

**New Jersey Department of Environmental Protection**  
**Division of Water Supply & Geoscience**  
FINAL VERSION 1.13.12; Revised 12.26.13

## Guidance for Developing a Coliform Sample Siting Plan

### Regulatory Requirement

In accordance with 40 CFR 141.21(a), public water systems must collect routine coliform samples at sites that are representative of water throughout the distribution system according to a written sample siting plan. Sampling locations should be designated at end users taps which are representative of service connections within the distribution system. On a case-by-case basis, the Division of Water Supply & Geoscience (Division) will evaluate and approve, if appropriate, the use of dedicated sampling stations. 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 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** – 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** - 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.

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- **Special Samples** – non compliance samples collected to help identify the extent of the contamination and/or to determine the effectiveness of a remedial action.

Content: Coliform Sample Siting Plan

1) Water System information:

- a. System name
- b. PWSID number
- c. System type (GW, SW, GWUDISW)
- d. List of water sources including their Safe Drinking Water Facility ID (i.e. WL001001, TP001002, 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. Blow offs/flushing points
- h. Dead end mains and/or known trouble areas
- i. Pressure zones
- j. Maximum Residence Time sites and/or other areas of high water age

3) Designate the minimum number of routine samples required per monitoring period based on the population served in accordance with 40 CFR 141.21(a)(2) and (a)(3).

- a. In accordance with N.J.A.C. 7:10-4.1(b), Community Water Systems (CWS) with less than 100 service connections and which do not provide disinfection are required to collect two coliform samples per month at bi-weekly intervals.

4) Designate the number of routine samples to be collected each monitoring period. If routine monitoring will involve more than the minimum number of

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samples to be collected, the written plan must specify under what conditions this occurs.

- a. Systems collecting at least 40 routine samples per month that also collect additional routine samples due to total coliform positive detections in the distribution system must detail their sampling strategy within their Coliform Sample Siting Plan for it to be acceptable.
- 5) Designate the frequency of sample collection at each sample site per monitoring period and provide a sample collection schedule. Sample collection can be established one of three ways:
- a. Designate the same number of sampling locations as required to meet the number of samples required 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;
  - c. Designate fewer sites than required and collect samples more frequently than once per month. However, this option is predicated on still having sufficient samples to characterize the distribution system as specified in item 6 below.

**Note:** *In accordance with 40 CFR 141.21(a)(4), water systems are expected to collect samples at regular time intervals throughout the month. Ground water only systems (except ground water under the direct influence of surface water) serving 4,900 persons or fewer may collect all required routine samples on a single day if they are taken from different sites.*

- 6) Provide a list of the routine sample sites to be utilized for reporting. Also include any addresses, site description (i.e. kitchen sink, bathroom sink, etc), and justification for choosing the sampling site. Appropriate sampling sites within the distribution network should characterize 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

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**Note:** *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.*

- 7) If the system collects less than 5 routine samples per monitoring period, provide a list of routine sample sites to be utilized for sampling and reporting the month following a routine total coliform positive result. Include any addresses, site description (i.e. kitchen sink, bathroom sink, etc.), and justification for choosing the sampling site. The routine sample sites designated under item 6 above must be included in this sampling.
- 8) 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.
- 9) 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. Standard procedures include, but are not limited to, the following:
    - i. Sample containers must be sterilized plastic or non-corrosive glass bottles or plastic bags with a capacity of at least 120 mL to allow at least a 1-inch head space. (Refer to EPA Lab Certification Manual, Fifth Edition, Jan 2005);
    - ii. 0.008% sodium thiosulfate added to sample container to neutralize any residual chlorine in the water sample.
    - iii. The sample container should be capped and sterilized by dry or moist heat. Presterilized plastic bags or bottles containing sodium thiosulfate are available commercially.
    - iv. The standard sample volume for total coliform analyses, regardless of approved analytical method used, is 100 ml  $\pm$  2.5ml;
    - v. Preserve sample by cooling to less than 10 degrees Celsius;

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- vi. The maximum holding time is 30 hours. To more effectively address public health concerns, samples should be analyzed as soon as possible upon receipt by the testing laboratory.

10) 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. Standard procedures include, but are not limited to, the following:
  - i. Prep the cold water sample tap by swabbing the tap with a chlorine solution or alcohol, or by flaming the tap (appropriate for metal taps only).
  - ii. Flush the prepped cold water tap long enough to obtain a representative sample, approximately 4 - 5 minutes of running time is necessary to replace the water in a typical service line (50 feet of  $\frac{3}{4}$  inch service line), and to ensure that any residual chlorine solution or alcohol is rinsed away from the tap before the actual sample is collected. A flushed sample is representative of the water flowing from the water main versus water that has only been in contact with interior plumbing materials, i.e. first draw sample;
  - iii. Adjust the flow rate to the width of a pencil and maintain a steady flow during sample collection;
  - iv. Determine and record the residual disinfectant level before collecting the microbiological sample
  - v. Wear latex gloves and avoid touching the cap or rim of the sample bottle;
  - vi. Ensure that the sample container does not touch the faucet;
  - vii. Collect a flushed sample from the prepped cold water tap;
  - viii. Refrigerate or place samples on ice immediately after sample collection;
  - ix. Retain completed chain of custody record for all samples collected.

11) 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).

