Coliform bacteria

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What are coliform bacteria, and how can they enter drinking water?

Coliform bacteria are microscopic organisms that originate in the intestinal tract of warm-blooded animals and are also present in soil and vegetation. Total coliform bacteria are generally harmless; however, their presence in drinking water indicates the possibility that disease-causing bacteria, viruses or parasites (pathogens) are also present in the water.

Bacterial pollution can result from runoff from woodlands, pastures and feedlots, septic tanks and sewage plants, and animals and wildfowl. Most coliform bacteria enter natural streams by direct deposition of waste in the water and runoff from areas with high concentrations of animals or humans. Domesticated animals contribute heavily to the bacterial population.

Because most intestinal pathogens cannot survive outside of a host body, they are not common in ground water (unless the ground water is close to a source of contamination). Most wells obtain their water at a depth at which pathogens are no longer present; however, an improperly constructed or damaged well, or one that is too shallow, may become contaminated.

What are health concerns from coliforms in drinking water?

Most strains of coliform bacteria are harmless and live in the intestines of healthy humans and animals. Coliforms indicate that water may be contaminated with sewage or similar wastes. Diseases which may be present in water that tests positive for coliform bacteria include typhoid fever, cholera, hepatitis, dysentery, diarrhea, giardiasis, and hemolytic uremic syndrome.

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WATER QUALITY EXTENSION

Drinking Water Facts…..

What is the drinking water standard for coliform bacteria?

The established standard for bacteria in drinking water includes total coliforms, fecal coliforms, and *E. coli*. *E. coli* is a type of coliform that is common in the intestinal tract of warm-blooded animals and humans. Some strains can cause illness and infection. Municipalities that collect less than 40 total coliform samples per month may have no more than one sample that tests positive, while those collecting more than 40 samples per month are required to have no more than 5% test positive. No samples should test positive for fecal coliform or *E. coli*. There is no standard for private wells, nor is any testing required, which means the owners of private wells must test their own water.

How do I know if there are coliforms in my water supply?

If you are on a public water system, your public system is tested often for coliform bacteria. A report which includes testing results is sent annually to consumers. To obtain a copy of the report for a public water supply, contact your public water system or call the Utah Department of Environmental Quality, Division of Drinking Water at 801-536-4200.

If any coliforms are found in a public water supply, the supplier is required to notify the public within 24 hours through newspapers, radio, TV and other means. With this notification, you will be instructed on how to treat your water until the public water system is cleaned and tests free of coliforms.

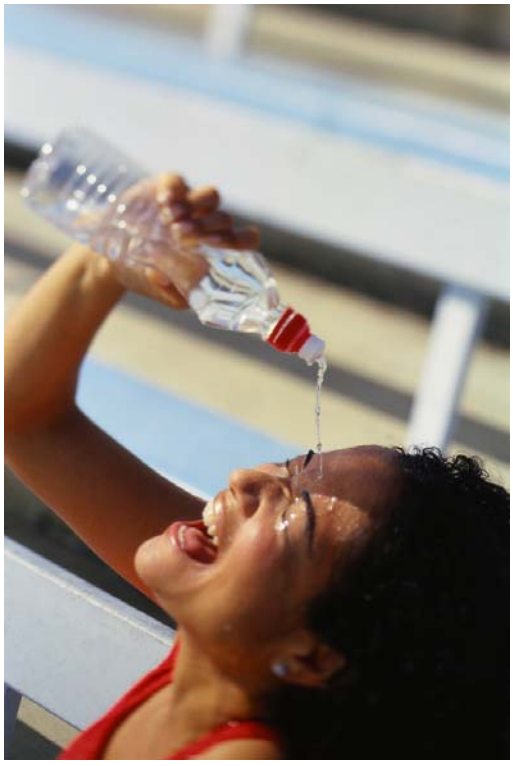
If you are on a private well you should test your well water at least once a year for coliforms. Also test your water if you have a new well or pump installed, or if there are any environmental changes that might affect your well, such as flooding or a new feedlot operation near your well. A list of certified labs in Utah is available at https://extension.usu.edu/waterquality/htm/homeownerswater/labs. A test for coliform bacteria should cost approximately $10-$30. You may be able to get it tested for free by the Utah Department of Agriculture and Food, State Groundwater Program. Call them at 801-538-9905 or go to http://ag.utah.gov/divisions/conservation/welltesting.html to learn more about their testing program.

