SMCL guidelines set by the EPA are not health-based, but are based upon water aesthetics. Aesthetics include odor, taste, color and clarity. The US EPA has established a Life-time Health Advisory value of 300ppm for manganese in drinking water.

The National Research Council has recommended safe and adequate daily intake levels for manganese that range from 0.3 to 1 mg/day for children up to 1 year, 1 to 2 mg/day for children up to age 10, and 2 to 5 mg/day for children 10 and older.

References:

Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological profile for manganese. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

US EPA 2012 Edition of the Drinking Water Standards and Health Advisories.

Where Can I Get More Information?

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This fact sheet was developed in cooperation with the Agency for Toxic Substances and Disease Registry