



**Guidance on Total Coliform Bacteria Monitoring
for Small Public Water Systems (Population Less
Than 3,301 Persons)**

Division: DDAGW
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I. PURPOSE:

The purpose of this guidance is to explain the total coliform monitoring requirements found in rules 3745-81-14 and 3745-81-21 of the Ohio Administrative Code and assist small public water systems in their compliance with these requirements.

II. BACKGROUND:

Pursuant to rules 3745-81-14 and 3745-81-21 of the Ohio Administrative Code all public water systems are required to monitor for total coliform bacteria by collecting samples throughout the distribution system according to a written sample siting plan. This guidance along with the development of a written sample siting plan prepares systems to collect total coliform bacteria samples according to proper sample collection methods, take repeat samples when necessary, and makes them aware of the associated public notice requirements.

III. GUIDANCE:

The attached guidance is intended to be provided to systems during sanitary surveys or at any other time when it is discovered that a sample siting plan has not been drafted and/or a system is having difficulties complying with total coliform monitoring requirements.

IV. ATTACHMENTS:

- A. Collection of Drinking Water Samples for Total Coliform Bacteria Analysis
- B. Sample Siting Plan Template for Total Coliform Monitoring by Small Public Water Systems (< 3,301)
- C. Flowchart: Interpretation of Total Coliform Bacteria Results
- D. Disinfection of Public Water System Wells

V. HISTORY:

The Division of Drinking and Ground Waters issued the initial Sample Siting Plan Guidance on June 1, 1998. The guidance was revised on July 13, 1999 to incorporate rule changes requiring fewer repeat samples and different criteria for acute violation public noticing and on August 17, 1999 to incorporate comments received from DDAGW staff. The guidance was revised again on February 7, 2005 to incorporate new public notice requirements and expanded to include all total coliform monitoring requirements. Minor revisions were made following comments from U.S. EPA on October 14, 2005. The guidance has been updated to reflect amended total coliform rules and reissued on June 16, 2011.

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**Guidance on Total Coliform Bacteria Monitoring for Small Public Water Systems
(Population Less Than 3,301 Persons)**

Purpose

This document provides plain language information on the total coliform bacteria monitoring requirements contained in Ohio Administrative Code rules 3745-81-14 and 3745-81-21. It does not replace the rules, but is intended to provide guidance for small public water systems.

Section

Page No.

1. Frequently Used Terms	4
2. Routine Monitoring	5
3. Repeat Monitoring	7
4. Sampling the Month Following a Total Coliform Positive Sample	8
5. Laboratory Invalidation of Sample Results	9
6. Public Notification Instructions	9
7. Identification and Elimination of Contamination	10
8. Contact Information	12

Appendices

Page No.

A. Collection of Drinking Water Samples for Total Coliform Analysis	13
B. Sample Siting Plan for Small Public Water Systems	17
C. Flowchart: Interpretation of Total Coliform Bacteria Results	25
D. Disinfection of Public Water System Wells	28

SECTION 1: FREQUENTLY USED TERMS

Chemical monitoring schedule - schedule provided to each public water system annually detailing sampling requirements for chemical contaminants.

Ground water under the direct influence of surface water (GWUDI) - a ground water source that has been designated as being under the direct influence of surface water due to concerns about the well isolation, well construction, and/or bacterial contamination.

Maximum Contaminant Level (MCL) - the highest allowable level of a contaminant in public drinking water.

Acute MCL violation - violation when total coliform bacteria is found in a routine sample and at least one repeat sample and fecal coliform or *E. coli* is also found in any of these samples. The violation is considered acute because the contaminant can cause an immediate risk to health.

Monthly MCL violation - violation when total coliform is present in two or more samples during any month for public water systems that monitor with fewer than 40 samples per month.

Public water system (PWS) - a system which provides water for human consumption through pipes or other constructed conveyances, if the system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year, or if the system serves an agricultural labor camp.

Community water system (CWS) - a PWS which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. *Examples: cities, mobile home parks, nursing homes*

Nontransient noncommunity water system (NTNC) - a PWS that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year. *Examples: schools, businesses*

Transient noncommunity water system (TNC) - a PWS that is not a community water system and that serves at least 25 different persons over 60 days of the year. *Examples: campgrounds, gas stations*

Total coliform bacteria - a group of microscopic organisms, commonly found in the environment, which are also present in the waste of humans and animals. The presence of coliform bacteria may indicate contamination by a number of disease-causing bacteria, viruses or protozoa.

Total coliform positive sample - total coliform bacteria were found to be present in the sample.

