



Guidance for Developing a Coliform Sample Siting Plan

New Jersey Department of Environmental Protection: Division of Water Supply & Geoscience

Regulatory Requirement

In accordance with 40 CFR 141.853, public water systems must develop a written coliform sample siting plan identifying sampling sites and a sample collection schedule that are representative of water throughout the distribution system. Coliform sample siting plans are to be maintained in the form of a hard copy on-site and are subject to state review and revision. *This guidance document also addresses a few Ground Water Rule requirements [40 CFR 141.400 et seq.] related to the Revised Total Coliform Rule (RTCR).*

Objectives

Monitoring under the RTCR is designed to detect the presence of microbiological contamination caused by potential compromises of source water quality, treatment effectiveness, and/or distribution system integrity based on the following considerations:

- 1) **Process Control:** Evaluates the effectiveness of the disinfection treatment and ensures that all water system treatments and pumping components are not vulnerable to microbiological contamination.
- 2) **System Reliability:** Characterizes the integrity of the distribution system by determining if bacteria are entering the distribution system through cross connections, low water pressure, leaking pipes, valves, joints, etc., or are persisting in the system within biofilms, stagnant zones, and/or water storage facilities. Such a characterization is useful in identifying the need for maintenance, repair, and cleaning of the distribution system to maintain adequate sanitary protection.

Microbiological Sample Types

- 1) **Routine Sample** – RTCR compliance samples that are required to be collected on a routine basis as established in a written Coliform Sample Siting Plan, typically quarterly or monthly, from sample locations throughout the distribution system.
- 2) **Repeat Sample** – RTCR compliance samples that are required to be collected within 24 hours of notification of any routine total coliform positive (TC+) sample in the distribution system.
- 3) **Triggered Source Water Sample** – Ground Water Rule compliance samples that are required to be collected at the raw water sample tap of all operational supply wells within 24 hours of notification by the laboratory that a routine distribution sample is TC+.
- 4) **Elective Source Water Sample** – Additional source water samples collected to gauge “operational quality” from the groundwater source(s), as part of normal operating procedures.

Elements of a Coliform Sample Siting Plan

- 1) Water System information:
 - a. System name
 - b. PWSID number
 - c. Number of service connections
 - d. Number of buildings/units
 - e. Population served
 - f. System type (NTNCWS, TNCWS)
 - g. Water system operating period (year-round, seasonal)
- 2) Sources (wells) information:
 - a. Facility ID (WL)
 - b. Name
 - c. Well permit number (if known)
- 3) Treatment facilities information:
 - a. Facility ID (TP)
 - b. Name
 - c. Disinfection treatment
 - d. Other treatment processes
- 4) Water tanks information:
 - a. Name
 - b. Type
 - c. Water type stored
 - d. Volume
- 5) Minimum number of routine samples, as outlined below:
 - a. A Non-Community Water System (NCWS) (not a seasonal system) using only groundwater and serving 1,000 or fewer people is required to collect one sample each calendar quarter [40 CFR 141.854(b)].
 - i. Increased monitoring to one sample per month is required if any of the criteria outlined in 40 CFR 141.854(f)(1)-(4) are met.
 - ii. Systems collecting routine samples on a quarterly basis are required to collect a minimum of three routine samples the month following a TC+ sample [40 CFR 141.853(j)].
 - iii. If the system consists of more than 1 building or unit, and/or service connection, the routine sample sites should be placed on a rotating schedule.
 - b. A Seasonal System is required to collect one sample per month that the system is in operation. A Seasonal System is defined as a NCWS not operated as a public water system on a year-round basis, which starts up and shuts down at the beginning and end of each operating season. It could also be a NCWS that remains pressurized during an off season, but serves less than 25 persons, or one that depressurizes a portion of the system but continues to serve water to the public.
 - c. A Community Water System (CWS) using only groundwater and

serving 1,000 or fewer people is required to collect one sample per month [40 CFR 141.855(b)].

