

# Groundwater Quality

## What You Need to Know

Forty-seven percent of the United States depends on groundwater for its basic drinking water supply. Having a basic understanding about groundwater quality will help ensure that your well is supplying potable water for your household.

Along with human activities, water quality is affected by a combination of natural processes. Most relate to chemical compositions underground. However, other factors such as biological, physical, and radiological conditions can cause the processes to occur as well.

The National Ground Water Association recommends that water well owners have their wells checked and tested by a professional contractor every year to ensure water safety.

What follows is information about some of the natural processes that can occur in water.

### Hard Water

The most common problem associated with groundwater may be hardness, caused by an abundance of calcium or magnesium. Hard water causes no health problems, but can be a nuisance as it may cause soap curds to form on pipes and other plumbing fixtures.

Calcium and magnesium are found in groundwater because of the dissolving of limestone. Limestone dissolves when it reacts with acidic rainwater through a reaction with carbon dioxide. Calcium and magnesium ions also can be released when water reacts with gypsum.

The installation of a water softener will usually solve this problem.

### Iron

A “rusty” taste in water is a result of iron in groundwater. It not only gives a bad taste, but it also can stain pipes and clothing.

Iron is natural in nature, so most groundwater does have some amount of iron in it. Iron comes from minerals contained in the earth, such as limestone, shale, and coal.

There are several treatment methods, including installing a water softener. Aeration—the addition of oxygen to the water—can aid in the precipitation of iron, which removes it from the water, as well.

### Nitrogen

Most nitrogen in groundwater comes from the atmosphere. Some plants can “attach” nitrogen from the atmosphere onto their roots. The nitrogen not used by the plants is then released into the soil.

Nitrogen compounds also can work their way into groundwater through fertilizers, manure and urine from farm animals, sewage, and landfills.

The most common forms in groundwater are ammonia, nitrate, and nitrite. Nitrates can be especially toxic to children under six months of age.

There are a variety of treatment methods to correct this problem, including reverse osmosis systems with water softeners.

### Silica

Silica comes from the weathering of silicate minerals in the ground. It causes no harmful effects to humans, but large amounts can cause scaling in pipes that impacts water flow.

### Sulfur

A “rotten egg” smell—emanating from hydrogen sulfide gas—is often associated with sulfur.

There are two varieties of sulfur: sulfides and sulfates. Sulfides are usually found in marshes and manure pits. Along with creating an unpleasant odor and taste, sulfides cause corrosion to plumbing and darken water. Sulfates often come from the dissolving of minerals, such as gypsum and anhydrite.

There are several methods of treating sulfur. Aeration is effective against hydrogen sulfide gas. Chlorination, a reverse osmosis system, or a negative ion-exchanger also can be effective in combating sulfur.

### Total Dissolved Solids

TDS, as they are commonly known, are the concentration of all dissolved minerals in water. They are the direct measurement of the interaction between minerals and groundwater.

TDS levels above 1000 mg/L will usually yield poor-tasting water. Levels above 2000 mg/L are considered undrinkable due to taste, and levels more than 10,000 mg/L are defined as undrinkable.

Water softeners with a reverse osmosis system are effective in lowering the TDS to satisfactory levels.

### Where can I get more information?

For more information on your private water well, contact your local contractor. Also, visit the Web site of the National Ground Water Association, [www.ngwa.org](http://www.ngwa.org), and its site just for well owners, [www.wellowner.org](http://www.wellowner.org).