Total coliform negative sample - total coliform bacteria were not found to be present in the sample.

Total coliform routine sample - sample required at regular intervals to test for microbiological contamination in public drinking water.

Total coliform repeat sample - sample taken following a total coliform positive routine sample to

confirm presence of microbiological contamination.

Water use and/or boil advisory - warning issued to consumers to boil water or use an alternative water source due to contamination of the public water supply. The appropriate advisory is determined in conjunction with the district office representative.

SECTION 2: ROUTINE MONITORING

Required Frequency

All public water systems are required by Ohio Administrative Code (OAC) rule 3745-81-21 to monitor for total coliform bacteria on a regular basis. As shown in the table below, the number of routine samples required depends on the type of system, source of water, and population served. Samples should be collected according to the instructions found in Appendix A.

The frequency of total coliform monitoring may be increased based on the results of a sanitary survey. The increased monitoring frequency may then be reduced following subsequent sanitary surveys, but will not be less than the minimum frequency listed in

Table 1.

Table 1. Public Water System Routine Monitoring Frequencies for Total Coliform Bacteria

Source of Water	Population Served	Public Water System Type	Minimum Frequency ¹
Surface water or GWUDI ²	Less than 3,301	All system types	4 times per month
Ground water or purchased water	Less than 1,001	Community	1 sample per month
		Transient noncommunity and nontransient noncommunity	1 sample per calendar quarter
	1,001 to 2,500	All system types	2 samples per month
	2,501 to 3,300	All system types	3 samples per month

(1) For seasonal systems, required when system provides water. See explanation on next page.

(2) GWUDI: Ground Water Under the Direct Influence of Surface Water



Special Note

Triggered Source Water Monitoring (TSWM) for Ground Water Systems

Ground water systems, as defined in 3745-81-01 of the OAC may be required to conduct TSWM as determined by Ohio EPA. TSWM may be required if the following conditions exist: the system does not provide at least 4-log treatment of viruses as approved by the director, and is notified that a routine total coliform sample is positive that has not been invalidated.

For more information on whether this requirement may apply to your public water system, please see rule 3745-81-42 of the OAC or contact your Ohio EPA district office.

Seasonal Systems

- Seasonal public water systems must notify their Ohio EPA district office of the operating season of the facility.
- Public water systems are required to monitor during every monitoring period, or partial monitoring period, that the system is “open.” This includes the “off” season if the water system is still providing water to any user, such as a caretaker.
- The only time monitoring is not required in a monitoring period is if the system is completely depressurized during the entire monitoring period.
- Seasonal systems should use a start-up and shut-down procedure for each operating period (e.g., semi-annually or annually). Contact your Ohio EPA district office or visit <http://epa.ohio.gov/ddagw> for a copy of this procedure.

Example: If a public water system that is monitoring quarterly is open from May 15 to September 15, the system must sample in the April to June and July to September calendar quarters, but does not need to sample in the January to March or October to December quarters.

Sample Siting Plan

All public water systems are required by Ohio Administrative Code rule 3745-81-21 to prepare and maintain a written sample siting plan for the collection of total coliform bacteria samples at sites which are representative of water throughout the distribution system. The plan should identify routine and repeat sampling locations. The sample siting plan should be kept up to date and maintained at your facility where it can be easily reached by people responsible for collecting samples. A sample siting plan template is located in Appendix B.

Chlorine Monitoring

Community and nontransient noncommunity public water systems that add chlorine or chloramines as a disinfectant must also measure chlorine residual levels (total chlorine) at the time and location that routine and repeat total coliform bacteria samples are collected. Tips on how to do this are provided in the sample siting plan template located in Appendix B.

What happens if... (see Appendix C)

The routine sample result(s) is total coliform negative?

- Continue taking the next required routine sample

The routine sample(s) is not collected?

- Your system has a monitoring violation
- Issue Tier 3 public notification, as instructed in Section 6

