

Guidance for Developing a Coliform Sample Siting Plan

New Jersey Department of Environmental Protection: Division of Water Supply & Geoscience
January 2016

Regulatory Requirement

In accordance with 40 CFR 141.853, public water systems must develop a written sample siting plan that identifies sampling sites and a sample collection schedule that are representative of water throughout the distribution system. A sampling location may be at a customer's premise, dedicated sampling station, or other designated compliance sampling location. Coliform sample siting plans are to be maintained on-site and are subject to State review and revision. *This guidance document also addresses some Ground Water Rule requirements [40 CFR 141.400 et seq.].*

Objectives

Monitoring under the Revised Total Coliform Rule is designed to detect the presence of microbiological contamination due to potential compromises of source water quality, treatment effectiveness, and/or distribution system integrity based on the following considerations:

- 1) **Process Control:** Evaluate the effectiveness of disinfection treatment and ensure that all water system treatment and pumping components are not vulnerable to microbiological contamination.
- 2) **System Reliability:** Characterize 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 bio-films, 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

- **Routine Sample** – Revised Total Coliform Rule 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 in the distribution system.
- **Repeat Sample** – Revised Total Coliform Rule compliance samples that are required to be collected within 24 hours of notification of any routine total coliform positive sample in the distribution system.
- **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 total coliform positive.
- **Special Purpose Samples** – non-compliance samples taken to determine whether disinfection practices are sufficient following routine repairs (i.e. pipe replacement or repair) or completion of remedial action(s).
- **Elective Source Water Sample** – Additional source water samples collected to gauge “operational quality” from the groundwater source(s), as part of normal operating procedures.

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Elements of a Coliform Sample Siting Plan

- 1) Water System information:
 - a. System name
 - b. PWSID number
 - c. System type (GW, SW, GWUDISW, SWP, GWP)
 - d. List of water sources including their Safe Drinking Water Facility ID (i.e. WL001001, CC001001, etc.)
 - e. Contact information for the system owner/operator
 - f. Total number of service connections
 - g. Population served
 - h. Treatment plant(s) description including treatment processes & chemicals used
 - i. Storage tank type(s) and volume(s)
 - j. List of wholesaler(s) and bulk purchaser(s) and their contact information
 - k. Date plan was prepared (and revision date, if applicable)
 - l. Name/telephone number of the person who prepared/revised the plan
- 2) Distribution system map that labels the following water system components:
 - a. Layout of distribution mains
 - b. Water source(s)
 - c. Treatment plant(s) (including booster stations)
 - d. Storage tanks
 - e. Interconnections
 - f. Routine sampling sites
 - g. Repeat sampling sites
 - h. Blow offs/flushing points
 - i. Dead end mains and/or known trouble areas
 - j. Pressure zones
 - k. Maximum Residence Time sites and/or other areas of high water age

The distribution map may be stored as an electronic GIS map as long as it can be accessed and provided upon request.

- 3) Designate the minimum number of routine samples required, 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 total coliform positive sample [40 CFR 141.853(j)].
 - b. A Seasonal System is required to collect one sample per month that the system is in operation. Seasonal system is 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 remains pressurized during an off season but serves less than 25 persons, or depressurizes a portion of the system but continues to serve water to the public.

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- 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 total coliform 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 total coliform 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.
- 4) Designate the number of routine samples to be collected each monitoring period. If routine monitoring will involve 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)].
- a. A NCWS routinely sampling on a quarterly basis must also designate the number of routine samples, minimum of three required, to be collected the month following a total coliform positive sample.
- 5) List the locations of all the routine sampling sites to be utilized for compliance reporting. Include any addresses, site descriptions (i.e. kitchen sink, etc.), and justifications for choosing each sampling site.
- a. A NCWS routinely sampling on a quarterly basis, must also provide a list of three (3) routine sample sites to be utilized for sampling and reporting the month following a routine total coliform positive result.
 - b. 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 surface water and/or ground water under the direct influence of surface water point of entry to be utilized if the turbidity level of the source water exceeds 1 NTU.
- Refer to Appendix A for additional guidance on selecting sampling locations.
- 6) 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 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

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- 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 predicated on still having sufficient sampling locations to characterize the distribution system.

Refer to Appendix A for additional guidance on designating sampling frequency.

- 7) List the locations 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 total coliform positive) from the following locations:
 - i. one repeat sample from the sample tap where the original total coliform positive sample was taken
 - ii. one repeat sample at a tap within five service connections upstream of the original total coliform positive sample site
 - iii. one repeat sample at a tap within five service connections downstream of the original total coliform positive sample site

If a system proposes to use 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.

Effective April 1, 2016, the Division will no longer be accepting a repeat sample collected from the raw source water tap.