- i. In accordance with N.J.A.C. 7:10-4.1(b), a CWS with less than 100 service connections that does not provide disinfection is required to collect two coliform samples per month at bi-weekly intervals.
- d. A public water system using surface water or ground water under the direct influence of surface water, and serving 1,000 or fewer people, is required to collect one sample per month [40 CFR 141.856(b)].
 - i. An unfiltered water system must collect at least one TC sample near the first service connection each day the turbidity level of the source water, measured as specified in 40 CFR 141.74(b)(2), exceeds 1 NTU.
- e. A public water system serving more than 1,000 people is required to sample monthly with the number of samples based on the population served in accordance with 40 CFR 141.857(b).
 - i. An unfiltered water system must collect at least one TC sample near the first service connection each day the turbidity level of the source water, measured as specified in 40 CFR 141.74(b)(2), exceeds 1 NTU.
- 6) Designate the number of routine samples to be collected each monitoring period. If routine monitoring involves more than the minimum number of samples to be collected, the written plan must detail this additional sampling, and the results must be used when calculating compliance [40 CFR 141.853(a)(4)].
- 7) List the locations of all the routine sampling sites to be used for compliance reporting. Include the addresses and unit numbers.
 - a. The sampling location may be at a customer's premise, a dedicated sampling station, or a designated compliance sampling location.
 - b. A NCWS routinely sampling on a quarterly basis must also provide a list of three (3) routine sample sites to be used for sampling and reporting the month following a routine TC+ result.
 - c. A public water system using unfiltered surface water and/or ground water under the direct influence of surface water must also provide a list of routine sample sites near the first customer for each point of entry to be used if the turbidity level of the source water exceeds 1 NTU.

Refer to [Appendix A](#) for additional guidance on selecting sampling locations.

- 8) Designate the frequency of sample collection at each sample site per monitoring period and provide a sample collection schedule. In accordance with 40 CFR 141.853(a)(2), samples must be collected at regular time intervals throughout the month, except that systems serving 4,900 or fewer people may collect all required samples on a single day if taken from different sites. Sample collection can be established in one of three ways:
 - a. Designate the same number of sampling sites as required to meet at

least the minimum number of required samples and collect one sample per month from each designated site.

- b. Designate a larger pool of sample sites than required and rotate sample sites to collect the required number of samples
 - i. This option is strongly recommended for small community or non-community water systems serving several service connections (i.e., buildings) on the property.
- c. Designate fewer sites than the minimum number of required samples and collect samples more frequently than once per month. However, this option is predicted by still having sufficient sampling locations to characterize the distribution system.

Refer to [Appendix A](#) for additional guidance on designating sampling frequency.

- 9) List the locations and unit numbers of repeat sampling sites [40 CFR 141.853(a)(5)]. The repeat sampling requirements are outlined below.
 - a. System must collect a total of three repeat samples (per routine TC+ result) from the following locations:
 - i. One repeat sample from the sample tap where the original TC+ sample was taken.
 - ii. One repeat sample at a tap within five service connections upstream of the original TC+ sample site.
 - iii. One repeat sample at a tap within five service connections downstream of the original TC+ sample site.

If a system proposes to use an alternative sampling location in lieu of the original upstream or downstream location, the system must submit its Coliform Sample Siting Plan to the Division of Water Supply and Geoscience (Division) for review and approval. This cannot be submitted immediately following a TC+ result.

- b. If a NCWS is comprised of only one realty improvement (building) and has 2 or more routine TC+s during a monitoring period, then a minimum of 6 repeat samples are required to be collected in the distribution system.
- 10) A Seasonal System, defined as a NCWS not operated as a public water system on a year-round basis and starts up and shuts down at the beginning and end of each operating season, or a NCWS that depressurizes a portion of the distribution system for a period of time or seasonally, is required to detail the start-up sampling location and timeframe for collection.
- a. If the system de-pressurizes all or a portion of the distribution system, the sampling location shall be within the area that was depressurized.
 - b. Start-up sampling is required to be conducted at least 2 weeks, but no more than 30 days, prior to serving water to the public.
 - c. If the start-up sample is TC+, the system shall comply with the repeat treatment technique, and *E.coli* analytical requirements under the

RTCR, as well as the triggered source water sampling and corrective actions under the Ground Water Rule.