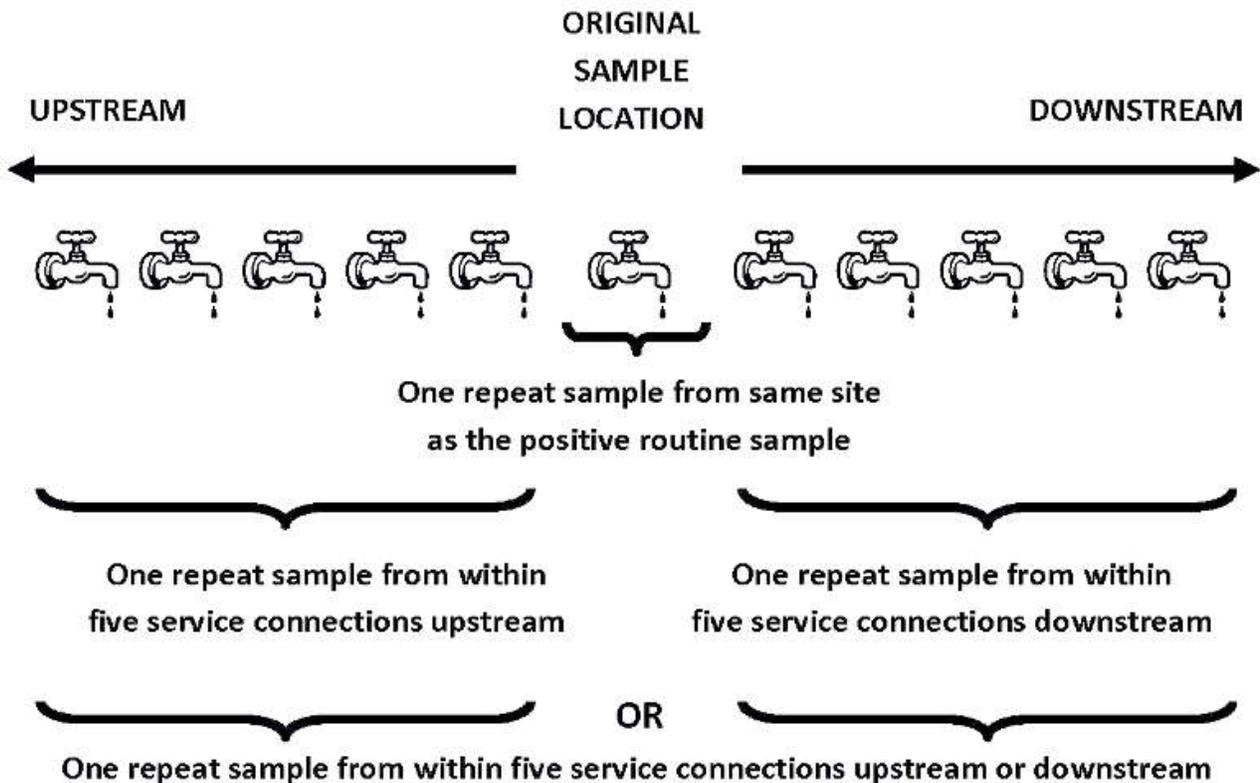
The routine sample result(s) is total coliform positive?

- Collect a set of 4 repeat samples within 24 hours, as described in Section 3
- Contact your district office if you have any questions
- Collect at least 5 routine total coliform samples in the following month as described in Section 4.
- Additional sampling may be required under the Ground Water Rule. Contact your local district office for more information.

SECTION 3: REPEAT MONITORING

Public water systems are required by Ohio Administrative Code rule 3745-81-21 to collect a set of **4 repeat samples for each routine total coliform positive sample**. The public water system must collect the repeat samples within 24 hours following notification of the total coliform positive sample by the laboratory or Ohio EPA. The repeat samples must be collected at the original total coliform positive routine sampling location and 3 additional sampling locations as described below. All 4 repeat samples must be collected on the same day. If there are fewer than 4 available faucets, the 4 repeat samples should be collected from all available faucets at a minimum of **5 minute intervals with the water running continuously between samples**. Your sample siting plan should be used to identify faucets for repeat samples. The samples should be clearly labeled as “repeat” and the sample number of the original routine total coliform positive sample should be noted on the sample submission report.

LOCATION OF 4 REPEAT SAMPLES



What happens if... (see Appendix C)

All repeat sample results are total coliform negative?

- Collect at least 5 routine total coliform samples the following month as instructed in Section 4

All repeat sample(s) are not collected on time?

- Contact your district office representative within 24 hours
- Your system has a monitoring violation
- Issue Tier 1 public notification, including a water use and/or boil advisory, until a set of 4 repeat samples are total coliform negative, as instructed in Section 6
- Conduct an investigation to determine the source of contamination, as instructed in Section 7
- Eliminate the source of contamination and disinfect, as instructed in Section 7
- Collect at least 5 routine samples the following month as instructed in Section 4

One or more repeats are total coliform positive?