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- 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 triggered source water sample along with the microbiological result.
- d. The Division encourages that the chlorine residual of the water supply be determined for any microbiological sample collected. 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 expectation applies regardless of whether or not the public water system has treatment to disinfect its water supply using chlorine.

12) Establish a plan of action when a ROUTINE total coliform positive occurs

- a. If also E. coli or fecal positive notify the Bureau of Safe Drinking Water (Bureau) by the end of the day when the system is notified of the test result, or by the end of the next business day if the Bureau's office hours have been closed for the day (40 CFR 141.21(e)(1)).
- 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 two weeks of the routine sample collection date, pursuant to the Ground Water Rule (40 CFR 141.402(a)(4)(i)).
- 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 141.21(b):
  - i. A system which collects more than one routine sample per monitoring period must collect no fewer than three repeat samples for each total coliform positive sample
  - ii. A system which collects one routine sample per monitoring period must collect no fewer than four repeat samples for each total coliform positive sample
  - iii. Repeat sample locations are required as follows:
    - 1. original sample site that tested total coliform positive
    - 2. sample site within 5 service connections upstream
    - 3. sample site within 5 service connections downstream
    - 4. If a fourth repeat sample is required, it shall be collected from any other appropriate tap location (see item 6 above)

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- iv. If a water system 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.
    - 1. Under these circumstances, the Division will not allow a Triggered Source Water sample collected under the Ground Water Rule to satisfy compliance with Total Coliform Rule.
  - 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.
    - 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. Outline protocol to collect a minimum of 5 routine total coliform samples during the next month water is provided to the public (40 CFR 141.21(b)(5)).
- 13) Establish a plan of action when triggered source water sample is E.coli positive as required within 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. 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)).
  - c. Implement Tier 1 public notification requirements within 24 hours (40 CFR 141.402(g)) that includes a Boil Water/Do Not Drink Advisory

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- 14) Establish a plan of action when a REPEAT total coliform positive occurs
- a. Consult with the Bureau within 24 hours after the becoming aware of the violation, pursuant to 40 CFR 141.203(b)(2). Consultation during off business hours should be directed to the Water Compliance and Enforcement duty officer through the DEP Hotline. Notify the DEP Hotline via telephone as soon as becoming aware of an **Acute** coliform violation. The following scenarios represent an Acute microbiological violation:
    - i. A routine sample is total coliform and fecal/E.coli positive and is followed by a repeat sample that is total coliform positive or both total coliform and fecal/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 is followed by a repeat sample that is total coliform positive and fecal/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 or total coliform positive and fecal/E.coli positive and no repeat sample were collected. This scenario requires a Tier 1 public notice and requires a Boil Water/Do Not Drink Advisory.
    - iv. A routine sample is total coliform positive or total coliform positive and fecal/E.coli positive and the repeat samples are collected late. This scenario requires a Tier 1 public notice and may require a Boil Water/Do Not Drink Advisory.
    - v. A routine sample is total coliform positive or total coliform positive and fecal/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 and Reporting violations will be issued if the system conducts remedial actions prior to repeat sample and triggered source water sample collection.
  - b. Notify the Bureau via telephone within 48 hours of becoming aware of a **Non-Acute** coliform violation, pursuant to N.J.A.C. 7:10-5.4(c). The following scenarios represent a Non-Acute microbiological violation:



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- i. Systems that collect less than 40 samples per month have more than one routine/repeat total coliform positive result. Tier 2 public notification is required.
    - ii. Systems that collect 40 or more samples per month, more than 5% of the samples are total coliform positive. Tier 2 public notification is required.
  - c. Implementation of corrective actions to remediate the contamination
    - i. Recommended to consult with Bureau of Water System Engineering prior to implementing corrective actions.
- 15) Establish a plan of action when your system fails to collect the required number of routine and/or repeat samples for a monitoring period
  - a. Public notification requirement – Tier 3 within 365 days (40 CFR 141.204)
  - b. Ensure collection of required number of routine and repeat samples in subsequent monitoring periods

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

- Total Coliform Rule: Quick Reference Guide:  
[http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/qrq\\_tcr\\_v10.pdf](http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/qrq_tcr_v10.pdf)
- Total Coliform Rule: A Handbook for Small Non- Community Water Systems serving Less than 3,330 persons:  
[http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/stepguide\\_tcr\\_smallsys-300.pdf](http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/stepguide_tcr_smallsys-300.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](http://www.epa.gov/ogwdw000/publicnotification/pdfs/guide_publicnotification_pnhandbook.pdf)
- Revised Public Notification Handbook for Transient Non-Community Water Systems:

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- <http://www.epa.gov/ogwdw000/publicnotification/pdfs/Public-Notification-Handbook-for-Transient-Noncommunity-Water%20Systems.pdf>
- A Small Systems Guide to the Total Coliform Rule:  
<http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/small-tcr.pdf>
  - Ground Water Rule: A Quick Reference Guide:  
[http://water.epa.gov/lawsregs/rulesregs/sdwa/gwr/upload/grg\\_gwr.pdf](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](http://www.epa.gov/safewater/disinfection/gwr/pdfs/guide_gwr_correctiveaction.pdf)
  - EPA's A Review of Distribution System Monitoring Strategies under the Total Coliform Rule  
<http://www.waterawards.in/suggested-reading/monitoring-distribution-protocol.pdf>