- d. For triggered source water monitoring under the Ground Water Rule, the source tap location (Facility ID: WL) as well as the sample site description must be included and labeled properly.
- 11) If the system conducts elective source water samples of its groundwater source(s) that are not providing certified 4-log treatment of viruses, it is strongly recommended that the system specify the source tap locations (Facility ID: WL) and frequency.
- 12) Identify who collects the TC samples (i.e., water system personnel or a certified laboratory). Provide their name, title (only applicable for water system personnel), phone number, and email.
- 13) Establish sample container preparation, transport procedures and residual disinfectant sampling.
- a. If a certified laboratory collects the microbiological samples, it is not necessary to address this item in the written plan.
 - b. If water system personnel were selected as the sample collectors, indicate the name, title, phone number, and email of a secondary sample collector. Specify the sample container prep and transport procedures, the sample collection procedures, as well as the disinfectant residual testing procedures.
 - c. Refer to the Office of Quality Assurance for standard procedures. (<http://www.state.nj.us/dep/oqa/>)
 - d. CWS and non-transient NCWS that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point and at the same time as TC is sampled, pursuant to 40 CFR 141.132(c).
 - i. Water systems practicing disinfection using gas or hypo chlorination should perform a free chlorine residual test and systems using chloramines should perform a total chlorine residual test.
 - e. Ground water systems must submit a chlorine residual reading for each triggered source water sample along with the microbiological result.
 - f. The Bureau of Safe Drinking Water (Bureau) strongly recommends the chlorine residual of the water supply be determined for all microbiological samples collected, regardless of whether the public water system has chemical treatment to disinfect its water supply. The chlorine residual analysis of the water supply should occur in the field at the same time and location as microbiological sample collection and recorded on the sample chain of custody or in a field notebook to be made available to the Division upon request.

14) Establish a plan of action when a ROUTINE TC+ occurs

- a. If also *E.coli* positive, the Bureau must be notified within 24 hours from when the system is notified of the test result [40 CFR 141.858(b)(1)]. Systems must call the DEP Hotline during off business hours.
- b. Notify all wholesale public water systems, as soon as possible but no more than 24 hours from being notified of the TC+ result, in which water was purchased from within seven days of the routine sample collection date, pursuant to the Ground Water Rule [40 CFR 141.402(a)(4)(i)].

Contact sample collector and/or certified laboratory to collect repeat samples within the distribution system within 24 hours of being notified of the routine TC+ result, pursuant to 40 CFR 141.858(a).

- c. If the system has groundwater supply well(s), outline the protocol to collect a triggered source water sample for each routine TC+ in the distribution system from a raw water sampling tap for each operational supply well(s) as soon as possible but no more than 24 hours of being notified of the routine TC+ result, pursuant to the Ground Water Rule [40 CFR 141.402(a)(2)].
- d. The raw water sampling tap must be prior to all treatment and storage. Refer to the [Ground Water Rule: Ground Water Source Tap Installation and Sampling for Public Water Systems.](#)
 - i. Operational supply well refers to any well that was in use within seven days from the collection date of the routine TC+ sample.
 - ii. If the system has a certification of 4-log virus treatment from the Bureau of Water System Engineering (BWSE) or is combined and treated with surface water (goes through surface water treatment), triggered source water monitoring is not required for those supply wells.
 - iii. If a water system does not have a Representative Source Monitoring Sampling plan approved by the BWSE, the water system must sample all of their wells in use. If the wells were offline and not serving water 7 days prior to the triggering event, a Well Out of Service form must be submitted by the 10th day after the triggering event.
- e. NCWSs routinely sampling quarterly must also outline protocol to collect a minimum of three routine TC samples during the next month water is provided to the public [40 CFR 141.853(j)].

15) Establish a plan of action when a REPEAT TC+ occurs

- a. Notify the Bureau (or DEP Hotline during off business hours) within 24 hours from when the system is notified of an *E.coli maximum contaminant level* (MCL) violation [40 CFR 141.861(a)(1)]. The following scenarios represent an *E.coli* MCL violation [40 CFR [40 CFR 141.860(a)]:
 - i. A routine sample is TC+ and *E.coli* positive and is followed by a repeat sample that is TC+ or both TC+ and *E.coli* positive. *This scenario requires a Tier 1 public notification and requires a*

Boil Water/Do Not Drink Advisory. Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.

