

Coliform Bacteria & Well Water Sampling



FACT SHEET

Michigan Department of Environmental Quality
Office of Drinking Water and
Municipal Assistance

What are Coliform Bacteria?

Coliform bacteria are commonly found in soil, on vegetation, and in surface water. They also live in the intestine of warm-blooded animals. Because coliform bacteria are most commonly associated with sewage or surface waters, they are used as an indicator group to determine the sanitary quality of drinking water. One particular type of coliform organism, called *E. coli*, is an indicator of fecal contamination. Some coliform bacteria strains can survive in soil and water for long periods of time. The routine coliform test performed by the Michigan Department of Environmental Quality (MDEQ) Laboratory detects both fecal and nonfecal coliform bacteria. Bacterial contamination cannot be detected by taste, smell, or sight.

Bacteria washed into the ground by rainfall or snowmelt are usually filtered out as water seeps through the soil. Properly constructed water wells do not typically harbor coliform bacteria. Coliform bacteria do not occur naturally in Michigan aquifers. (Fractured or creviced bedrock aquifers that are close to the surface are the exception). They can be introduced into a new well during construction and can remain if the water system is not thoroughly disinfected and flushed.

Coliform bacteria can persist within slime formed by naturally occurring groundwater 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.

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 casing, 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.

What are the 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, a strain of coliform bacteria called *E. coli* 0157:H7 from animal yard runoff entered a poorly constructed water supply well and resulted in two deaths and over 1,000 cases of illness at a county fair in New York. Canada's most serious waterborne disease outbreak occurred in Walkerton, Ontario in 2000. *E. coli* and *Campylobacter jejuni* from manure spread on a farm near the town entered a well that supplied the town's public water supply. The outbreak resulted in seven deaths and 2,300 people suffered from the symptoms.

Coliform Bacteria Study

In response to a high number of water wells that tested positive for coliform bacteria following a 1993 Midwest flood, the Centers for Disease Control (CDC) conducted a study in 1994. Water wells at 5,520 houses in nine states were surveyed and sampled. The 6-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**

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

Coliform Bacteria & Well Water Sampling

Detecting Coliform Bacteria

All drinking water wells should be tested at least annually for coliform bacteria. Michigan's well construction code requires that all new, repaired, or reconditioned wells 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.

Be sure to use proper sampling techniques while taking the sample. Human error in sampling can cause 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. Old, rusty, leaky, rarely used, or swing-type faucets can lead to a positive result and are not recommended.

Keep in mind that coliform organisms do not always show up in every sample. They are 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**. You may want to consider using bottled water as a temporary potable source. Bringing the water to a rolling boil for three minutes will kill the bacteria.

How Can I Eliminate Coliform Bacteria?

If coliform organisms 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 water 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.

The MDEQ does not recommend continuous chlorination as a substitute for proper well design and construction.

Some local health departments collect water samples as part of their permitting/inspection process for new wells. Others rely on well owners to collect the samples. Your local health department can furnish sample containers or can provide a list of private laboratories that offer state certified drinking water testing.

FOR ASSISTANCE

Contact your local health department or:
Michigan Department of Environmental Quality
Office of Drinking Water & Municipal Assistance
Environmental Health Section
525 West Allegan
PO Box 30241
Lansing, MI 48909-7741
Phone: 517/284-6542
Fax: 517/241-1328
Internet: www.michigan.gov/deq
Environmental Assistance Center: 1-800-662-9278