

Appendix A

Developing a Sample Siting Plan¹



¹Text adapted from John Potts, "Coliform Sampling Plans Reduce Errors," Oregon.*PIPELINE*, spring 1994.

Introduction

The TCR requires each small community drinking water system to sample for coliforms according to a written plan, which must be made available to the Primacy Agency, typically the State drinking water agency. Having a written sample collection protocol helps ensure that all sampling is done correctly, even when assignments of water system personnel change.

The plan specifies where in the distribution system routine samples will be drawn in order to ensure that they are “representative” of the water supplied to every customer. Representative samples that accurately reflect the quality of the finished water are crucial because, if coliforms are in the water supply, they may not be found uniformly throughout the distribution system. The sampling plan also designates repeat sampling sites to be used if a sample drawn from a routine sampling point tests positive for coliforms. Remember, the purpose of sampling is not to draw “clean” samples, but to identify any coliform contamination so it can be dealt with promptly. Because of this, it is important to identify dead ends and trouble spots in the distribution system for sampling locations.

Developing a Sampling Plan

The details of a sampling plan depend on the characteristics of the system for which it is developed and on the requirements of the Primacy Agency. (Contact your Primacy Agency for its complete requirements. A list of Primacy Agencies can be found at the end of this section.) Factors to consider when preparing a site sampling plan include:

- The location and type of water sources, treatment facilities, storage tanks, pressure stations, and service connections.
- The location of dead-end pipes, main and branch lines, loops, and other aspects of the piping system’s configuration.
- Cross connection hazards and shared connections.
- Areas of low water pressure and slow water movement.
- Varying population densities.
- Hydrants (for flushing schedule).

A Basic Site Sampling Plan

A basic site sampling plan may have three components: a map of the distribution system; a narrative description of the plan; and a maintenance program.

Distribution system map: This map provides the layout of the distribution system and shows:

- All water sources and their entry points into the distribution system.
- The area served by each water source (if the water from the various sources is not combined prior to distribution).
- Treatment facilities, such as filtration and disinfection.
- Storage tanks and reservoirs.
- Pressure reducing stations.
- Booster pump stations.
- Pressure zones.
- *Routine* sampling sites.
- *Repeat* sampling sites.
- Interconnections and critical valves.
- Pipe material and size.

- Hydrant locations.
- Location of blowoffs/flushing points.
- Dead-end mains and/or known trouble areas.

Plan narrative: The description of the site sampling plan includes:

- Water system name and contact person(s).
- Water system seven-digit identification number.
- Water source name(s).
- Storage/reservoir volume.
- Treatment plant description (process used, source[s] treated, location, etc.).
- Total population served.
- Number of service connections.
- Number and area of pressure zones, with population and service connections in each zone.
- Description of sampling rotation within a community, area, etc. This is especially important if the site plan incorporates large areas such as rural water systems.

Maintenance program: This section of the site sampling plan identifies:

- The minimum number of *routine* samples required per monitoring period.
 - The number of *routine* sample sites needed to represent all distribution areas and all areas of concern.
 - The location of all *routine* sampling sites needed to cover all areas in the distribution system. (The address of each site should be listed here, and the sites should be identified on the distribution system map.)
 - Sample collection schedule (for systems that collect more than one sample per month). Samples should be collected at regular intervals, not all on the same day.
 - Monthly rotation cycle (if applicable). It is desirable to rotate through each sample site three or four times a year.
 - A description of the five *routine* sampling sites that will be used for *routine* sampling the following month after the presence of coliforms has been confirmed.
 - A brief description of the sample collection techniques used. This will help avoid false positives due to improper collection techniques.
- The schedule for flushing the distribution system's lines. This procedure is vital in reducing the possibility of coliform and biofilm buildup. Systems that have dead-end lines should flush regularly.
 - The name and telephone number of the person who prepared the site sampling plan.
 - The date the site sampling plan was prepared (and revision date if applicable).

Sampling Sites

Sampling sites specified in the sampling plan should be selected carefully throughout the distribution system to represent the varying conditions that occur there. (See Figure 1 on the next page for examples.) It is especially important to identify and include in the sampling plan areas that may adversely affect the microbiological quality of the water. These include cross connections, varying population densities, low-pressure zones, sites of deteriorating water mains, shared connections, and areas of low-velocity water movement.