- ii. A routine sample is TC+ and *E. coli* negative and is followed by a repeat sample that is TC+ and *E.coli* positive. *This scenario requires a Tier 1 public notification and requires a Boil Water/Do Not Drink Advisory. Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.*
- iii. A routine sample is TC+ and *E.coli* positive and no required repeat samples were collected. *This scenario requires a Tier 1 public notification and requires a Boil Water/Do Not Drink Advisory. Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.*
- iv. A repeat sample is TC+ but not tested for *E.coli*. *This scenario requires a Tier 1 public notification and requires a Boil Water/Do Not Drink Advisory. Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.*
- v. Repeat samples are collected more than 24 hours after being notified of the positive routine results. *This scenario requires a Tier 1 public notification and may require a Boil Water/Do Not Drink Advisory. Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.*
- vi. A routine sample is TC+ or both TC+ and *E.coli* positive and corrective actions (i.e. shock disinfection, repairs/adjustments to treatment unit, etc.) are implemented prior to the collection of required repeat samples. *This scenario requires a Tier 1 public notification and may require a Boil Water/Do Not Drink Advisory. Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.*
- vii. Note that Monitoring violations and Reporting violations will be issued if the system conducts remedial actions prior to repeat sample and triggered source water sample collection. Public notifications and certification forms must be submitted to NJDEP within 10 days of distribution.

Notify the Bureau within 48 hours or on the next business day, whichever is sooner, of a treatment technique trigger for coliforms [N.J.A.C. 7:10-5.4(c)].

The following scenarios represent Level 1 treatment technique triggers for coliforms [40 CFR 141.859(a)]:

- i. Systems collecting 40 or more samples per month, more than 5% of the samples collected are TC+.
 - ii. Systems collecting fewer than 40 samples per month, two or more samples collected are TC+.
 - iii. A routine sample is TC+ and *E.coli* negative, and all required repeat samples are not collected.
- b. Submit to the NJDEP a Level Assessment within 30 days of an *E.coli* MCL violation or a treatment technique trigger. Based on results,

conduct either a Level 1 or Level 2 assessment and submit the completed assessment report to the Bureau of Safe Drinking Water within 30 days from being notified of the *E.coli* MCL violation and/or treatment technique trigger for coliforms.

- c. For Level 2 Assessments, contact a licensed well driller, licensed pump installer, licensed operator (must have equal or higher license than system classification), and/or licensed professional engineer to complete the assessment.

The following scenario requires a Level 1 Assessment:

- i. Level 1 treatment technique triggers for coliforms (scenarios outlined in (a) above).

The following scenarios require a Level 2 Assessment:

- i. *E.coli* MCL violation (scenarios outlined in (a) above).
- ii. Two Level 1 treatment technique triggers within a rolling 12-month period.

Consult with NJDEP if a Level 2 Assessment was conducted and no sources of contamination were identified prior to implementing corrective actions.

Note: Multiple treatment technique triggers may occur during a single monitoring period. For instance, a system collecting fewer than 40 samples per month can trigger a Level 1 treatment technique with two or more TC+ samples and trigger a separate Level 1 treatment technique with failure to collect all required repeat samples for a routine TC+, *E.coli* negative sample. These two Level 1 treatment technique triggers occurred within a rolling 12-month period; and therefore, require a Level 2 Assessment.

Failure to conduct a required Level 1 or Level 2 Assessment is a treatment technique violation which requires notification to the Bureau by the end of the next business day after the system learns of the violation; a Tier 2 public notification is also required.

- 16) Establish a plan of action when the triggered source water sample is *E.coli* positive as required per the Ground Water Rule [40 CFR 141.400 et seq.].
 - a. Initiate consultation with the Bureau as soon as practical, but no later than 24 hours after the public water system learns of the positive result [40 CFR 141.203(b)(2)].
 - i. Implement Tier 1 public notification requirements within 24 hours [40 CFR 141.402(g)] that includes a Boil Water/Do Not Drink Advisory. *Tier 1 public notifications must be reviewed and approved by NJDEP prior to distribution/posting.*
 - ii. Submit the public notification and certification form to NJDEP within 10 days of distribution.
 - iii. Collect five additional source water samples from the source tap location within 24 hours from notification of the *E.coli* positive result [40 CFR 141.402(a)(3)]. Source water samples should be taken 15 minutes apart. Contact your sample collector/certified

laboratory to ensure these samples are collected. If the ground water system fails to collect the five additional source water samples or if any of the five additional source water samples are *E.coli* positive, corrective actions are required to be implemented under the Ground Water Rule [40 CFR 141.403((a)(2))].