For more information on how to test your well water, see the brochure *Testing Your Well Water*, and the Fact Sheet *How to Protect Your Well Water*. For help interpreting the results of your water test, use the USU Water Quality Extension Water Testing Toolkit at https://extension.usu.edu/waterquality/htm/wqtool.

How can I treat drinking water that contains coliforms?

When coliform bacteria are found in a **public water supply**, the supplier is required to notify users within 24 hours, and will immediately begin disinfecting the water supply by feeding chlorine into the water system. If fecal coliform bacteria or a specific type of bacteria (*E. coli*) have been found, the water supplier must issue a "Boil Order" notice. Decontaminating and re-testing the water supply will likely take several days, and during that period you should boil all water for several minutes before using it for drinking, cooking, brushing teeth, making ice, or ingesting it in any way. Always follow the instructions provided by the water supplier until the "Boil Order" is rescinded.

Private well owners are responsible for disinfection of their water supply. The first thing to do is to determine if the contamination is in the well or in the water system inside the home. Test the water at the well itself (or as close as possible). If it contains coliforms then the well is contaminated. Otherwise, the source of contamination is somewhere in the plumbing system itself and not the well. If the water at the well returns an uncontaminated test result, but the water at the tap is contaminated, the contamination source may be an inadequately maintained treatment system. Many point-of-use systems, such as activated charcoal filters, at the faucet or in a refrigerator water system, can harbor bacteria. These filters should be maintained and replaced according to the manufacturer's directions. Other possible sources include cross connection with irrigation water or back siphonage from garden hoses.



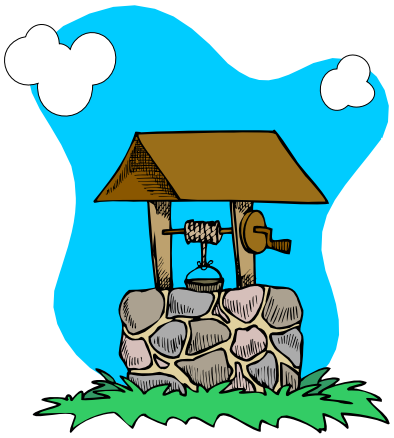
If tests show that your well water is contaminated with bacteria, you must determine how the bacteria are entering the well and correct that problem. Consider the possible sources of the contamination, which might include a faulty septic system, storm runoff, or livestock waste runoff. If practical, correct any of these problems before installing permanent water treatment equipment.

A contaminated water well can be treated by "shock chlorination," in which a strong chlorine solution is introduced into the well and allowed to circulate through the water system. See the shaded box at the end of this fact sheet. "Shock chlorination" may also result in removal of films of biological material in the plumbing system that can harbor coliform bacteria.

You may also wish to contact the Utah Department of Environmental Quality, Division of Drinking Water at 801-536-4200

Drinking Water Facts…..

A well can become contaminated in a number of ways:



- A shallow or dug well can be contaminated by surface water.
- An improperly sealed well casing or liner can allow bacteria from upper soil layers to enter the well. An old well casing may also rust through.
- The well casing may become cracked during an earthquake, from subsidence or from impact damage from farm machinery or snowplows.
- If there is no watertight seal on the well casing, surface water may enter the well during a flood or storm runoff.
- Bacteria can enter a well when it is drilled, or when a pump is installed or serviced. These bacteria may come from contaminated drilling equipment, or from pipe or cable laid out on the ground prior to installation.
- Lack of a backflow device on a pump can allow contaminated water to be siphoned back into a well.

