MCDH

Drinking Water

What's in my water?

Coliform Bacteria
Nitrate
Iron
Hardness
Sulfate
Fluoride
Chloride
Water Odors

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COLIFORM BACTERIA

Coliform bacteria is the standard used for bacterial quality in drinking water. Coliform bacteria is not a single bacteria species, rather it is a grouping of several different bacterial species. They all exhibit certain characteristics and are naturally found in the following areas;

1. Coliform bacteria naturally lives in the intestinal tracts of humans and animals, and are always found in sewage.
2. Some types of coliform bacteria also naturally live in soils and surface waters (lakes, rivers, ponds, etc.).

The presence of coliform bacteria in well water indicates that sewage or some type of surface water is entering and contaminating the water supply. Along with coliform bacteria, other disease causing organisms may be present, and these can cause diseases such as dysentery, typhoid, and hepatitis. A well contaminated with coliform bacteria requires immediate attention. Most wells can be disinfected by a simple chlorination process. In serious cases, repeated chlorinations may be needed. The Illinois Department of Public Health requires a coliform free water supply. The procedure for chlorinating a well can be obtained from the McHenry County Department of Health or a licensed well driller may be contacted to disinfect a well.

NITRATE

Nitrates are compounds containing nitrogen and oxygen. They are major components in commercial fertilizers but can also occur naturally in ground water. The standard for nitrates in Illinois is 10 mg/L (milligrams per liter), set by the Illinois Environmental Protection Agency (I.E.P.A).

Sources of Nitrates

- run off from fertilizers
- municipal and industrial waste water
- septic tanks
- animal feed lots
- decaying plant debris
- refuse dumps

High nitrate levels post a health risk to pregnant women and infants under the age of one year with a disease known as methemoglobinemia, or blue baby illness. This illness occurs as a result of bacteria in an infant's stomach reducing nitrates to nitrites. Nitrite then combines with hemoglobin in the blood, reducing the blood's capability of carrying oxygen. As a result, the baby will turn blue. Prompt medical attention is required.

Older children and adults can consume large quantities of nitrates without these effects. In the adult stomach, strong acids are produced which inhibit the growth of bacteria responsible for the conversion of nitrate or nitrite.

Hot & Cold Water: If the odor is found in both hot and cold water, then it is safe to assume there is an SRB contamination. This problem can be treated through shock chlorination. If the problem reoccurs, it may be necessary to periodically clean the well by shock chlorination or, in severe cases, install a constant chlorinator.

NOTE: Chlorine must be handled with extreme care. If you are unfamiliar with proper handling procedures - contact a licensed well driller. Use EXTREME CAUTION when working with Chlorine or Chlorine compounds in an enclosed area.

There are also water treatment devise designed to reduce or eliminate sulfur bacteria odors.

This brochure is intended to describe commonly tested parameters for ground water quality and safety. Less frequently tested parameters for safety would include metals, solvents, gasoline, pesticides and herbicides. The tests described in this brochure would not indicate the presence of these man-made contaminants.

WATER ODORS

A common water quality complaint of many well owners is a "rotten egg" smell. This odor is most likely hydrogen sulfide, a gas produced from sulfur bacteria. Usually the amount of gas produced is not enough to be considered a health hazard, but is enough to cause unpleasant odors and sometimes plumbing problems.

Hydrogen sulfide in high levels is a corrosive gas which can, over time, eat at metal piping, plumbing connections and even metal well casings.

The bacteria responsible for these common problems are not unusual. They live off sulfur-containing compounds which are abundant in our soil environment. There are two different types of sulfur bacteria - sulfur oxidizing and sulfate reducing bacteria.

SULFUR OXIDIZING BACTERIA (SOB): These type of bacteria exist in environments where oxygen is abundant. They are responsible for the conversion of sulfides into elemental sulfur. It forms a slime which coats pipes and screens, and can clog a plumbing system.

SULFATE REDUCING BACTERIA (SRB): This type of bacteria, unlike SOB's live in environments with little or no oxygen. They are responsible for the production of hydrogen sulfide gas, along with other by-products.

DETECTING SULFUR BACTERIA: Once you have noticed the rotten egg odor and before you pinpoint your problem to a sulfur bacteria contamination, it is important to find where the odor is prevalent; in the hot water only or in both the hot and cold water.

Hot Water Only: If the odor is found in the hot water only, it may be either of two things, the sacrificial element in the water heater or an SRB build-up in the water heater.

1. The sacrificial element - Contact a plumber for specific remedial action.
2. An SRB build-up in your water heater can be simply eliminated by turning the temperature up on your water heater to the high setting (160° F) for eight hours, then draining the tank. The SRB's, at this point, should be destroyed.

CAUTION: The hot water must have an operable pressure release valve, otherwise, this method of treatment may be highly dangerous. The temperature setting must be reduced following treatment to prevent scalding, hot water dangers and to avoid high energy cost.

IRON

Iron is an abundant element in the earth's crust. Objectionable color, taste, and odor may be present when high concentrations of iron are present. Stained laundry, clogged pipes and corroded plumbing can also be a result. The Illinois Environmental Protection Agency (I.E.P.A.) recommends an iron level of 0.3 milligrams per liter (mg/L).