- 17) Establish a plan of action when the additional source water sample is *E. coli* positive.
 - a. Notify the Bureau as soon as practical, but no later than 24 hours after the public water system learns of the positive result.
 - i. Update Tier 1 public notification (Do Not Drink/Boil Water Advisory) within 24 hours. *Tier 1 public notification must be reviewed and approved by the Bureau prior to distribution/posting.*
 - ii. Submit the public notification and certification form to NJDEP within 10 days of distribution.
 - iii. Hire a licensed professional to investigate the source components and submit a written corrective action plan within 30 days. **No corrective action should be taken without approval from the Bureau.**
 - iv. Make sure to include in the corrective action plan:
 1. Summary of findings of investigation of all source components.
 2. Proposed corrective actions.
 3. Timeframes to complete proposed corrective actions, including significant milestones.
 - v. Complete Bureau approved corrective actions within 120 days from becoming aware of the *E. coli* positive result.
- 18) Establish a plan of action when your system incurs a treatment technique violation.
 - a. Notify the Bureau within 48 hours or on the next business day, whichever is sooner, of the treatment technique violation. [40 CFR 141.861(a)(2)]. The following scenarios represent treatment technique violations:
 - i. System fails to conduct the required assessment or corrective actions with the required timeframe.
 - ii. Seasonal system fails to complete state approved start up procedure prior to serving water to the public.
 - b. Conduct Tier 2 public notification within 30 days.
 - i. Send a draft to the Bureau for review and approval if a Bureau template is not used.
 - ii. The public notification form and certification form must be submitted to the Bureau within 10 days of distribution.
 - c. Conduct and submit the required Level Assessment to the Bureau within 30 days.¹
 - i. If a Level 2 Assessment is required, a licensed well driller, pump installer, licensed operator (must have equal or higher license than system classification), and/or licensed professional engineer must be contacted to complete the assessment.

¹ If a system triggers RTCR and GWR, prior to implementing corrective actions, approval from the Bureau is required.

- d. Implement the proper corrective actions based on Level Assessment findings.
 - i. Prior to implementing corrective actions, consult with the Bureau if Level 2 Assessment was conducted and no sources of contamination were identified prior to implementing corrective actions.
 - ii. Complete corrective actions within 30 days.
- 19) Establish a plan of action when your system incurs a monitoring violation.
 - a. Notify the Bureau within 10 days after the system learns of the monitoring violation. The following scenarios represent monitoring violations:
 - i. Failure to collect every required routine sample during a monitoring period.
 - ii. Failure to analyze for *E.coli* following a TC+ routine sample.
 - b. Implement Tier 3 public notification [40 CFR 141.204] within one year.
 - i. Submit the public notification and certification form to NJDEP within 10 days of distribution.
 - c. Contact the sample collector and/or certified laboratory to ensure all required routine samples and analyses of *E.coli*, if required, are conducted in subsequent monitoring periods.
- 20) Establish a plan of action when your elective source water monitoring sample is *E.coli* positive.
 - a. Notify the Bureau (or DEP Hotline during off business hours) within 6 hours after the system learns of the *E.coli* positive result. Be sure to specify notification is for an elective source water sample.
 - b. Comply with any requirements set forth during consultation(s) with NJDEP.
- 21) Additional contact information needed:
 - a. System owner contact information
 - b. Licensed operator of record contact information (not required for transient system)
 - i. Must include license type and number
 - c. Certified laboratory information
 - d. County health department contact information
 - e. Licensed well driller contact information
 - f. Licensed plumber contact information
 - g. Treatment company contact information

22) Distribution map:

- a. The distribution map may be stored as an electronic GIS map if it can be accessed and provided upon request.
- b. Include:
 - i. Routine sampling sites
 - ii. Repeat sampling sites
 - iii. Source water sample tap
 - iv. Point of entry (POE) sample tap(s)
 - v. Wells
 - vi. Treatment plants (including booster stations)
 - vii. Storage tanks
 - viii. Water distribution lines
 - ix. Dead end water lines
 - x. Maximum residence time sites/areas

23) Sampling Plan Certification:

- a. After completing the plan, specific signatures are needed along with the date of completion. This includes:
 - i. Plan preparer signature and date
 - ii. Plan preparer name printed and title
 - iii. Water system owner signature and date
 - iv. Water system owner name printed and title
 - v. Licensed operator signature and date
 - vi. Licensed operator name printed and license number
- b. For further updates and revisions, signatures are needed again with new dates.