If all results are E. coli and fecal coliform negative:

- Your system has a monthly MCL violation
- Conduct an investigation to determine the source of contamination, eliminate the source of contamination, and disinfect (per Section 7)
- Collect at least 5 routine samples the following month as instructed in Section 4

If any routine or repeat is E. coli or fecal coliform positive:

- Contact your district office representative within 24 hours
- Your system has an acute MCL violation
- Issue Tier 1 public notification, including a water use and/or boil advisory, until a set of 4 repeats are total coliform negative, as instructed in Section 6
- Conduct an investigation to determine the source of contamination, eliminate the source of contamination, and disinfect (per Section 7)
- Collect at least 5 routine samples the following month as instructed in Section 4

SECTION 4: SAMPLING THE MONTH FOLLOWING A TOTAL COLIFORM POSITIVE SAMPLE

Public water systems are required by Ohio Administrative Code rule 3745-81-21 to collect **at least 5 routine samples** the month following a total coliform positive sample. (Repeat samples do not count towards the requirement to collect five routine samples.) Samples should be collected at locations identified earlier in Section 2. It is recommended that the 5 samples be collected on different days of the month.



What happens if... (see Appendix C)

All 5 sample results are total coliform negative?

- Return to routine monitoring

1 or more of the 5 samples is not collected?

- Your system has a monitoring violation
- Issue Tier 3 public notification, as instructed in Section 6
- Return to routine monitoring

1 or more of the 5 sample results are total coliform positive?

- Collect 4 repeat samples for each total coliform positive sample as described in Section 3
- Contact your district office representative if you have questions
- Conduct an investigation to determine the source of contamination, eliminate source of contamination, and disinfect (per Section 7)
- Collect at least 5 routine samples the following month as instructed in Section 4



SECTION 5: LABORATORY INVALIDATION OF SAMPLE RESULTS

If a **routine or repeat** sample is analyzed by a membrane filter technique and produces a high background count (HBC) or confluent growth, and further analysis indicates that total coliforms are not present, the sample is considered invalid and replacement samples (1 for routine samples, a set of 4 for repeat samples) must be collected within 24 hours from the time the public water system is notified, as required by Ohio Administrative Code rule 3745-81-21.

SECTION 6: PUBLIC NOTIFICATION INSTRUCTIONS

Public water systems are required by Ohio Administrative Code rule 3745-81-32 to notify the public if they exceed the MCL or fail to monitor for total coliform. If Tier 1 public notification is required, the public water system must contact the Ohio EPA district office and issue notification no later than 24 hours after being notified of the violation. If Tier 2 or Tier 3 public notification is required, Ohio EPA will send a letter that contains the appropriate public notice, instructions on how to issue the notice, and a verification form. Send a copy of the public notice issued and the completed verification form to your Ohio EPA district office representative as soon as the public notification period has ended.

Tier 1 Public Notice: Acute MCL Violations

- Issue public notice (including a water use and/or boil water advisory) and consult with your district office for additional instructions as soon as possible, but no later than 24 hours after being notified of the violation. Consultation with the district office is recommended prior to issuing public notice, but in no case should the public notice be issued later than 24 hours after being notified of the violation.

- Use one or more of the following methods to reach all persons served, as established during consultation:
 - ❖ Radio and television (appropriate for community systems)
 - ❖ Continuous posting (appropriate for noncommunity systems)
 - ❖ Hand delivery
 - ❖ Another method with the approval from your Ohio EPA district office
- The public notice cannot be lifted until a set of 4 repeat samples are total coliform negative

Tier 2 Public Notice: Monthly MCL Violations

- Issue as soon as practical, but no later than 30 days after notification of the violation
- Community public water systems use mail or other direct delivery
- Noncommunity public water systems use continuous posting, mail or other direct delivery
- If posted, notices must remain in place as long as the violation or situation exists, but at least for 7 days

Tier 3 Public Notice: Monitoring Violations

- Community public water systems issue as soon as practical, but no later than 1 year after notification of the violation
- Community public water systems use mail or other direct delivery
- Noncommunity public water systems issue as soon as practical, but no later than 30 days after notification of the violation
- Noncommunity public water systems use continuous posting, mail or other direct delivery
- If posted, notices must remain in place as long as the violation or situation exists, but as least for 7 days

SECTION 7: IDENTIFICATION AND ELIMINATION OF CONTAMINATION

Public water systems are required by Ohio Administrative Code rule 3745-81-14 to determine and eliminate the source of contamination following any total coliform MCL violation. Repeat and special purpose samples should be used to help identify the source of contamination. Special purpose samples may be used to investigate the source of contamination or to verify the problem has been resolved, but will not be used to determine compliance with total coliform monitoring or MCL requirements. During an investigation, you do not need to collect any more repeat samples *solely* in response to the total coliform positive **repeat** sample results you just received. However, all remaining **routine** monitoring must be conducted for each monitoring period, and repeat samples must be taken for each total coliform positive routine sample.