Iron problems are the result of a high mineral iron content in the water; however, iron bacteria are also responsible for iron related problems.

IRON BACTERIA: Iron bacteria are a group of microorganisms that exist in environments with high levels of iron. Though they pose no health risk, these microorganisms combine mineral iron with oxygen to produce rusty slime that is responsible for objectionable water quality. An iron bacteria contamination can be easily detected by:

- yellow or orange color to water
- slime on inner walls of toilet tanks
- odors that resemble fuel oil, cucumbers, or sewage

Once a well becomes contaminated with iron bacteria, it is often difficult to get rid of completely. Chlorinating a well can help to reduce, and in some cases, eliminate iron bacteria. However, it may require repeated chlorinations. The procedure for chlorinating a well can be obtained from the McHenry County Department of Health or a licensed well driller can be contacted to disinfect a well.

NOTE: **In severe cases, shock chlorination may be necessary and should be performed by a licensed well driller.**

IRON REMOVAL: Options are available to remove iron from a water supply, if necessary.

PHOSPHATE FEEDERS: (for iron levels up to 2.0 mg/L) This appliance does not actually remove iron, but instead treats the iron so that it stays dissolved in solution rather than precipitating out. A phosphate feeder uses food grade phosphates and a one pound supply can treat up to 60,000 gallons of water.

ZEOLITE SOFTENERS: (for iron levels up to 10.0 mg/L) This system involves ion exchange and is commonly used to soften water.

MANGANESE TREATED GREEN SAND FEEDERS: (for iron levels up to 10.0 mg/L) This method for iron removal causes dissolved iron to precipitate out. The precipitate is then trapped by the sand

HARDNESS

Acceptable levels for water hardness are based upon consumer acceptance.

Hardness is the quantity of calcium and magnesium in the water and contributes significantly to the total dissolved solids. High concentrations are detrimental to boilers and hot water heaters, resulting in scale formations when the water is heated. The amount of soap or detergent required for laundry increases as the hardness of the water increases.

The concept of hardness is difficult to define exactly. In areas of the country where the total dissolved solids are very low, a water hardness of 50 milligrams per liter (mg/L) might be considered "hard." In other areas, a hardness of 50 mg/L would be considered "very soft." An attempt was made by Dufor & Becker (1964) to classify the hardness of public water supplies for the 100 largest cities of the United States, (US Geological Survey, Paper 1812, Pg. 27). Their classification is as follows:

HARDNESS RANGE	
(mg/L as CaCO3)	***DESCRIPTION***
0 to 60	SOFT
61 to 120	MODERATELY SOFT
121 to 180	MODERATELY HARD
GREATER THAN 180	HARD

It is not unusual to reach 200 to 300 mg/L of hardness where the water is in contact with limestone or gypsum. Water from gypsiferous formations may reach 1000 mg/L or higher.

SULFATE

Sulfates are naturally found in many wells in varying concentrations. They are the result of the dissolution of sediment (magnesium sulfate, sodium sulfate, and calcium sulfate). Sulfate is also the result of decaying organic matter. The presence of sulfate in drinking water can result in a laxative effect. Both sodium sulfate (Glauber salt) and magnesium sulfate (Epsom salt) are well known laxatives. The amount of magnesium and sodium in the water significantly influences the laxative effect of the sulfate.

Persons living in an area of high sulfate usually acclimate to water with high sulfates in a relatively short period of time. Newcomers an casual users of the water frequently experience the laxative effect.

The taste threshold for sulfates occurs at levels of 300-400 mg/L and may cause objectionable taste in water and coffee.

No adverse health effects have been noted from concentrations of 500 mg/L, but it is recommended that sulfates in water not exceed 250 mg/L to prevent the water from having a laxative effect.

FLUORIDE

Fluorides are an essential constituent of all diets and an important component in maintaining good dental health.

Fluoride, at an optimum level, helps to reduce dental caries or tooth decay. The most common source of fluoride is drinking water. Fluoride is found naturally in ground water, but many communities also supplement their drinking water with fluoride, maintaining levels from 0.9—1.2 mg/L.

For those who have private wells, optimum levels may not be found. Low levels of fluoride in drinking water may be a factor in tooth decay. High levels of fluoride can also occur. Excessive fluoride in water can lead to dental fluorosis, a discoloration and mottling of the teeth.

The maximum allowable concentration set by the Illinois Environmental Protection Agency is 2.0 mg/L.

CHLORIDE

Chloride is a component in many salts such as sodium chloride (table salt) and potassium chloride. Chloride, in reasonable amounts, is not harmful to health. When levels become excessive, a salty taste is detected. Chloride is found in practically all natural waters including ground water. Levels will vary depending on the geography. Although no maximum allowable concentration has been established for chloride, it is generally agreed that a level of 250 mg/L is an appropriate action level. The taste threshold for chloride occurs around 210—310 mg/L and will cause objectionable taste to many people. Excessive amounts of chloride may result in individual consumer complaints.