Division of Water Supply & Geoscience Contact Information

- Bureau of Safe Drinking Water: 609-292-5550
- Bureau of Water System Engineering: 609-292-2957
- DEP Hotline (for off business hours): 1-877-WARN-DEP
- Bureau of Water Allocation and Well Permitting: 609-984-6831
- Bureau of Water Resources & Geoscience: 609-292-2576
- NJDEP Office of Quality Assurance 609-292-3950

Additional Guidance Documents

- [Revised Total Coliform Quick Reference Guide](#)
- [Revised Total Coliform Rule Assessments and Corrective Actions Guidance Manual, Interim Final](#)
- [EPA's A Review of Distribution System Monitoring Strategies under the Total Coliform Rule](#)
- [Revised Public Notification Handbook for Community and Non-Transient Non-Community Water Systems](#)
- [Revised Public Notification Handbook for Transient Non-Community Water Systems](#)
- [Ground Water Rule: A Quick Reference Guide](#)
- [Ground Water Rule Corrective Actions Guidance Manual](#)
- [Consecutive System Guide for the Ground Water Rule](#)
- [Basic Information about Pathogens and Indicators in Drinking Water](#)
- [Drinking Water Distribution Systems](#)

APPENDIX A

RTCR SAMPLING STRATEGY GUIDANCE

The Division of Water Supply and Geoscience (Division) developed the following TC sampling strategy to improve characterization of water quality within the distribution system to identify microbiological contamination. Results produced from microbiological sampling can assist operators in evaluating the effectiveness of treatment performance and assess the physical integrity of distribution components while ensuring a safe supply of water to consumers. Sampling at regular, consistent time intervals allows for better detection of changes in distribution water quality. The Division outlines the recommended process for sample site selection below.

Step 1: Divide Distribution System into Multiple Grid Areas

Divide the distribution system into a grid consisting of multiple areas (i.e. zones), based on the variables below:

- 1) Routine sampling sites
- 2) Repeat sampling sites
- 3) Water source(s) (wells and interconnections)
- 4) Treatment plant(s) (including booster stations)
- 5) Storage tanks
- 6) Interconnections
- 7) Pressure zones
- 8) Population
- 9) Water main size, age, etc.
- 10) Topography
- 11) Dead end water lines
- 12) Maximum residence time sites/areas

The number of routine samples to be collected must be factored into this process to establish a spatial and temporal sampling plan. It is important to specify the basis for the grid area size and frequency selected for your distribution system and the associated benefits.

Step 2: Determine Number of Routine Sample Site(s)

Take the number of routine samples to be collected each monitoring period, and determine the number of sites the system will use to comply with the sampling requirement.

- Community and non-community water systems required to conduct monthly monitoring should refer to Table 1 for the required number of routine samples per month and recommendations for selecting the number of routine sample sites to be used.
- Non-community water systems required to conduct quarterly monitoring should refer to Table 2 for the required number of routine samples per month and recommendations for selecting number of routine sample sites to be used.

The goal is to establish a pool of sampling sites within each grid area that provides representative coverage throughout the distribution system and rotate through all sample sites several times per year or multiple times per month.

The required minimum number of samples, as detailed in the RTCR [40 CFR 141.851 et seq.], are based on the population served, and may not provide adequate coverage to assess water quality within the distribution system due to configuration and other system specific factors.