Customers' faucets and specially installed sampling taps are the two most common types of sampling sites. Customer faucets may not always be

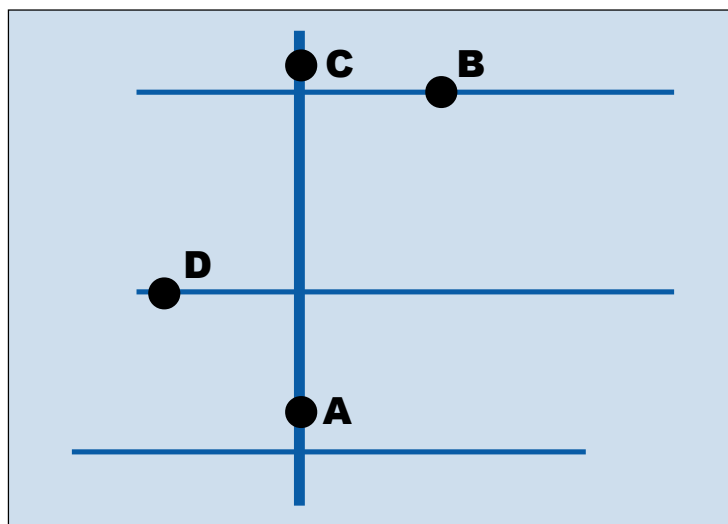
conveniently accessible. Also, samples from a customer's faucet may not accurately reflect distribution system conditions, for reasons that have to do with the customer's plumbing, which are not under the water supplier's control. If customers' faucets are to be used, each faucet should be

examined carefully to ensure its suitability. Some examples of **undesirable** conditions are:

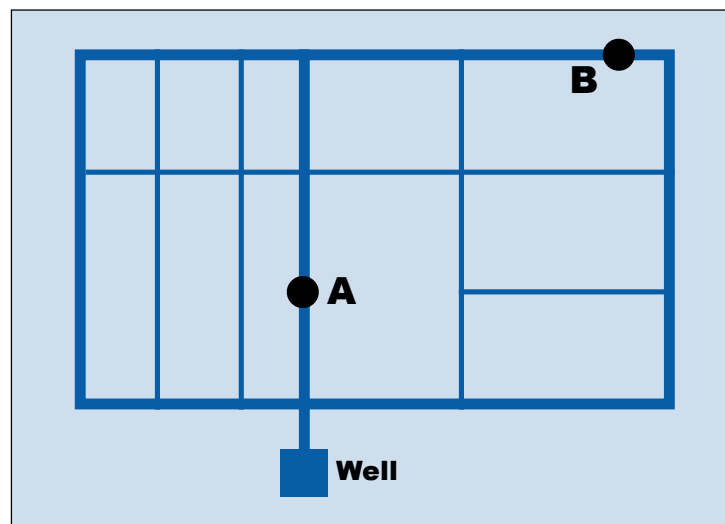
- Swivel-type faucets that have a single valve for hot and cold water.

Figure 1

Examples of Sampling Locations Based on System Characteristics



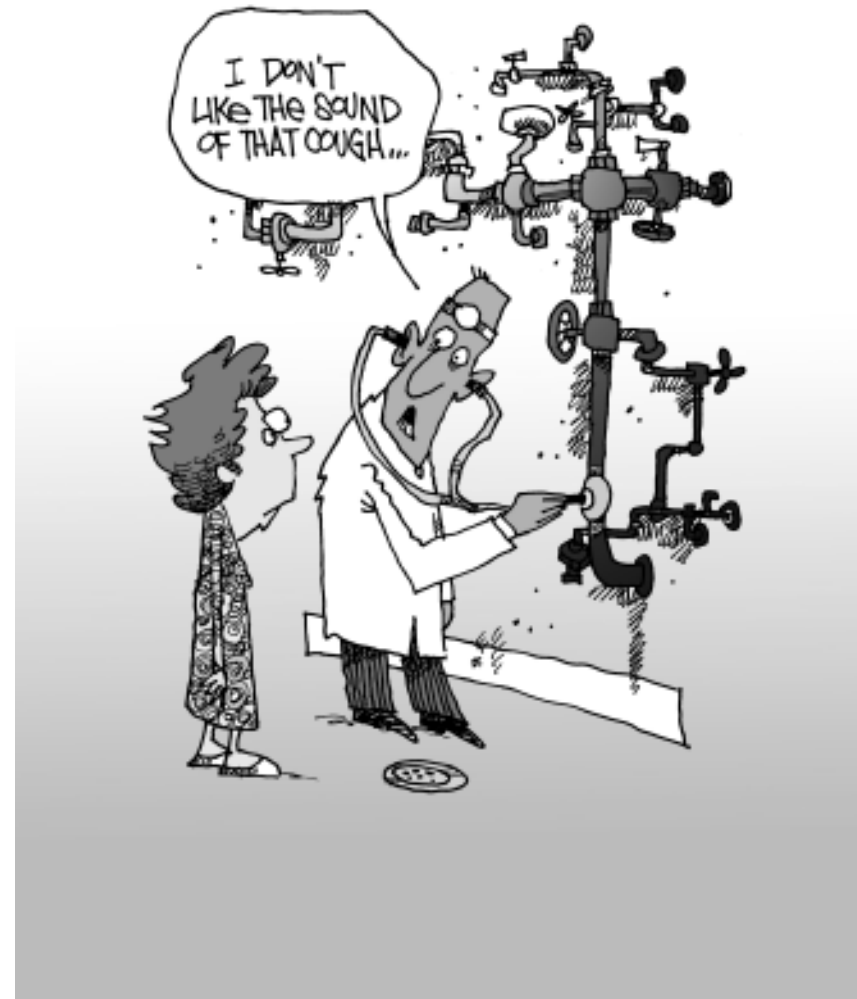
Providing samples that are representative of all the conditions in a system that has a number of branch lines with dead-ends, such as this one, might require four sampling locations: **A** gives a sample representative of conditions along the distribution system's main line. **B** provides a sample that represents conditions along one of the branch lines. Samples taken at **C** show conditions near the dead-end of the main line, while samples from **D** are representative of conditions near the dead-end of a branch line. (Adapted from *A Guide to Bacteriological Sampling of Public Water Supplies*, Virginia Department of Health, January 7, 1998.)



