Iron

Some soil and rocks in Minnesota contain minerals very high in iron. As rain falls or snow melts on the land surface and water seeps through iron-bearing soil and rock, iron can be dissolved into the water. In some cases, iron can also result from corrosion of iron or steel well casing or water pipes. Similar to how iron in a metal pail turns to rust when exposed to water and oxygen, iron minerals in water turn to rust and stain plumbing fixtures and laundry.

How to Detect Iron

Taste

Iron may give water a metallic taste and affect how food and beverages taste.

Color

Iron in water can:

- Cause yellow, red, or brown stains on dishes, laundry, and plumbing fixtures.
- Turn tea, coffee, and potatoes black.

Clogs

Iron can clog wells, pumps, sprinklers, dishwashers, and other devices.

Iron May Help Other Organisms Grow

Iron in water does not usually present a health risk. Your body needs iron to transport oxygen in the blood. Most iron comes from food, since the body cannot easily absorb iron from water.

Iron may present some concern if harmful bacteria have entered a well. Some harmful organisms require iron to grow. If there is iron in the water, it may be harder to get rid of harmful bacteria.

Testing for Iron

Yellow or red colored water is often a good indication that iron is present. However, a laboratory can tell you the exact amount of iron, which can be useful in deciding on the best type of treatment. In addition to testing for iron, it can helpful to test for hardness, pH, alkalinity, and iron bacteria.

Point of reference: Water with an iron level above 0.3 milligrams per liter (mg/L) is usually considered objectionable. Iron levels are usually below 10 mg/L in water.

Minnesota Department of Health recommends you use an accredited laboratory to test your water. Contact an accredited laboratory to get sample containers and instructions, or ask your county environmental or public health services if they provide well testing services.

Controlling Iron

Home water treatment is the most common method for controlling iron in water. Depending on circumstances, other options may include:

- **Using a different water source** that is low in iron, such as a public water system or a well drawing water from a different water-bearing formation.
- **A new well.** Keep in mind that it is difficult to predict what the iron concentration will be in a new well. Neighboring wells may be an indicator, but the iron content of two nearby wells may be quite different.

Water Treatment

Effectively treating iron depends on the form(s) of iron present, the chemistry of the water, and the type of well and water system. It is best to work with a water treatment specialist to find the best solution.

Forms of Iron

- **Ferrous iron** (“clear-water iron”): Water comes out of the faucet clear, but turns red or brown after standing.
- **Ferric iron** (“red-water iron”): Water is red or yellow when it first comes out of the faucet.
- **Organic iron**: It is usually yellow or brown, but may be colorless. Very shallow wells or wells affected by surface water are more likely than other wells to have organic iron.

Ferrous (Clear-Water) Iron Treatment

Water softeners and **iron filters** (such as a manganese greensand filter) are effective at removing clear-water iron. Water softeners are the more common method. Manufacturers report that some water softeners can remove up to 10 mg/L. However, 2 to 5 mg/L is a more common limit. A manganese greensand filter can be effective for levels that are up to 10 to 15 mg/L.

A water softener removes hardness minerals like calcium and magnesium. Iron will plug the softener and must be periodically removed from the softener resin by backwashing. A water softener will be less effective if there is low water hardness and high iron or the system allows contact with air, such as in an air-charged “galvanized pressure tank.”

Ferric (Red-Water) Iron Treatment

- **Iron filters** (such as a manganese greensand filter) are a common treatment for red-water iron levels up to 10 to 15 mg/L.
- **Aeration** (injecting air) or **chemical oxidation** (usually adding chlorine in the form of calcium or sodium hypochlorite) followed by filtration are options if iron levels are more than 10 mg/L.
- **Sediment filter**, **carbon filter**, or **water softeners** can remove small amounts of iron, but the iron will quickly plug the system.

Organic Iron Treatment

Organic iron and tannins present water treatment challenges. Organic iron and tannins can slow or prevent iron oxidation, so water softeners, aeration systems, and iron filters may not work well. **Chemical oxidation followed by filtration** may be an option.

Distillation or **reverse osmosis** can remove any type of iron. If there is a lot of iron in the water, it can quickly plug up the units, so a whole house treatment system may be better.

Iron Bacteria and Well Treatment

Iron bacteria are organisms that consume iron to survive. In the process, they produce deposits of iron and a red or brown slime called a "biofilm." The organisms are not harmful to humans, but can make an iron problem much worse. The organisms naturally occur in shallow soils and groundwater and they may be introduced into a well or water system when it is constructed or repaired.

See "*Iron Bacteria in Well Water*" for how to prevent, remove, and treat iron bacteria.

Resources

Home Water Treatment
(www.health.state.mn.us/communities/environment/water/factsheet/hometreatment.html).

Iron Bacteria in Well Water
(www.health.state.mn.us/communities/environment/water/wells/waterquality/ironbacteria.html).

Licensed Well and Boring Contractor Directory
(www.health.state.mn.us/lwcsearch).

Search for Accredited Laboratories
(www.health.state.mn.us/labsearch).

Water Quality, Well Testing, Well Disinfection
(www.health.state.mn.us/wellwater).

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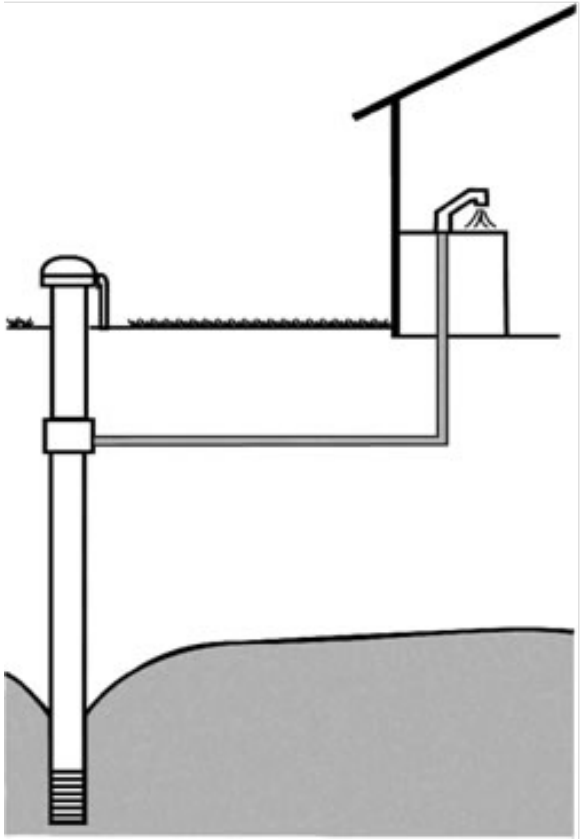

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Well Management Section
Environmental Health Division