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## Environmental Health FACT SHEET

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### IRON IN DRINKING WATER

Iron is one of the most troublesome elements in water supplies. Making up at least 5 percent of the earth's crust, iron is one of the earth's most plentiful resources. Rainwater as it infiltrates the soil and underlying geologic formations dissolves iron, causing it to seep into aquifers that serve as sources of groundwater for wells. Although present in drinking water, iron is seldom found at concentrations greater than 10 milligrams per liter (mg/l) or 10 parts per million. However, as little as 0.3 mg/l can cause water to turn a reddish brown color.

Iron is mainly present in water in two forms: either the soluble ferrous iron or the insoluble ferric iron. Water containing ferrous iron is clear and colorless because the iron is completely dissolved. When exposed to air in the pressure tank or atmosphere, the water turns cloudy and a reddish brown substance begins to form. This sediment is the oxidized or ferric form of iron that will not dissolve in water.

#### **Health**

Iron is not hazardous to health, but it is considered a secondary or aesthetic contaminant. Essential for good health, iron helps transport oxygen in the blood. Most tap water in the United States supplies approximately 5 percent of the dietary requirement for iron.

#### **Taste and Food**

Dissolved ferrous iron gives water a disagreeable taste. When the iron combines with tea, coffee and other beverages, it produces an inky, black appearance and a harsh, unacceptable taste. Vegetables cooked in water containing excessive iron turn dark and look unappealing.

#### **Stains and Deposits**

Concentrations of iron as low as 0.3 mg/l will leave reddish brown stains on fixtures, tableware and laundry that are very hard to remove. When these deposits break loose from water piping, rusty water will flow through the faucet.

#### **Iron Bacteria**

When iron exists along with certain kinds of bacteria, problems can become even worse. To

survive, the bacteria utilize the iron, leaving behind a reddish brown or yellow slime that can clog plumbing and cause an offensive odor. This slime or sludge is noticeable in the toilet tank when the lid is removed.

### **Organic Iron**

Since iron combines with different naturally occurring organic materials, it may also exist as an organic complex. The combination of naturally occurring organic material and iron can be found in shallow wells and surface water. This type of iron is usually yellow or brown but may be colorless.

### **Test Your Water**

If there is an iron problem with the water supply, the first step is to determine the source. The source of iron may be from the corrosion of iron or steel pipes or other components of the plumbing system where the acidity of the water, measured as pH, is below 6.5.

A laboratory analysis of water to determine the extent of the iron problem and possible treatment solutions should begin with a test for iron concentration. A water sample kit can be obtained from a certified laboratory. The laboratory's instructions for collecting the water sample should be followed. Collect the sample as close to the well as possible.

If the source of water is a public water system and you experience iron-related problems, it is important to contact a utility official to determine whether the red water is from the public system or from the home's plumbing or piping.

### **Well Construction**

One alternative in solving an iron problem may be to construct a new water well, eliminating the need for treatment. An Illinois licensed water well contractor, knowledgeable about the quality of groundwater, can be contacted to discuss options.

### **Treatment**

The table on the next page lists the treatment methods for the various forms of iron. Before choosing a water treatment method or device, use the attached chart to answer the following questions:

1. What form of iron do I have in my water system?
2. According to the water test results, will the water treatment unit remove the total iron concentration? (Total iron includes both soluble and insoluble iron.)
3. Will the treatment unit treat the water at the flow rate required for my water system?
4. Will the pH have to be adjusted prior to a particular treatment?
5. Would the construction of a new well or the reconstruction of an existing well be more cost effective than a long-term iron removal treatment process?

### **Treatment Methods for Various Forms of Iron**

<b>Symptoms</b>	<b>Form of Iron</b>	<b>Treatment Methods</b>	<b>Considerations</b>
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Tap water is first clear and colorless. After standing, reddish brown particles appear and settle to bottom of glass.	Dissolved ferrous iron	Aeration/Filtration	Temperature dependent
		Water softener	Hardness must be calculated and increased sodium concentration should be checked if users(s) on restricted sodium diet. System must be airtight.
		Chlorination/Filtration	Use of chlorine liquid or pellets. Requires frequent monitoring and proper water pressure. May require lengthy contact time.
		Manganese Greensand/Filtration <sup>1</sup>	Adequate pressure
		Catalytic filtration <sup>2</sup>	Dissolved oxygen, alkalinity, organic matter, chlorination, polyphosphate, temperature limitations
		Ozonation	Cost
		Sequestering	Method may not prevent staining and may require removal of sequestering agents and iron. Test for agents before choosing another treatment device.
Symptoms	Form of Iron	Treatment Methods	Considerations
Tap water appears rusty or has a red or yellow color. After standing, particles settle to bottom.	Insoluble red water ferric iron	Manganese Greensand/Filtration <sup>1</sup>	Adequate pressure
		Catalytic filtration <sup>2</sup>	Dissolved oxygen, alkalinity, organic matter, chlorination, polyphosphate, temperature limitations

		Chlorination/Filtration	Use of chlorine liquid or pellets. Requires frequent monitoring and proper water pressure.
Symptoms	Form of Iron	Treatment Methods	Considerations
Water tank, toilet tank and plumbing have reddish brown or yellow gelatinous slime or sludge present. Odor may be objectionable.	Iron bacteria	Shock chlorination; consider following with continuous chlorination.	Chlorine products must be suitable for drinking water. Method requires long contact time for adequate treatment.
Symptoms	Form of Iron	Treatment Methods	Considerations
Water may appear yellow or brown color or be colorless. Source is groundwater from shallow well or surface water.	Organic iron	Water softener	First, treat for organics (activated carbon). Check for corrosive properties. System must be airtight.
		Manganese Greensand/Filtration <sup>1</sup>	First, treat for organics. Maintain adequate pressure.
		Ozonation	Cost

1. Manganese Greensand: A naturally occurring mineral or manufactured material, treated with potassium permanganate that is capable of removing iron; it absorbs dissolved iron and requires chemical regeneration.

2. Catalytic Filtration: A granular filter medium that enhances the reaction between oxygen and iron and then filters the insoluble iron.

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Rockford, IL 61103  
815-987-7511

**MARION REGION**

2309 W. Main - Ste. 106  
Marion, IL 62959  
618-993-7010

**PEORIA REGION**

5415 N. University  
Peoria, IL 61614  
309-693-5360

**EDWARDSVILLE REGION**

#22 Kettle River Drive  
Glen Carbon, IL 62034  
618-656-6680

**CHAMPAIGN REGION**

2125 S. First St.

**WEST CHICAGO REGION**

245 W. Roosevelt Rd., Bldg. 5

Champaign, IL 61820  
217-333-6914

West Chicago, IL 6018  
630-293-6800

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Springfield, IL 62761, 217-782-5830, TTY (hearing impaired use only) 800-547-0466.  
Questions may be directed to your local health department, to one of the Illinois Department of  
Public Health's regional offices or to the Department's central office in Springfield.

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**environmental health home**



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[Questions or Comments](#)