- b. If a NCWS is comprised of only one realty improvement (building) and has 2 or more routine total coliform positives during a monitoring period, then a minimum of 6 repeat samples are required to be collected in the distribution system.
- 8) 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 total coliform positive, the system shall comply with the repeat, treatment technique, and *E.coli* analytical requirements under the Revised Total Coliform Rule, as well as the triggered source water sampling and corrective actions under the Ground Water Rule.
- 9) 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 monitoring location(s) and frequency.

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- 10) Identify primary and alternate sample collector(s). Provide their name and title.
 - a. If a certified laboratory collects the microbiological samples, provide the name and contact information for the laboratory.
 - i. Explain how the laboratory is notified of the designated sampling sites and how the system is ensuring that laboratory is adhering to these sampling sites.
- 11) Establish sample container preparation and transport procedures
 - a. If a certified laboratory collects the microbiological samples, it is not necessary to address this item in the written plan.
 - b. Refer to the Office of Quality Assurance for standard procedures.
(<http://www.state.nj.us/dep/oqa/>)
- 12) Establish sample collection procedures
 - a. If a certified laboratory collects the microbiological samples, it is not necessary to address this item in the written plan.
 - b. Refer to the Office of Quality Assurance for standard procedures.
(<http://www.state.nj.us/dep/oqa/>)
- 13) Establish protocol for testing disinfectant residual at the same time and location of microbiological sample collection
 - a. If a certified laboratory collects the microbiological samples, explain how the laboratory is notified of items b – d below as they apply to your water system.
 - b. 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 total coliforms are 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.
 - c. Ground water systems must submit a chlorine residual reading for each triggered source water sample along with the microbiological result.
 - d. The Division encourages that the chlorine residual of the water supply be determined for all microbiological sample collected, regardless of whether or not 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. This recommendation applies regardless of whether or not the public water system has treatment to disinfect its water supply using chlorine.
- 14) Establish a plan of action when a ROUTINE total coliform positive occurs
 - a. If also *E.coli* positive, the Bureau of Safe Drinking Water (Bureau) must be notified by the end of the day 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 of your wholesale public water systems, within 24 hours from being notified of the total coliform positive result, in which water was purchased from within one week of the routine sample collection date, pursuant to the Ground Water Rule [40 CFR 141.402(a)(4)(i)].

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- c. Outline protocol to collect repeat samples within the distribution system within 24 hours of being notified of the routine total coliform positive result, pursuant to 40 CFR 141.858(a).
 - d. If the system has groundwater supply well(s), outline protocol to collect a triggered source water sample for each routine total coliform positive in the distribution system from a raw water sampling tap for each operational supply well(s) within 24 hours of being notified of the routine total coliform positive result, pursuant to the Ground Water Rule [40 CFR 141.402(a)(2)].
 - i. 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.*
http://www.statenj.us/dep/watersupply/pdf/gwr_source_tap_install.pdf
 - ii. Operational supply well refers to any well that was in use within one week from the collection date of the routine total coliform positive sample.
 - iii. If the system has a certification of 4-log virus treatment from the Division, triggered source water monitoring is not required for the supply wells that are treated by the 4-log certified virus treatment.
 - e. NCWS routinely sampling quarterly, must also outline protocol to collect a minimum of three routine total coliform 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 total coliform positive occurs
- a. Notify the Bureau (or DEP Hotline during off business hours) by the end of the day when the system is notified of an *E.coli* MCL violation [40 CFR 141.861(a)(1)]. The following scenarios represent an *E.coli* MCL violation [40 CFR 141.860(a)]:
 - i. A routine sample is total coliform and *E.coli* positive and is followed by a repeat sample that is total coliform positive or both total coliform and *E.coli* positive. *This scenario requires a Tier 1 public notice and requires a Boil Water/Do Not Drink Advisory.*
 - ii. A routine sample is total coliform positive and *E. coli* negative and is followed by a repeat sample that is total coliform positive and *E.coli* positive. *This scenario requires a Tier 1 public notice and requires a Boil Water/Do Not Drink Advisory.*
 - iii. A routine sample is total coliform positive and *E.coli* positive and no required repeat samples were collected. *This scenario requires a Tier 1 public notice and requires a Boil Water/Do Not Drink Advisory.*
 - iv. A repeat sample is total coliform positive, but not tested for *E.coli*. *This scenario requires a Tier 1 public notice and requires a Boil Water/Do Not Drink Advisory.*
 - v. Repeat samples are collected more than 24 hours after being notified of the positive routine results. *This scenario requires a Tier 1 public notice and may require a Boil Water/Do Not Drink Advisory.*
 - vi. A routine sample is total coliform positive or both total coliform positive 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 notice and may require a Boil Water/Do Not Drink Advisory.*
 - 1. 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.

