

FACTS ON DRINKING WATER

Coliform Bacteria – Total Coliforms & E.Coli

Total coliforms are a group of bacteria commonly found in the environment, for example in soil or vegetation, as well as the intestines of mammals, including humans. Total coliform bacteria are not likely to cause illness, but their presence indicates that your water supply may be vulnerable to contamination by more harmful microorganisms.

Escherichia coli (E.coli) is the only member of the total coliform group of bacteria that is found only in the intestines of mammals, including humans. The presence of E.coli in water indicates recent fecal contamination and may indicate the possible presence of disease-causing pathogens, such as bacteria, viruses, and parasites. Although most strains of E.coli bacteria are harmless, certain strains, such as E.coli 0157:H7, may cause illness.

Sources

Total coliforms and E.coli are used as indicators to measure the degree of pollution and sanitary quality of well water, because testing for all known pathogens is a complicated and expensive process.

The main source of pathogens in drinking water is through recent contamination from human or animal waste, from

- Improperly treated septic and sewage discharges
- Leaching of animal manure
- Stormwater runoff
- Domestic animals or wildlife

During and after precipitation, bacteria and other harmful microorganisms from any of these sources may be washed into rivers, lakes, or groundwater. Poor well construction or poor maintenance can increase the risk of groundwater contamination.

Health Risks

In water, coliform bacteria have no taste, smell, or colour. They can only be detected through a laboratory test.

The Canadian Drinking Water Quality Guideline for total coliforms is none detectable per 100 mL. The Canadian Drinking Water Quality Guideline for *Escherichia coli* (E.coli) is none detectable per 100 mL.

Maximum Acceptable Concentration for Drinking Water = none detectable per 100 mL

This means that in order to conform to the guideline:

- For every 100 mL of drinking water tested, no total coliforms or E.coli should be detected.

When drinking water is tested for total coliforms and E.coli and the water is safe to drink, the results may be presented in a variety of formats:

- Absent
- 0 colony forming units per 100 millilitres (0 CFU/100 mL)
- Less than 1 colony forming unit per 100 millilitres (<1 CFU/100mL)
- Non-detect (ND)

0 most probable number per 100 millilitres (MPN/100 mL) – only when a bacteria count is requested

E.coli in drinking water indicates the water has been contaminated with fecal material that may contain disease-causing microorganisms, such as certain bacteria, viruses, or parasites.

The health effects of exposure to disease-causing bacteria, viruses, and parasites in drinking water area varied. The most common symptoms of waterborne illness include nausea, vomiting, and diarrhea. Infants, the elderly, and those with compromised immune systems may suffer more severe effects. In extreme cases some pathogens may infect the lungs, skin, eyes, nervous system, kidneys, or liver and the effects may be more severe, chronic, or even fatal.

You should not assume that your water is safe to drink just because it has not made you sick in the past. If bacteria are present in your water, there is a risk that it could make you ill.

Testing

Regularly test your well water for a standard suite of bacterial and chemical parameters, including total coliforms and E.coli. Use an SCC or CALA accredited water testing laboratory. Find a list of accredited laboratories at www.cala.ca or www.scc.ca. Samples must be kept cool and be delivered to the lab within 24 hours of sampling.

For more information on water testing services at Provincial Analytical Services Laboratory, please see Department of Environment's water testing services at www.gnb.ca/environmment. The cost can vary depending on the lab and the number of parameters being tested.

Test Results

If your test results found bacteria to be present, your water is not safe to drink. Retest your water to confirm the original results. Boil your water while you are waiting for your test results, or use another source for drinking, preparing infant formulas, preparing juices and ice cubes, washing fruits and vegetables, cooking, and brushing your teeth.

To destroy pathogens, bring water to a rolling boil for one minute. You do not usually need to boil water for other household purposes. Those who can avoid swallowing the water may shower, bathe, and wash using the well water. Toddlers and infants should be sponge bathed. Dishes and laundry may be washed in well water either by hand or machine.

If E.coli is present in the water, it means there has been recent fecal contamination and other pathogens may be present. Investigate the source of the bacteria and take corrective measures.

If E.coli is absent, but only total coliforms are present, it could mean one of three things:

- A layer of bacteria may have developed within your well or plumbing system. This layer of bacteria is called a biofilm.
- Surface water may be getting into your well. This increases the risk of animal waste contaminating your water sooner or later.
- Your well water may come from an aquifer that contains bacteria. This can happen when groundwater comes from a shallow source.

Boiling Water

To kill microorganisms, you must keep water at a rolling boil for at least one minute. Water can be boiled either in a pot or kettle on a stove, in a microwave oven, or in an electric kettle without an automatic shut-off.

Solutions

If E.coli is confirmed to be present in the well water:

- Inspect the well construction and repair or rehabilitate the existing well. Check separation distances between wells and sources of contamination. Determine if there is a source of E.coli near your well, such as a malfunctioning septic system. Table 1 shows the minimum distances that must be maintained according to the NB Water Well Regulation 90-79 under the Clean Water Act and the NB On-site Sewage Disposal System Regulation 09-137 under the Public Health Act. Reconstruct the existing well, if necessary. In some cases it may be necessary to properly decommission the existing well and construct a new well. Contact New Brunswick Department of Environment for more information on well decommissioning or setbacks under the Clean Water Act.
- In the interim, use water that has been properly boiled, bottled water, or another source of water that has been tested and found to be safe for
 - Drinking
 - Preparing infant formula

- Preparing juices or ice cubes
- Washing fruits and vegetables
- Cooking
- Brushing your teeth
- Install a treatment system to treat your current source of water if there is no other source of water available and correction of the problem is not possible.