For more information on well contamination, see USU Fact Sheet "How to Protect Your Well Water" available at https://extension.usu.edu/waterquality/files/uploads/PDF/Fact%20Sheet%201%20Well%20Water.pdf

For help identifying possible sources, use the simple survey available at http://extension.usu.edu/waterquality/files/uploads/PDF/basic%20questions.pdf. Determining the source of contamination, eliminating that source (if possible), and a shock chlorination treatment should correct the problem. If contamination persists, the next option is to install a continuous water treatment system to provide disinfection. Continuous water treatment methods include:

Chlorination. Chlorine is fed into the water after it has left the pump and before it enters the holding tank.

Ultraviolet Radiation (UV). Light is used to kill microorganisms such as bacteria (viruses, cysts and worms may be unaffected).

Ozonation. Ozone is more effective against bacteria and viruses than chlorine, but requires an on-site ozone generator. Ozonation is generally more expensive than other water treatment methods.

A continuous water treatment system should be installed by a licensed, registered professional. To verify a license, please see http://www.dopl.utah.gov/. Make sure the water equipment salesperson is knowledgeable and the company specializes in water treatment. Some water treatment specialists may not be familiar with all the latest technologies and treatment equipment. Always obtain cost quotations from more than one company and always have your water analysis done by an independent laboratory. Once installed, it is very important to follow the equipment maintenance schedule. For more information on treatment systems, see the Drinking Water Fact Sheet *Drinking Water Treatment Systems*.

Drinking Water Facts…..

Shock chlorination

Shock chlorination can be used to disinfect well water if the well is contaminated by pathogens. This should be done for new wells, if there has been work on the well that could introduce bacterial contamination, or if a water test indicates the presence of coliform bacteria. This is not effective if there is a source of contamination to the well that has not been removed.

The following steps for the disinfection procedure are from a fact sheet by New Mexico State Extension

(available online at: http://aces.nmsu.edu/pubs/_m/m-115.html)

- Mix 2 quarts bleach in 10 gallons of water; pour into well.
- Connect a garden hose to a nearby faucet and wash down the inside of the well.
- Open each faucet and let the water run until a strong chlorine odor is detected, then turn it off and go to the next one. Don't forget outdoor faucets and hydrants. Drain the water heater and let it refill with chlorinated water. If a strong odor is not detected at all outlets, add more chlorine to the well. (If you have an impaired sense of smell, use chlorine test strips sold with swimming pool supplies to detect chlorine at each outlet).
- Flush the toilets.
- Mix an additional 2 quarts bleach in 10 gallons of water. Pour it into the well without pumping or turning on any water.
- Allow chlorinated water to stand in the well and pipes for at least 8 hours (preferably 12 to 24 hours).
- Run water from outdoor faucets (away from desirable vegetation) until the chlorine odor is slight or not detected at each faucet. Then run indoor faucets until there is no chlorine odor. Minimize the amount of chlorinated water flowing into a septic tank.

Where can I get more information?

The Utah Department of Environmental Quality provides information on drinking water at http://drinkingwater.utah.gov/consumer_information.htm

EPA Information: http://water.epa.gov/drink/contaminants/basicinformation/ecoli.cfm, http://water.epa.gov/drink/info/well/index.cfm

University of Minnesota Water Resources Center: http://wrc.umn.edu/

EPA Safe Drinking Water Hotline: 800-426-4791

The American Ground Water Trust provides a wealth of information for water users and well owners on their Web site, http://www.agwt.org

Utah State University, Water Quality Extension web site provides information on drinking water at http://extension.usu.edu/waterquality/

Sources

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For more information, contact USU Water Quality Extension at 435-797-2580, or visit our website at http://extension.usu.edu/waterquality