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- b. 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 total coliform positive.
 - ii. Systems collecting fewer than 40 samples per month, two or more samples collected are total coliform positive.
 - iii. A routine sample is total coliform positive and *E.coli* negative, and all required repeat samples are not collected.
- c. Conduct a Level 1 or Level 2 assessment and submit the completed assessment report to the Bureau of Water System Engineering within 30 days from being notified of the *E.coli* MCL violation and/or treatment technique trigger for coliforms.

The following scenarios require a Level 1 assessment:

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

The following scenarios require a Level 2 assessment:

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

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 total coliform positive samples and also trigger a separate Level 1 treatment technique with failure to collect all required repeat samples for a routine total coliform positive, *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 notice 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)].
 - b. Implement Tier 1 public notification requirements within 24 hours [40 CFR 141.402(g)] that includes a Boil Water/Do Not Drink Advisory.
 - c. Collect five additional source water samples (from raw water sample tap) within 24 hours from notification of the *E.coli* positive result [40 CFR 141.402(a)(3)].
 - i. 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)].

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- 17) Establish a plan of action when your system incurs a treatment technique violation.
 - a. Notify the Bureau by the end of the next business day when the system learns of the 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 a State approved start up procedure prior to serving water to the public.
 - b. Implement Tier 2 public notification requirements.
- 18) 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 24 hours after the system learns of the *E.coli* positive result. Be sure to specify notification is for an elective source water sample.
- 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 total coliform positive routine sample.
 - b. Implement Tier 3 public notice [40 CFR 141.204].
 - c. Ensure collection of required number of routine samples and analysis of *E.coli*, if required, in subsequent monitoring periods.

The Revised Total Coliform Rule identifies Monitoring violations and Reporting violations separately and are therefore two different violation types.

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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

Additional Guidance Documents

- Revised Total Coliform Rule Revisions:
http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/regulation_revisions.cfm
- Revised Total Coliform Quick Reference Guide:
<http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/upload/epa815b13001.pdf>
- Revised Total Coliform Rule Assessments and Corrective Actions Guidance Manual, Interim Final: <http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/upload/epa815r14006.pdf>
- EPA's A Review of Distribution System Monitoring Strategies under the Total Coliform Rule
http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/issuepaper_tcr_monitoring.pdf
- Revised Public Notification Handbook for Community and Non-Transient Non-Community Water Systems:
http://www.epa.gov/ogwdw000/publicnotification/pdfs/guide_publicnotification_pnhandbook.pdf
- Revised Public Notification Handbook for Transient Non-Community Water Systems:
<http://www.epa.gov/ogwdw000/publicnotification/pdfs/Public-Notification-Handbook-for-Transient-Noncommunity-Water%20Systems.pdf>
- Ground Water Rule: A Quick Reference Guide:
http://water.epa.gov/lawsregs/rulesregs/sdwa/gwr/upload/grg_gwr.pdf
- Ground Water Rule Corrective Actions Guidance Manual
http://www.epa.gov/safewater/disinfection/gwr/pdfs/guide_gwr_correctiveaction.pdf
- Consecutive System Guide for the Ground Water Rule
<http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=60000IQC.txt>
- Basic Information about Pathogens and Indicators in Drinking Water
<http://water.epa.gov/drink/contaminants/basicinformation/pathogens.cfm>
- Drinking Water Distribution Systems
<http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/distributionsystems.cfm>

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APPENDIX A

REVISED TOTAL COLIFORM RULE SAMPLING STRATEGY GUIDANCE

Objective

The Division of Water Supply and Geoscience (Division) developed the following total coliform 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) Water source(s)
- 2) Treatment plant(s) (including booster stations)
- 3) Storage tanks
- 4) Interconnections
- 5) Pressure zones
- 6) Population
- 7) Water main size, age, etc.
- 8) Topography

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 (as identified in item 4 of Guidance for Developing a Coliform Sample Siting Plan) and determine the number of sites the system will utilize 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 number of routine sample sites to be utilized.
- 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 utilized.

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 Revised Total Coliform Rule [40 CFR 141.851 et seq.], are based on population served and may not provide adequate coverage to assess water quality within the distribution system due to configuration and other system specific factors.

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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, 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.

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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 per Month 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 as long as 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 25,000	20 25		Half the number of samples. <i>Example: a system that collects 240 samples should have at least 120 sample sites.</i>
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.

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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	Sample locations alternated ever 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 total coliform positive result.

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

TABLE 3: List of Total Coliform 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:

Guidance for Developing a Coliform Sample Siting Plan

New Jersey Department of Environmental Protection: Division of Water Supply & Geoscience
January 2016

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