Technical Brief
Compliance Monitoring for Safe Drinking Water – Best Management Practices for Water Districts

Sampling water treatment and distribution systems for *E. coli* helps ensure safe water.

Water District technicians test for E. coli at several locations throughout the distribution system.

Shown here is the Compartment Bag Test (CBT) by Aquagenx. It is one of the E. coli field tests available on the market. This one requires no electricity or expensive equipment.

Contract laboratories will typically provide the bottles, coolers and forms needed for compliance monitoring. Or consider using one of the E. coli field tests available for low resource settings.

Compliance Monitoring Best Practices for Water Districts

This Technical Brief is intended to assist Water Districts in utilizing Best Management Practices (BMPs) for monitoring for fecal contamination in drinking water. It provides guidance on the number of required samples and how to select proper sampling points throughout the water treatment and distribution system.

E. coli as an Indicator of Fecal Water Pollution

Because it is impractical to test water for every pathogen, indicators of contamination are used for water system compliance. According to the Yale University School of Medicine, **E. coli is the best biological drinking water indicator for public health protection.** In recent years, the United States Environmental Protection Agency (USEPA), World Health Organization and others have adopted *E. coli* monitoring as the best practice for water system compliance.

Technical Details – How Many Samples Are Required?

The answer to this question is based on the number of people served by the water system. Use the table below for guidance*:

Recommended minimum number of E. coli samples in piped water distribution systems

Total Population Served	Total number of Samples/year
<5000	12
5000 – 100,000	12 per 5000
100,000 – 500,000	12 per 10,000 plus an additional 120
>500,000	12 per 50,000 plus an additional 600

*Adapted from Guidance for Drinking Water Quality, World Health Organization, 4th Edition, 2011

Sampling at multiple locations throughout the entire systems aids the operator in isolating areas where contamination may be entering the system, simplifying remedial action. Sample locations should include points at the farthest reaches of the distribution system, dead ends, and at taps connected to large multi-user buildings such as apartment complexes. The above recommendations serve as best practices for routine compliance monitoring. Other activities, such as repairing water line breaks or removing illegal connections in conjunction with non-revenue water reduction activities requires additional monitoring.

Technical Details – Sample Point Selection

Use the following guidance for selection of sample point locations throughout the water system:

- The distribution of sample points throughout the water system should be proportional to the number of people supplied in different parts of the system. For example, if 30% of the population served is in one zone of the system, 30% of the samples should be taken from that zone.
- Water quality in different pressure zones can vary greatly. Therefore, each pressure zone must be monitored adequately.
- Should a system have more than one water source or more than one treatment plant, the samples must be proportional to the number of people served by each source or plant.
- Sampling the water source and at different points in the treatment process can be useful in determining overall disinfection needs.
- Obtain extra samples when repairing water line breaks, removing illegal or unauthorized connections, in the event of a back flow or back siphonage, or should flooding occur.
- In general, sample as close to the point of use as possible and be sure to sample over the entire water system, from supply, treatment and distribution.
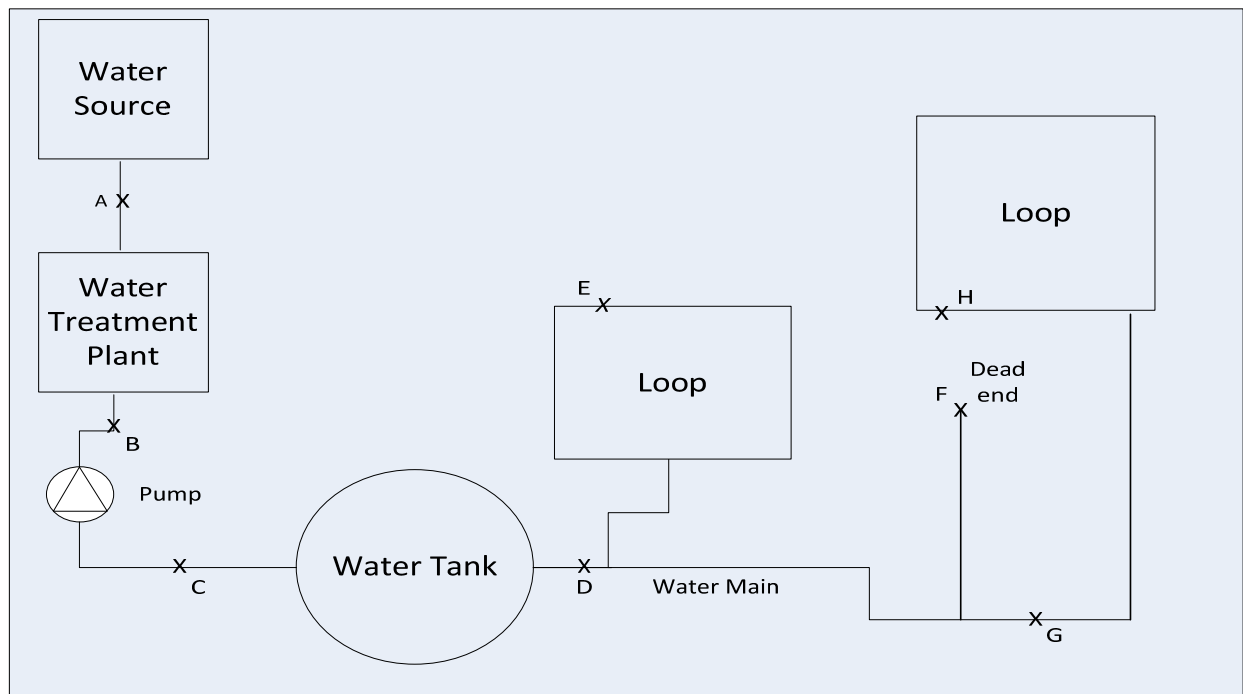
Typical Water System Layout

Where:
- A is representative of the quality of raw water
- B is representative of the quality of the water after treatment
- C is representative of the quality of the water after pumping into the distribution system
- D and G are representative of the quality in the main line
- E and H are representative of the quality of the water in a distribution loop (subdivision)
- F is representative of the quality of water at a dead end

Adopted from: *E. coli Monitoring Guidance Notes, Department of Energy and Water Supply, Queensland, Australia, 2005*