

General Water Quality Sampling Guidelines for Drinking Water

Why Water Quality Testing



Safe drinking water is a fundamental human right and unsafe drinking water is a global health crisis. Water quality is just as important as water quantity. There is widespread recognition that “improved” water sources as defined by the United Nations/World Health Organization Joint Monitoring Program do not always equal safe water: “Improved” refers to the construction of the source or if it is protected in some way, and not to the quality of the water. Water quality testing studies done on “improved” sources reveal those sources still contain high levels of fecal contamination. An important component of eliminating the global water quality crises is to conduct ongoing water quality monitoring in a health-risk based framework.

Why Test for *E. coli* Bacteria

The World Health Organization (WHO) Guidelines for Drinking Water Quality say *E. coli* is the preferred indicator organism for fecal contamination, and WHO recommends testing for *E. coli* in a 100 mL water sample. The concentration of pathogens in a water sample can be small, but the number of different pathogens can be very large, therefore we use “indirect evidence” and indicator organisms to detect potential pathogens. The greatest waterborne risk to health is transmitted through fecal pathogens found in the intestines of humans and warm-blooded animals. *E. coli* is the most reliable indicator for fecal contamination mainly because it is generally not found reproducing or growing in the environment, and is introduced into the environment by the feces of humans and animals.

Number of Samples to Test

Sampling ultimately depends on what you would like to figure out. For example, if you are testing a water system, sampling should occur at the water source, different distribution points and at different time points. If you are testing multiple water points, it is usually best to sample each water point at least once. If the results for an analysis are negative for *E. coli*, this is a good indication that the water is low health risk or “safe” at the time. If a sample from a water point gives positive results, it is best to analyze another sample from the same water point. If the results of the second analysis are positive, this is good evidence of a contaminated water point.

Sampling Frequency

There is always the risk that contamination can be intermittent, and therefore retesting water periodically is recommended. The frequency of retesting depends on the vulnerabilities of the water source and supply system, as some water systems and sources are more stable and

better protected and maintained than others. It is advisable to test more frequently if the water point is used by more people because more people are at risk if the water becomes contaminated from an intermittent event or phenomenon.

How Water Sources Are Recontaminated



Most waters are more vulnerable to *E. coli* contamination during and shortly after precipitation events and especially when there is flooding. Fecal bacteria enter water sources through: contaminated surface water run-off entering wells, springs, other sources; collecting water with unwashed hands and/or dirty containers; animals using the same source; objects falling into the well or source; open defecation.

Groundwater sources are more difficult to assess for *E. coli* contamination, as this may depend on local geo-hydrological conditions, fecal waste sources and their potential to impact the source. Sometimes the potential sources of *E. coli* are obvious, such as shallow, open wells or a well with a defective casing or liner.

Corrective Actions to Improve Water Quality

When water contaminated by *E. coli* is found, it is best to take actions to identify the reasons for the contamination by doing a sanitary assessment or sanitary inspection. See the following examples:

- www.who.int/water_sanitation_health/hygiene/emergencies/fs2_1.pdf
- www.who.int/water_sanitation_health/dwq/wsp170805AppC.pdf
- iceh.uws.edu.au/pdf_files/water_SanitaryInspection_Annex.pdf
- www.lboro.ac.uk/well/resources/technical-briefs/50-sanitary-surveying.pdf
- http://www.who.int/water_sanitation_health/dwq/2edvol3c.pdf

Another recommended action is to begin steps to correct any water point deficiencies found, based on the sanitary inspection/assessment. The actions depend on the types of deficiencies detected or found. In some cases, the corrections or fixes may be obvious, such as restricting animals from accessing the water and not allowing the water to be used for other purposes such as human or animal waste disposal or bathing, if it is surface water.

For unimproved waters that are typically of higher risks, treating the water is probably the best immediate intervention, perhaps at the water source point (where the water is collected) or at the point of use in the home (household water treatment).

SDG 6 and Water Quality



The United Nations Sustainable Development Goal 6 (SDG 6) is a dedicated water and sanitation goal that sets out to “ensure availability and sustainable management of water and sanitation for all.” SDG 6 champions water quality. It contains six targets that span the entire water cycle. Several of the targets focus on water quality. The goals are specific, measurable

and action-oriented in order for everyone in the world to have access to safe, uncontaminated drinking water.

SDG 6 recognizes there is a need to test water at the household level to both understand where water is unsafe and then to validate and audit various efforts to improve household and community water quality.

Accurate assessment of progress toward safe water targets includes measuring *E. coli* concentrations in drinking water with accessible, precise tests.

Aquagenx CBT Ideal for Low Resource, Rural and Disaster/Emergency Areas



The Aquagenx CBT Kit is the ideal *E. coli* water quality test for on-site testing in-the-field. It is optimized for rural and low resource areas and does not require electricity, labs or expensive equipment. The CBT generates quantified (MPN), color-coded, easy-to-score test results.

The CBT is simple to use. It enables ambient temperature incubation $\geq 25^{\circ}$ Celsius, works at variable temperatures and does not require constant temperature control in an incubator.

The CBT has many advantages over other testing methods:

- Lab-free
- Electricity-free
- Cold chain-free
- Portable and compact, easy to pack and carry
- No expensive, bulky equipment required
- Simple for anyone to use, don't have to be a scientist
- Ambient temperature incubation at 25° Celsius and above
- Works at variable temperatures, constant temperature control not required
- Quantified, color-coded test results test (MPN) without lab dependency
- Meets WHO recommendations for water quality testing – *E. coli* in 100 mL sample

CBT Procurement Programs for SDG 6

Aquagenx will develop SDG 6 procurement programs with governments, service providers and NGOs to make ongoing water quality monitoring with the CBT affordable and sustainable. We are happy to help and work with you toward attaining all targets in SDG 6.

Please contact us for personalized service!

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