

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.

Total coliform bacteria are commonly found in the environment (e.g. soil or vegetation) and are generally harmless. If only total coliform bacteria are detected in drinking water, the source is probably environmental, and fecal contamination is not likely. However, if environmental contamination can enter the system, there may be a way for other pathogens to enter the system. Therefore, it is important to determine the source and resolve the problem.

Fecal coliform bacteria are a sub-group of the total coliform group. They appear in great quantities in the intestines and feces of people and animals. The presence of fecal coliform in a drinking water sample often indicates recent fecal contamination – meaning that there is a greater risk that pathogens are present than if only total coliform bacteria are detected.

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 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 Iowa aquifers. (Fractured or creviced bedrock aquifers and sand/gravel 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 (i.e. iron bacteria). 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 (grouting) 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.