

Coliform Bacteria Information

What is the reason drinking water is tested for coliform bacteria?

Coliform bacteria testing is used to identify water systems with pathways that may allow contamination to enter the water supply. Under the Federal Revised Total Coliform Rule for public water systems, the presence of coliform bacteria alone does not indicate a health threat that requires discontinuing use of the water.

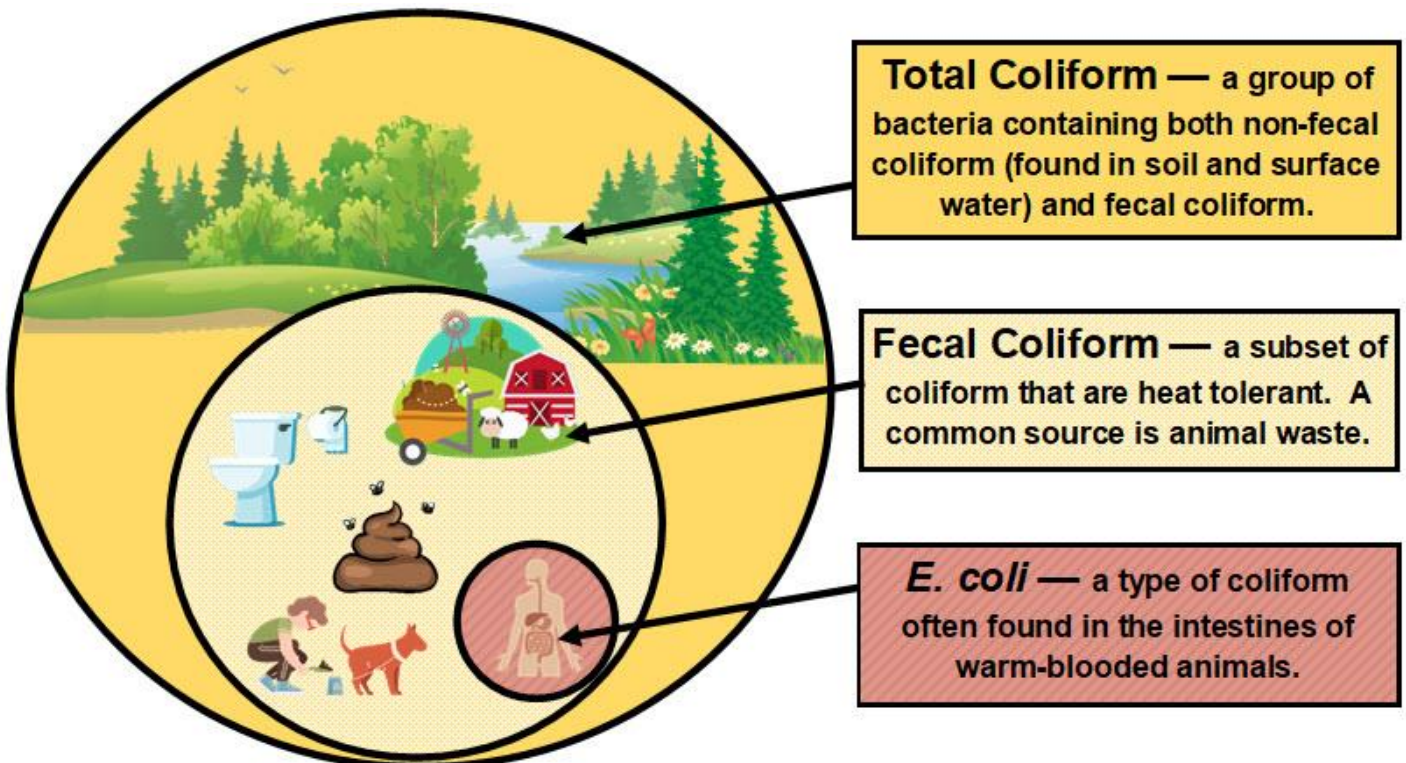
Coliform bacteria are found in the intestines of warm-blooded animals but also live in soil, vegetation and surface water. Coliform bacteria are not commonly found in groundwater unless it is introduced by pump work, a piping cross connection or the water source is influenced by surface water. Coliform may grow in a water system where a biofilm has grown. A biofilm is a large group of many bacteria types that cling to a surface. Biofilms are often difficult to remove. Most coliform bacteria are not harmful to humans but there are some types that may cause illness or opportunistic infections in vulnerable individuals.

Tests to determine when coliform bacteria are present are based on the common traits this bacteria group shares, but other bacteria do not. Coliform testing is needed because most microbes including disease causing organisms (pathogens) are too small to be seen in water and may not be detected by odor or taste. Pathways that allow coliform to enter a water system may also allow pathogens to enter the system. Pathogens are microorganisms that may cause disease.