If E.coli is absent, but only total coliforms are present, solutions depend on why total coliforms are present:

- If a biofilm has developed within your well or plumbing system, you can disinfect your well and plumbing system.
- If surface water is getting into your well, you need to identify how surface water is entering your well and prevent this from happening. You may need the help of a well specialist.
- If your well water comes from an aquifer that contains bacteria, which can happen when groundwater comes from a shallow source, you have two options:
 - Drill a deeper well, which may solve the problem. Be sure to meet the separation distances outlined in Table 1 and properly decommission your old well.
 - Install a treatment system.

Compare the cost of drilling a new well to the long-term cost of buying and maintaining a treatment system.

Table 1: Separation Distances Required by NB Water Well Regulation 90-79 under the Clean Water Act and NB On-site Sewage Disposal System Regulation 09-137 under the Public Health Act

Source of Potential Contamination	Type of Well	Minimum Distance From Well
Water Well Regulation 90-79		
Cesspool receiving raw sewage	All types	30 m
Seepage (leaching) pit, filter bed, soil absorption field, earth pit privy or similar disposal unit	Drilled well Dug well	25 m 30 m
Septic tank, concrete vault privy, sewer of tightlyjointed tile or equivalent material or sewer connected foundation drain	Drilled well Dug well	15 m 30 m
Sewer of cast iron with leaded or approved mechanical joints, independent clean water drain or cistern	All types	3 m
Pumphouse floor drain, cast iron with leadedor approved mechanical joints, draining to ground surface	All types	600 mm
Cesspool or seepage pit that is more than 3.5 m deep unless the well is so cased as to prevent seepage from the cesspool or seepage pit into the well	All types	60 m
Right-of-way of any highway or public road	All types	10 m
On-site Sewage Disposal Regulation 09-137		
Septic Tank	Drilled Well Dug Well/Sandpoint Well	15 m 30 m
Disposal Field	Drilled Well Dug Well/Sandpoint Well	23 m 30 m

Treatment

Bacteria cannot be removed from water with pitcher-type carbon filters.

Bacteria can be removed by keeping water at a rolling boil for at least one minute.

Effective treatment methods for microbial contamination include

- Permanent point-of-entry disinfection units, which can use
 - Chlorine
 - Ozone
 - Ultraviolet light (UV light)
- Distillation

Buy a treatment system that has been certified to meet the current NSF standards for the inactivation of bacteria. NSF International is a not-for-profit, non-governmental organization that sets health and safety standards for manufacturers in 80 countries. See its website at www.nsf.org.

An ultraviolet light unit purchased for the inactivation of pathogenic microorganisms must be certified to NSF Standard 55 Class A. Units without the Class A designation are only intended to be used for the reduction of non-pathogenic, nuisance organisms. Ultraviolet lights are intended for water that is visually clear (that is, not coloured, cloudy, or turbid). If the water is turbid, it should be filtered first to clarify the water.

Once installed, re-test your water to ensure that the treatment system is working properly. Maintain the system according to the manufacturer's instructions to ensure a continued supply of safe drinking water. Testing should be conducted every three months for supplies that are contaminated with bacteria.

For more information on water treatment, please contact a private water treatment company.

Prevention

Tips for preventing bacteria, and other unwanted organisms, from entering a well:

- Make sure that the well casing is watertight and extends 152 millimeters (6 inches) or more above ground.
- Ensure the well has a proper vermin-proof cap.
- Disinfect the well, pump, and plumbing after repairs.
- Disinfect any water placed in a well for drinking, repair, or priming of pumps. Never use water from a lake or pond in your well.
- Keep pumps, well pipes, and well equipment off the ground when they are being repaired – laying them on the ground can cause them to become contaminated with bacteria.

For more information, please contact the nearest regional Health Protection Branch office:

Bathurst

165 St- Andrew Street
(506) 549-5550

St. Stephen

41 King Street
(506) 466-7615

Perth-Andover

35 F Tribe Rd.
(506) 273-4715

Grand Falls

131 Pleasant Street
(506) 737-4400

Caraquet

295, boulevard St-Pierre Ouest
(506) 394-4728

Tracadie

3520, rue Principale
(506) 394-4728

Shippagan

239B, boulevard J.D. Gauthier
(506) 394-4728

Moncton

81 Albert Street
(506) 856-2814

Fredericton

300 St Mary's Street
(506) 453-2830

Campbellton

10 Village Avenue, Unit 15
(506) 789-2549

Sussex

30 Moffett Avenue
(506) 432-2104

Saint John

55 Union Street
(506) 658-3022

Miramichi

1780 Water Street
(506) 778-6765

Edmundston

121 Church Street
(506) 737-4400

Woodstock

200 King Street
(506) 325-4408