

Frequently Asked Questions about Manganese in Drinking Water

What is manganese and where does it come from? Manganese is a common, naturally-occurring mineral found in rocks, soil, groundwater, and surface water. Manganese is a natural component of most foods. Manganese is an essential nutrient and eating a small amount of it each day is important to stay healthy.

Why are the drinking water advisories for manganese being issued now? Recent guidance from U.S. Environmental Protection Agency (EPA) has prompted this action. Manganese is an unregulated contaminant that EPA is collecting occurrence information on to determine if establishing an enforceable national primary drinking water standard is warranted. The EPA health advisory levels for manganese were established in 2004. Based on more recent health studies, EPA has elevated their interest in manganese. As a precautionary effort to protect your health while further scientific studies and research are being reviewed and conducted, EPA recommended that states work with systems to notify the public when an existing health advisory level has been exceeded.

When did the North Dakota Department of Health find out about the elevated manganese levels? Historically, it has been a well-known fact that some public water systems in North Dakota contained elevated manganese levels. It is important to note that nothing has changed with respect to manganese levels in the state's drinking water. The only thing that has changed is EPA's guidance regarding response to health advisory levels.

Does this advisory also affect other neighboring water systems? The drinking water advisory issued by a public water system only pertains to those customers served by that public water system.

What level of manganese is a concern in drinking water? 1-day and 10-day health advisories are considered acute or short-term levels that are not expected to cause adverse effects for up to 1 or 10 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 has 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 limit to decrease their exposures and to decrease the possibility of adverse neurological effects.

What health effects does manganese cause? Too much manganese can increase the risk of health problems, particularly for infants under 6 months old. Infants are more at risk than older children and adults because their brains and bodies are developing quickly. Infants exposed to manganese over 0.3 mg/L may experience learning or behavioral problems. Some studies have shown that too much manganese during childhood may also have effects on the brain, which may affect learning and behavior.

Adult's drinking water with high levels of manganese for many years may experience impacts to their nervous system, resulting in behavioral changes and other nervous system effects, including slow and clumsy movements. Exposure to high levels of manganese can cause harm to the nervous system. A disorder similar to Parkinson's disease called Manganism can result. Tremors, shaking, and an unsteady gait are characteristics of very high exposure to manganese. This type of effect is most likely to occur in the elderly after exposure to high levels of manganese or with individuals exposed to welding vapor that contains high levels of manganese. The EPA's health advisory is intended to protect against this effect.

Manganese is poorly absorbed through the skin. There are no concerns about manganese exposure through skin contact with food or water containing manganese.

If you are concerned about your health from manganese exposure, discuss your concerns with your healthcare provider.

For more information regarding the health effects associated with manganese in drinking water, please contact Bob Benson with the US EPA Region 8 office in Denver, CO at (303) 312-7070, or the North Dakota Drinking Water Program at (701) 328-5211.

How long is manganese retained in a person? Does it bioaccumulate? A person has a number of biological systems operating that control absorption of manganese from the diet and from manganese in drinking water. There are other biological systems that are responsible for removing manganese from the body. These biological control systems maintain the internal concentration of manganese within a narrow range. If excess manganese is absorbed, it is usually eliminated within 24 hours. Manganese typically does not bioaccumulate in a person.

Can I drink water with high levels of manganese? If the tap water contains manganese above 0.3 mg/L it is recommended that bottle-fed infants under 6 months old should use an alternate water source for drinking. If the tap water contains manganese above 1.0 mg/L children and adults should also consider using an alternate source of water for drinking. A properly maintained in-home water softener or reverse osmosis treatment systems may reduce the manganese levels in tap water to levels below the health advisory levels. However, each home plumbing and treatment system is unique, and some homes may not have treated tap water available at the taps most used for drinking and cooking. If you have an in-home treatment

system, you may wish to check with your service provider to ensure your system is working properly. Ensuring your system is in working order minimizes the need for testing. If you are concerned about your system's effectiveness to remove manganese, water testing is available from the following laboratories: North Dakota State Public Health Laboratory's Division of Chemistry, (701) 328-6140; Fargo-Cass Public Health; Environmental Laboratory (701) 298-6997 and Minnesota Valley Testing Laboratories (701) 258-9720 or (800) 279-6885.

Filters found in refrigerators, water pitchers, or affixed directly to a faucet do not remove manganese. If you are considering installing new in-home treatment equipment, consult the manufacturer data and certifications to ensure that their treatment system is effective at reducing manganese to levels below 0.3 mg/L.

Should I use this water to make formula for my baby? No. The most important thing to do is switch to bottled water or an alternate source of water that is low in manganese to make formula such as treated water from a tested reverse osmosis system or in-home water softener.

Should I be concerned about my child's health? If you have health concerns about your child, you should speak to your health care provider.

Should I stop breastfeeding my child? If you are healthy and breastfeeding, you should continue to do so. Human milk contains lower manganese levels than formula or milk from cows.

Should I be concerned if I am pregnant? If you are concerned, you should talk to your health care provider.

Can I cook with the water? Do not use tap water to prepare some foods, such as soup, where large amounts of water will be consumed with the food. The tap water may be used to prepare foods, such as pasta, where the water is discarded prior to consumption.

Do not boil the water. Boiling will concentrate the levels of manganese.

Can I use the water to make ice and drinks? No. As a precaution, consider not using untreated water to make ice or to prepare beverages unless using tested softened or RO filtered tap water.

Can I use the water to wash dishes and do laundry? Yes.

Can I bathe, shower, or wash my hands with the water? Yes. Manganese is poorly absorbed through the skin.

Can I brush my teeth with the water? Yes. However, do not swallow the water.

Can I give the water to my pets and livestock? Information is not available on the effect of elevated manganese in drinking water on pets and livestock. Please contact your veterinarian.