

## COLIFORM AND E. COLI BACTERIA

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"Testing for bacteria" is the most common quality check for well water. "No bacteria" is the preferred result. There are many different types of bacteria that might occur in your well water. This article gives some background information about these minute single-cell organisms. (Just one, is a bacterium, but they are usually referred to in the plural, bacteria). Most are harmless to humans and many are actually beneficial for our existence. Microfossils in ancient rocks show bacteria were around 3.2 billion years ago. Bacteria were probably responsible for creating the first oxygen that appeared on Earth, about 2 billion years ago.

Some bacteria grow and multiply by using energy (food) obtained from minerals in ground water such as sulfur ("sulfur bacteria") or iron ("iron bacteria"). Some bacteria thrive in oxygen rich environments (aerobic) and others in oxygen deficient (anaerobic) conditions. They have three fundamental shapes: spherical (coccus), rod-like (bacillus) and curved (vibrio, spirillum, spirochete). Most bacteria are very small (about 1 micron long). If they were lined up side by side, 25,000 bacteria would take up about an inch. Most bacteria reproduce by splitting into two. If conditions are suitable, bacteria can reproduce very quickly, completing one division every 20 to 30 minutes. Bacteria are very resilient, remaining dormant when conditions are not ideal. Dried, but living bacteria can even be carried in the air. Bacteria can excrete toxins or carry them inside their cell wall until they die and disintegrate. Some bacteria may invade a specific organ of the body, for example the brain, throat or bone. Bacteria may also produce enzymes, some of which are responsible for illness.

Coliform bacteria are the bacteria most commonly associated with well water. The United States Environmental Protection Agency (EPA) standard for drinking water is a total coliform count of zero. Coliform bacteria are a large group of various rod-shaped species and strains of bacteria. The group includes bacteria that occur naturally in the intestines of warm-blooded animals (fecal coliform) and non-fecal coliform. Non-fecal coliform bacteria are very common and are found virtually everywhere on soil particles, insects, plants, animals, walls and furniture in homes and on your skin and clothes.

Fecal coliform can include disease causing (pathogen species) and non-disease causing species. Over 200 types of non-disease causing bacteria have been found in human digestive tracts. Most arrive on the food and drink we consume. Many yogurt cultures include coliform bacteria. *Lactobacillus acidophilus* is the most common bacteria strain used in commercial yogurts and some studies show it creates an acidic environment that inhibits harmful bacteria in the digestive tract.

*Escherichia coli* (E. coli), often listed in water quality analyses, is one species of fecal coliform bacteria. A single E. coli is 2 microns long and about 0.5 microns in diameter. There are hundreds strains of E. coli bacteria that differ only in the type of toxin or enzyme that they produce. Despite the fact that they originate in the digestive system of a warm-blooded creature, most E. coli strains are not harmful to humans.

E. coli can be easily cultured in a laboratory and therefore, they are a good indicator species for bacterial contamination in water tests. Its presence in a water sample indicates that sewage material may be present and that if sewage is present, more harmful disease-causing organisms may also be present, for example *Vibrio cholerae* that causes cholera.

Over 150 million Americans use ground water for drinking every day. Most is from public utility wells but about 40 million people obtain ground water from 15 million private wells. The source water for many utility supplies is from lakes and rivers and because of the billions of organisms in surface water; utility supply water is treated, usually with chlorine or ozone, before entering the supply pipelines. Most private well water from properly constructed wells does not require treatment because there is much less chance of contamination. However, homeowners should check their source water quality. Common causes of bacteria in wells are that the well is receiving water from close to the surface, or that the well cap is not properly sealed. Very often "shock chlorination" can kill off all bacteria in a well. Home treatment devices are available to ensure that any bacteria that do enter the well are removed before the water gets to the kitchen tap. It is the responsibility of homeowners to keep self-supplied well water free from health risk.

The Trust's web site [www.privatewell.com](http://www.privatewell.com) has information about well bacteria and water treatment for homeowners.

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