

ENVIRONMENTAL HEALTH FACT SHEET

Coliform Bacteria and Drinking Water

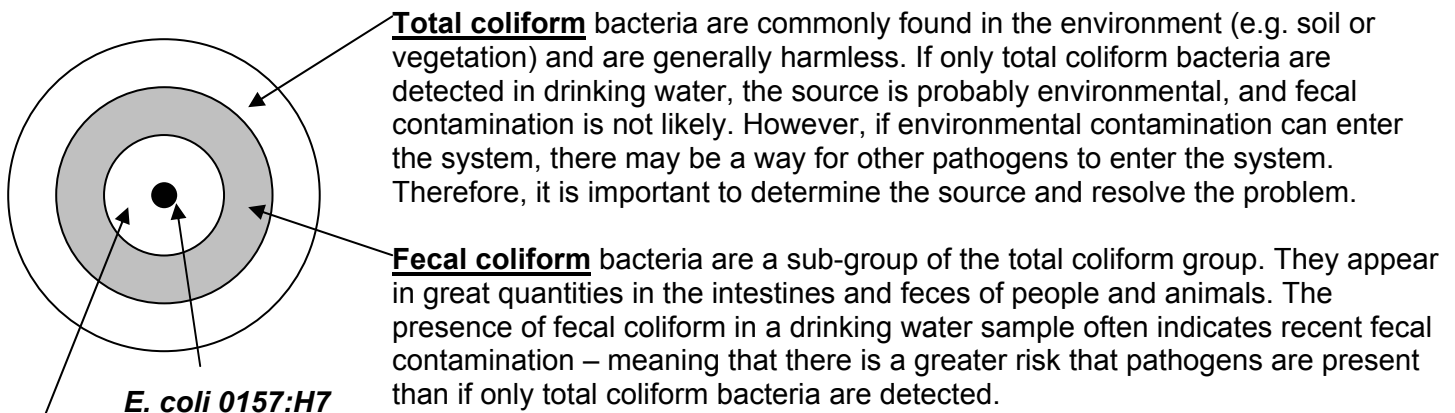


What are Coliform Bacteria?

Coliform bacteria are commonly found in soil, on vegetation, and in surface water. They also live in the intestines of warm-blooded animals and humans. Some coliform bacteria strains can survive in soil and water for long periods of time. Coliform bacteria will not likely cause illness. However, because coliform bacteria are most commonly associated with sewage or surface waters, the presence of coliform bacteria in drinking water indicates that other disease-causing organisms (pathogens) may be present in the water system. There are three different groups of coliform bacteria; each has a different level of risk.

Total coliform, fecal coliform, and *E. coli* – what's the difference?

Total coliform, fecal coliform, and *E. coli* are all indicators of drinking water quality. The total coliform group is a large collection of different kinds of bacteria. The fecal coliform group is a sub-group of total coliform and has fewer kinds of bacteria. *E. coli* is a sub-group of fecal coliform.



E. coli is a subgroup of the fecal coliform group. Most *E. coli* are harmless and are found in great quantities in the intestines of people and warm-blooded animals. Some strains, however, may cause illness. The presence of *E. coli* in a drinking water sample almost always indicates recent fecal contamination – meaning that there is a greater risk that pathogens are present. *E. coli* outbreaks receive much media coverage. Most outbreaks have been related to food contamination, caused by a specific strain of *E. coli* known as *E. coli* 0157:H7, which can cause serious illness and death. When a drinking water sample is reported as “*E. coli* present” it does not mean that this specific strain is present. However, it does indicate recent fecal contamination. Treating contaminated drinking water with a disinfectant or boiling the water destroys all *E. coli*, including 0157:H7.

What are the health effects of Coliform Bacteria?

Most coliform bacteria do not cause illness. However, their presence in a water system is a public health concern because of the potential for disease-causing strains of bacteria, viruses, and protozoa to also be present. Waterborne disease from these organisms typically involves flu-like symptoms such as nausea, vomiting, fever, and diarrhea. In 1999, *E. coli* 0157:H7 from animal yard runoff that entered a poorly constructed water well resulted in two deaths and over 1000 cases of illness at a county fair in New York.

How can Coliform Bacteria get into drinking water?