Why is water tested for *Escherichia coli* (*E. coli*) bacterium?

Most waterborne pathogens that contaminate water supplies come from the feces of animals, including humans. In Wisconsin all public bacterial tests that are found to contain coliform bacteria are then tested for *E. coli*, a bacterium. This test is an indicator of fecal contamination of the water supply. Fecal contamination is associated with waterborne pathogens that may cause illnesses in humans.



What routine bacteria samples are required?

Water system samplers are required to sample for coliform bacteria according to a sampling schedule that is set based on system type, population served, compliance history for sampling, sanitary survey requirements and vulnerability of the water supply. Sample schedules may be annual, quarterly, or monthly. In Wisconsin, if coliform is found in a sample, that sample will also be tested for *E.coli* bacteria.

For information on how to collect a coliform sample [Click here](#).

Bacteria samples are required to be collected at sample sites in the distribution system to ensure the sample is representative of the water the public consumes. If all the water consumers receive is treated, the sample location will be after the treatment equipment. Sample sites without treatment may be approved if they better represent the water quality customers receive. A state or county field representative will provide a list of approved sample sites on a monitoring plan completed during a water system site visit. The sampler should alternate between distribution sample locations if a monitoring plan contains more than one on the approved plan. These routine samples will be identified on lab slips with **Sample Source** marked as D - Distribution System and **Sample Type** marked as D – Routine Distribution.

Sample Source (location):	Sample Type (check only one)	
<input checked="" type="checkbox"/> D - Distribution System	<input checked="" type="checkbox"/> D - Routine Distribution	<input type="checkbox"/> N - New Construction
<input type="checkbox"/> W - Well/Source	<input type="checkbox"/> C* - Check: Same location as Positive "D" Sample	<input type="checkbox"/> I - Investigation
	<input type="checkbox"/> R* - Repeat: Within 5 connects of Positive "D" Sample	<input type="checkbox"/> W - (Raw) Water
	<input type="checkbox"/> A - Additional Routine (month following positive "D")	WI Unique Well No: _____
		Entry Point ID: _____
	*IF THE SAMPLE TYPE IS "C" or "R":	
	"D" or "A" Positive Sample Date: ___/___/___ "D" or "A" Positive Sample ID: _____	

A water system may be required to collect a raw water sample depending on the type of treatment the system has. Raw water is the water that comes directly from the well. The sample tap to collect the raw water from is located at or before the pressure tank. Systems with a buried pressure tank, pitless receiver tank, or an above ground discharge unit installed must have a raw water sampling faucet installed immediately following the water piping point of entry into the building. These raw water samples are identified on lab slips with **Sample Source** marked as W - Well/Source and **Sample Type** marked as W - (Raw) Water.

Sample Source (location):	Sample Type (check only one)	
<input type="checkbox"/> D - Distribution System	<input type="checkbox"/> D - Routine Distribution	<input type="checkbox"/> N - New Construction
<input checked="" type="checkbox"/> W - Well/Source	<input type="checkbox"/> C* - Check: Same location as Positive "D" Sample	<input type="checkbox"/> I - Investigation
	<input type="checkbox"/> R* - Repeat: Within 5 connects of Positive "D" Sample	<input checked="" type="checkbox"/> W - (Raw) Water
	<input type="checkbox"/> A - Additional Routine (month following positive "D")	WI Unique Well No: _____
		Entry Point ID: _____
	*IF THE SAMPLE TYPE IS "C" or "R":	
	"D" or "A" Positive Sample Date: ___/___/___ "D" or "A" Positive Sample ID: _____	

What do I do if the initial sample indicates bacteria are present?

A water sample containing bacteria will be reported as "Present" in a presence absence test, or in a quantitative test as a number equal to or greater than "1 MPN" or "1 CFU". Sample results reported as most probable number (MPN) or colony forming units (CFU) are used in quantitative testing to assess how much coliform bacteria is present. If your water sample is reported to contain coliform or *E. coli*, a DNR or County representative will contact you and guide you through the required additional sampling.

[Click here](#) to view a flowchart common steps for coliform positive samples.

[Click here](#) for information on coliform sampling locations.

What happens when coliform bacteria are confirmed in system water samples?

Bacterial contamination is confirmed when the presence of coliform bacteria is found in a distribution system sample and at least one of the three follow-up samples. The confirmed presence of coliform bacteria is used to identify water systems that require additional review. The review uses the “**Find and Fix**” method.