Sampling sites should be dispersed throughout the grid areas which target representative areas and areas with vulnerabilities. A successful monitoring strategy should take into consideration the following:

- a. Areas of the distribution system with different water ages
- b. Areas reflective of different water sources or areas where there is an interface between multiple sources of water
- c. Areas representing cross connection hazards
- d. Areas primarily sourced by finished water storage facilities
- e. Areas comprised of different water main materials (i.e. CLDIP or PVC)
- f. Areas representing low water flow conditions
- g. Areas representing low or no chlorine residuals
- h. Areas representing low water pressures
- i. Areas representing supplemental (booster) disinfection stations
- j. Areas representing water supply to critical/sensitive facilities (e.g. schools, daycares, hospitals)
- k. Areas reflecting varying population densities

Samples should not be collected from fire hydrants, faucets that point upward (i.e. drinking water fountains), faucets that are corroded or have leaking packing material, swivel-type faucets, single handle faucets, faucets that have threads on the inside of their spouts, faucets that contain aerators or screens (aerators or screens should be removed with care), faucets that are close to or below ground level, faucets that are dirty or surrounded by excessive foliage or taps that are dirty, corroded, or are leaking. Samples should not be collected from a hose or other attachment to a faucet.

Water systems cannot avoid areas of the distribution system for the simple reason of inaccessibility of customer taps. Dedicated sampling stations can be installed to obtain samples within areas where access to customer taps is very limited or non-existent.

Step 3: Specify the grid area (i.e. zone) each sampling site is located within

Label each grid area as Zone 1, Zone 2, etc. and specify the zone in which each sample site is located. Table 3 below can be used to list the sampling site locations and associated information. The sample collector, when completing the chain of custody, should identify the zone along with the specific address/location. The certified laboratory will then have to submit the result with the sample location beginning with the zone specification (i.e. Zone 1 99 Main Street). This will allow for trending data and triangulating problem areas in the distribution system.

TABLE 1: Recommended number of routine sample sites and sampling schedule for community and non-community systems conducting monthly monitoring.

| Population Served | Minimum Number of Routine Samples perMonth ¹ | Number of Routine Sample Sites ² | Schedule |
|--|---|---|---|
| 1 to 1,000 1,001 to 2,500 2,501 to 3,300 3,301 to 4,100 4,101 to 4,900 | 1 2 3 4 5 | Twice the number of sample sites as samples. <i>Example: a system that collects 2 samples should have 4 sample sites.</i> | Samples can be collected on the same day of each month if they are from different sites. ³ Sample locations should be alternated every month so that every location is sampled at least once every 2 months. |
| 4,901 to 5,800 5,801 to 6,700 5,701 to 7,600 7,601 to 8,500 8,501 to 12,900 | 6 7 8 9 10 | Same number of sample sites as number of samples to be collected. <i>Example: a system that collects 15 samples should have 15 sample sites.</i> | Sample twice a month at regular intervals. |
| 12,901 to 17,200 | 15 | | Sample three times a month at regular intervals. |
| 17,201 to 21,500 21,501 to 25,00 | 20 25 | | Samples collected should be evenly distributed throughout the month. |
| 25,001 to 33,000 | 30 | | |
| 33,301 to 41,000 41,001 to 50,000 | 40 50 | | |
| 50,001 to 59,000 59,001 to 70,000 70,001 to 83,000 83,001 to 96,000 | 60 70 80 90 | | |
| 96,001 to 130,000 130,001 to 220,000 220,001 to 320,000 320,001 to 450,000 | 100 120 150 180 | | |
| 450,001 to 600,000 600,001 to 780,000 780,001 to 970,000 970,001 to 1,230,000 | 210 240 270 300 | | |
| 1,230,001 to 1,520,000 1,520,001 to 1,850,000 1,850,001 to 2,270,000 2,270,001 to 3,020,000 | 330 360 390 420 | | |
| 3,020,001 to 3,960,000 3,960,001 or more | 450 480 | | |

¹This column indicates the minimum required number of samples required based on population served. If your system is planning on collecting more than the minimum required number of samples, please refer to recommendations that more accurately reflect the number of samples to be collected.

²Each distribution system has varying conditions; therefore, the number of routine sample sites should be influenced by the number of grid areas and other distribution system conditions.

³A community water system with less than 100 service connections that doesn't provide disinfection is required to collect 2 coliform samples per month at biweekly intervals.