Coliform bacteria do not occur naturally in Michigan aquifers. (Fractured or creviced bedrock aquifers that are close to the surface are the exception.) Bacteria washed into the ground by rainfall or snowmelt are usually filtered out as water seeps through the soil, so properly constructed water wells do not typically harbor coliform bacteria. However, coliform bacteria can persist within slime formed by naturally occurring ground water microorganisms. The slime (or biofilm) clings to the well screen, casing, drop pipe, and pump. Disturbances during pumping or well maintenance can cause the slime to dislodge, releasing the coliform bacteria.

Bacteria can be introduced into a new well during construction and can remain if the water system is not thoroughly disinfected and flushed. Well construction defects such as insufficient well casing depth, improper sealing of the space between the well casing and the borehole, corroded or cracked well casings, and poor well seals or caps can allow sewage, surface water, or insects to carry coliform bacteria into the well. Unplugged abandoned wells can also carry coliform bacteria into deeper aquifers.

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Coliform Bacteria Study*

The Centers for Disease Control and Prevention (CDC) conducted a study in 1994 in which water wells at 5520 houses in nine states were surveyed and sampled. The six-month-long study revealed that water supply wells at the **highest risk** for coliform bacteria contamination were:

- **Dug/Bored Wells**
- **Brick/Rock/Concrete Wells**
- **Wells in Pits**

How can I detect Coliform Bacteria in my water?

Since bacterial contamination cannot be detected by taste, smell, or sight, all drinking water wells should be tested at least annually for coliform bacteria. Michigan's well construction code requires all new, repaired, or reconditioned wells to be disinfected with chlorine to kill bacteria that may have been introduced during construction. Testing is required initially to demonstrate that the water is free of coliform bacteria before the well is put into service. A coliform bacteria test is also recommended *immediately* if:

- A sudden change occurs in your water's taste, appearance, or odor.
- The water turns cloudy after rainfall or the top of the well was flooded.
- You suspect a contamination source (e.g., septic system or barnyard) is within 50 feet of your well.
- Family members are experiencing unexplained flu-like symptoms.

Water sampling containers can be obtained from Washtenaw County Environmental Health. Be sure to use proper sampling techniques while taking the sample, as human error in sampling can cause false-positive sample results. Refer to the instructions that accompany the water sample container. A clean, well-maintained, and frequently used faucet should be used to collect the sample.

Keep in mind that coliform bacteria do not always show up in every sample. They can be sporadic and sometimes seasonal when they occur in a water supply. Be concerned but do not panic if coliform bacteria are detected. Before treating, repairing, or replacing the well, it is wise to resample immediately if a positive sample is collected. If you receive a second positive sample for total coliforms, or if the initial sample is positive for fecal coliforms, **do not consume the water**. Bring the water to a rolling boil for three minutes to kill the bacteria. You may also want to consider using bottled water as a temporary water source.

How can I eliminate Coliform Bacteria from my well water?

If coliform bacteria are present, the source of the problem should be identified. Resampling from several locations within the water system is helpful. The entire water system may need to be thoroughly flushed and disinfected before a negative bacteria sample can be obtained. Sometimes it is necessary to repeat the disinfection process.

A well drilling contractor or local health department sanitarian can help identify structural defects in the system. These include: openings at the top of the well; old, rusty, or damaged well casing; unprotected suction line; buried wellhead; and, close proximity of a well to septic tanks, drainfields, sewers, kitchen sinks, drains, privies, barnyards, animal feedlots, abandoned wells, and surface water. Cross-connections with wastewater plumbing can also introduce coliform bacteria into the water supply. If any of the above are found, proper changes or repairs should be made. After the defects are corrected the entire water system should be disinfected and the water retested before drinking. Washtenaw County Environmental Health does not recommend continuous chlorination as a substitute for proper well design and construction.

Where can I get more information?

Washtenaw County Environmental Health
(734) 222-3800
www.eWashtenaw.org

Michigan Department of Environmental Quality
(517) 241-1377
www.michigan.gov/deq

References:

*A Survey of the Quality of Water Drawn from Domestic Wells in Nine Midwest States, CDC, September 1998.

City of Lacey, Washington "Coliform Bacteria and Drinking Water" Fact Sheet

Michigan Department of Environmental Quality Water Division, Groundwater Section "Coliform Bacteria and Well Water Sampling" Fact Sheet

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