Looped distribution systems such as this one allow water to flow freely in all directions. In this system, only two sampling locations are necessary to provide samples representative of the main loop (**A**) and the branch loop (**B**) conditions. (Adapted from *A Guide to Bacteriological Sampling of Public Water Supplies*, Virginia Department of Health, January 7, 1998.)

- Faucets that have leaky packing material around the stem.
- Faucets that supply areas, such as janitorial or commercial sinks, where bacterial contamination is likely.
- Faucets close to or below ground level.
- Faucets that point upward.
- Faucets that have threads on the inside of their spouts.
- Faucets that have aerators. (If such faucets are to be used, the aerators must be removed before a sample is collected.)

To avoid the problems inherent with customer faucets, many water suppliers collect water samples for coliform analysis from special taps connected directly to distribution pipes. These special taps can be simple a faucet at the end of a riser pipe connected to the distribution line, or a more sophisticated manufactured sampling station installed at the water meter or into the distribution main.



Safe Drinking Water Act Primacy Agencies

Alabama	Department of Environmental Management Water Supply Branch	Illinois	Environmental Protection Agency Division of Public Water Supplies	Montana	Department of Environmental Quality Public Water Supply Section
Alaska	Division of Environmental Health Drinking Water and Wastewater Program	Indiana	Department of Environmental Management Office of Water Management	Nebraska	Department of HHS Regulation & Licensure
Arizona	Department of Environmental Quality Water Quality Division	Iowa	Department of Natural Resources Water Supply Section	Nevada	Department of Human Resources Bureau of Health Protection Services
Arkansas	Department of Health Division of Engineering	Kansas	Department of Health and Environment Bureau of Water	New Hampshire	Department of Environmental Services Water Supply Engineering Bureau
California	Department of Health Services Division of Drinking Water and Environmental Management	Kentucky	Department for Environmental Protection Division of Water	New Jersey	Department of Environmental Protection Environmental Regulation
Colorado	Department of Public Health and Environment Drinking Water Program	Louisiana	Department of Health and Hospitals Division of Environmental & Health Services	New Mexico	Environment Department Drinking Water Bureau
Connecticut	Department of Public Health Water Supplies Section	Maine	Department of Human Services Division of Health Engineering	New York	Department of Health Bureau of Public Water Supply Protection
Delaware	Health and Social Services Division of Public Health	Maryland	Department of the Environment Public Drinking Water Program	North Carolina	Department of Environment and Natural Resources Public Water Supply Section
District of Columbia	U.S. EPA Region 3	Massachusetts	Department of Environmental Protection Drinking Water Program	North Dakota	Department of Health
Florida	Department of Environmental Protection Drinking Water Section	Michigan	Department of Environmental Quality Drinking Water & Radiological Protection Division	Ohio	State Environmental Protection Agency Division of Drinking & Ground Water
Georgia	Department of Natural Resources Environmental Protection Division	Minnesota	Department of Health Drinking Water Protection Section	Oklahoma	Department of Environmental Quality Water Quality Division
Hawaii	Department of Health Environmental Management Division	Mississippi	Department of Health Division of Water Supply	Oregon	Department of Human Resources Drinking Water Program
Idaho	Department of Health and Welfare Division of Environmental Quality	Missouri	Department of Natural Resources Division of Environmental Quality	Pennsylvania	Department of Environmental Protection Bureau of Water Supply Management
				Rhode Island	Department of Health Office of Drinking Water Quality

South Carolina	Department of Health & Environmental Control Bureau of Water
South Dakota	Department of Environment & Natural Resources Division of Environmental Regulation
Tennessee	Department of Environment & Conservation Division of Water Supply

Texas	Natural Resource Conservation Commission Water Utilities Division
Utah	Department of Environmental Quality Division of Drinking Water
Vermont	Department of Environmental Conservation Water Supply Division
Virginia	Department of Health Division of Water Supply Engineering

Washington	Department of Health Drinking Water Division
West Virginia	Bureau for Public Health Office of Environmental Health Services
Wisconsin	Department of Natural Resources Bureau of Water Supply
Wyoming	U.S. EPA Region 8 Wyoming Drinking Water Program

Note: States in **boldface** type have prepared guidance on Sampling Siting Plans for systems to use in complying with the monitoring requirements of the TCR.

If you have any questions on who your Primacy Agency is, call the U.S. EPA Hotline at 1-800-426-4791.