TABLE 2: Recommended number of routine sample sites and sample schedule for non-community systems conducting quarterly monitoring.

| Population Served | Minimum Number of Routine Samples per Quarter | Number of Routine Sample Sites ¹ | Schedule |
|---|---|--|---|
| 25-1000 and serving one building or unit | 1 | 3 ² | Sample locations alternated every quarter so that every location is sampled at least once per year. |
| 25 – 1000 and serving multiple buildings or units (i.e. strip mall) | 1 | Same number as the number of buildings or units ³ | Alternate sample locations every quarter so that every location is sampled at least once per year. |

¹Each distribution system has varying conditions; therefore, the number of routine samples sites should be influenced by the number of grid areas and other distribution system conditions.

²The recommendation of three is based on the requirement that three routine samples are required the month following a TC+ result.

³A system with less than three buildings or units must still identify at least three routine sampling sites for the month following a TC+ result.

TABLE 3: List of TC Sample Sites

| Routine Sample Site | Zone Area | Justification | Sampling Schedule | Repeat Sample Sites |
|---------------------------------------|-----------|----------------------------|--|----------------------------------|
| Example: 20 Main Street –kitchen sink | Zone 1 | Low chlorine residual area | 2 nd and 4 th week of each month | 1. Original: 20 Main Street |
| | | | | 2. Upstream: 18 Main Street |
| | | | | 3. Downstream: 24 Main Street |
| | | | | 1. Original: |
| | | | | 2. Upstream: |
| | | | | 3. Downstream: |
| | | | | 1. Original: |
| | | | | 2. Upstream: |
| | | | | 3. Downstream: |
| | | | | 1. Original: |
| | | | | 2. Upstream: |
| | | | | 3. Downstream: |

Examples

1. System collecting 3 routine samples per month

System selects six routine sample sites (Site 1, 2, 3, 4, 5, and 6) and splits them into two groups: Group 1 consists of Site 1, 2, and 3; Group 2 consists of Site 4, 5, and 6. The system rotates which group will be sampled every other month.

| | | | |
|---------------------------|--------|--------|--------|
| January 15 th | Site 1 | Site 2 | Site 3 |
| February 15 th | Site 4 | Site 5 | Site 6 |
| March 15 th | Site 1 | Site 2 | Site 3 |
| April 15 th | Site 4 | Site 5 | Site 6 |

2. System collecting 7 routine samples per month

System selects seven routine sample sites (Site 1, 2, 3, etc.) and splits the sites into two approximate groups: Group 1: Site 1, 2, 3, and 4; Group 2: Site 5, 6, and 7. The system rotates which group will be sampled every other week.

| | | | | |
|--------------------------|--------|--------|--------|--------|
| January 5 th | Site 1 | Site 2 | Site 3 | Site 4 |
| January 12 th | Site 5 | Site 6 | Site 7 | |
| January 19 th | Site 1 | Site 2 | Site 3 | Site 4 |
| January 26 th | Site 5 | Site 6 | Site 7 | |

3. System collecting 15 routine samples per month

System selects 15 routine sample sites (Site 1, 2, 3, etc.) and splits the sites into three equal groups: Group 1: Sites 1 – 5; Group 2: Sites 6 – 10; Group 3: Sites 11 -15. The system rotates which group will be sampled at regular intervals within each month.

| | |
|------------------------|---------------|
| March 1 st | Sites 1 – 5 |
| March 14 th | Sites 6 – 10 |
| March 30 th | Sites 11 - 15 |

4. System collecting 20 routine samples per month

System selects 20 routine sample sites (Site 1, 2, 3, etc.) and splits the sites into four equal groups: Group 1: Sites 1 – 5; Group 2: Sites 6 – 10; Group 3: Sites 11 – 15; Group 4: Sites 16 – 20. The system rotates which group will be sampled each week of the month.

| | |
|--------------------------|---------------|
| January 5 th | Sites 1 – 5 |
| January 12 th | Sites 6 - 10 |
| January 19 th | Sites 11 -15 |
| January 26 th | Sites 16 - 20 |

5. System collecting 1 sample per quarter

System selects three routine sample sites (Site 1, 2, and 3) and rotates the site sampled each quarter.

| | |
|--------------------------|--------|
| January 15 th | Site 1 |
| April 15 th | Site 2 |
| July 15 th | Site 3 |
| October 15 th | Site 1 |