The “**Find and Fix**” method includes a site investigation (Level 2 Assessment) conducted by DNR or county staff to **find** potential sanitary defects. Sanitary defects are defects that could provide a pathway for microbial contamination to enter the distribution system or a failure of a protective barrier. [Click here](#) for an example of a Level 2 Assessment form.

A copy of the Level 2 Assessment form listing corrective actions will be provided to the water system owner after an assessment is completed. Most corrective action plans include **fixing** problems identified and disinfecting the entire water system by specified due dates. Completing the corrective action plan may eliminate and/or prevent bacteria contamination in the water system. These actions can help prevent waterborne illness in humans.

[Click here](#) for information on potential causes of bacterial contamination.

[Click here](#) for information on well treatment techniques including chlorination.

What is a Boil Water Advisory?

A boil water advisory includes a letter providing advice and required actions for a water system to take to protect water consumers. This advisory is issued when *E. coli* bacteria are found in either the routine distribution water sample or any of the three samples collected to further evaluate the water supply plus at least one of the other samples are coliform positive (coliform present).

***E. coli* bacteria in drinking water is a serious health concern
and should not be consumed.**

The maximum contaminant level (MCL) for *E. coli* bacteria is 0 colony forming units (CFU) – not present.

<i>E. coli</i> MCL Violation Occurs with the Following Sample Result Combination	
Routine – scheduled distribution or additional sample	Repeat – check, repeat or triggered (source) sample
<i>E. coli</i> present	Total coliform present
<i>E. coli</i> present	Any missing sample
<i>E. coli</i> present	<i>E. coli</i> present
Total coliform present	<i>E. coli</i> present
Total coliform present	Total coliform + (but no <i>E. coli</i> analysis conducted)



A water system that is issued a Boil Water Advisory is required to public notice by posting a notice with required language provided by a state or county representative. Water systems that remain open to the public must use an alternative source of water for human consumption. Human consumption means drinking, bathing, cooking and dishwashing. Bathing includes all personal hygiene needs in a home, business or school setting.

[Click here](#) for more information on post notice requirements.

[Click here](#) for a blank copy of a boil water advisory with required language.

What are Effects on Human Health of Microbial Pathogens?

Fecal contamination and waterborne pathogens can cause a variety of illnesses.

According to the [Center for Disease Control and Prevention](#) the top 5 outbreak causes in wells are:

1. Hepatitis A
2. *Giardia*
3. *Campylobacter*, *E. coli* (tie)
4. *Shigella*
5. *Cryptosporidium*, *Salmonella* (tie)

The type of microbial contaminant, the concentration in the water, the exposure pathway, the amount of water a person consumes, and individual susceptibility can impact whether a person will experience health effects.

Common illness symptoms may include diarrhea, vomiting, cramps, nausea, jaundice, headaches and fatigue. More severe illness cases may develop such as kidney failure, inflammation of the liver and bloody diarrhea. Chronic diseases can also result from infection with a waterborne pathogen. Chronic diseases associated with consuming contaminated water include irritable bowel syndrome, renal impairment, hypertension, cardiovascular disease and reactive arthritis. Young children, the elderly and people with compromised immune systems may experience greater reactions from exposure to microbial contaminants.



Occurrence of coliform bacteria

Weather events and seasonal temperatures may impact when coliform bacteria are found in vulnerable drinking water sources. More coliform bacteria may be present after higher volume precipitation events, during snow melt time-periods and flood events. Coliform bacteria are more active in warmer environments and more likely to be found in water samples during warmer weather.

The more water samples that are confirmed coliform positive the more likely there is a higher concentration of bacteria in the water system. It is an option at some water testing laboratories to request more specific tests to determine a count for the number of bacteria in both coliform and *E. coli* tests. This may be useful in determining the extent of the contamination, but the presence of any bacteria is a concern and corrective actions are needed to improve the water system.

Additional Resources:

- WI DHS - Fact Sheet for Public and Licensed Facilities Bacteria in Drinking Water: Public Health Advice [Exit DNR]
<https://www.dhs.wisconsin.gov/publications/p4/p45090.pdf>
- WI DHS - How to Keep Safe if You Receive a Boil Water Notice [Exit DNR]
<https://www.dhs.wisconsin.gov/publications/p44589.pdf>
- WI DNR - Wisconsin Administrative Code NR 809 contains Safe Drinking Water Act requirements
https://docs.legis.wisconsin.gov/code/admin_code/nr/800/809

For more information regarding Transient Non-community Public Drinking Water, please visit our website <https://dnr.wisconsin.gov/topic/DrinkingWater/TNownerOperator.html> or contact the DNR Service Center Desk for assistance at (888) 936-7463