IMPORTANT NOTE

A Tier 1 public notice cannot be lifted until a set of 4 repeat samples is total coliform negative.

The cause of the coliform contamination could be in the water source, the treatment process, the sample collection procedure, or in the distribution system. Systems should consult with their Ohio EPA district office representative on any measures taken to identify and eliminate the source of contamination. In addition, any corrective actions or measures taken by the drinking water system prior to or after repeat testing should be noted.

Some tips for investigating total coliform bacteria contamination are provided below. This is not an exhaustive list and does not replace consultation with your Ohio EPA district office representative. Additionally, information on disinfecting a well can be found in Appendix D.

Tips for Investigating Total Coliform Bacteria Contamination

1. Check sample tap for cleanliness and confirm correct sample collection procedure was used.
2. Check the well for possible sources of contamination, including:
 - Ensure that water drains away from the well casing.
 - Look inside the casing.
 - Determine if any fluid is seeping into the well. This may indicate a crack in the casing. This can be determined by looking inside the well with a flashlight, a down-hole camera, or by using a mirror on sunny days. You may hear fluid seeping into the well.
 - Make sure the well cap is securely closed and vermin-proof.
 - Check the pit-less adaptor to ensure it is connected properly and securely.
3. Check the area surrounding the well to determine if septic systems, surface bodies of water, or other sources of contamination have encroached on the well's isolation radius.
4. Make sure there are no leaks in the line between the well and the treatment system.
5. Check for holes in the pressure tank bladder.
6. Make sure the treatment equipment is properly maintained, and if work has recently been done on the system; ensure that proper disinfection followed to minimize the introduction of bacteria into the system.
7. Ensure that backflow prevention devices are tested and maintained.
8. Look for areas where fluid could be siphoned back into the system (i.e. hoses connected to the tank and dropped into a sump, etc.).
9. Collect investigatory water samples from appropriate locations to isolate where contamination may be entering the system (i.e. directly from the well, from the tank, after the softener, after a treatment unit and so forth, depending on the system.)
10. If no possible sources of contamination are revealed, consider hiring a well driller to inspect the well with a down-hole camera and/or a plumber to inspect the distribution system to identify any deficiencies.
11. Consult with your Ohio EPA district office representative and take corrective measures to eliminate the source of contamination.

Appendix A
*Collection of Drinking Water Samples
for Total Coliform Bacteria Analysis*

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The following is the approved procedure for the collection of drinking water samples for analysis of total coliform, as detailed in the methods approved in Ohio Administrative Code rule 3745-81-27. The following procedure should be followed **in detail** to ensure a valid laboratory analysis.

- 1) Select the sampling tap.
 - a) A tap, such as faucet or small valve, is preferable. Do not sample from hoses or drinking water fountains.
 - b) Avoid taps with a leak at the stem or taps with a swivel joint.
 - c) Aerated or screened nozzles may harbor bacteria. The aerator or screen must be removed before collection of the sample.
 - d) Place all carbon filters, sediment filters and water softeners on bypass unless operated by the public water system.
 - e) Sanitize the nozzle of the tap with a chlorine solution.
 - i) Use a 6% sodium hypochlorite solution, such as household liquid bleach. **Do not use chlorine solutions with special scents.** To prepare a sanitizing solution, add one ounce of bleach to one gallon of water (or 1 tablespoon per half-gallon). Store the mixed solution in a tightly closed screw-capped container. The solution should be discarded and remade 6 months after preparation. Stronger solutions can be used; however, some faucet discoloration may result.
 - ii) Flush the sample tap to waste for 1 minute. Close the valve.
 - iii) Apply the sanitizing solution prepared in step (i) above to the nozzle. This can be accomplished by either using a spray bottle or a plastic bag.
 - (1) Using a spray bottle, saturate the tap opening with sanitizing solution then wait at least 2 minutes before proceeding, or
 - (2) Place a bag over the nozzle and hold the top of the bag tightly on the tap. Alternately squeeze and release the bag to flush the solution in and out of the tap. Do this for 2 minutes. A fresh solution and bag must be used to sanitize each tap.

2) Flush the tap.

The sample to be collected is intended to be representative of the water in the main. The tap must be opened fully and the water runs to waste for at least 3-5 minutes to allow for adequate flushing of the piping between the tap and water main.

- 3) Reduce the flow from the tap to the width of a pencil to allow the sample bottle to be filled without splashing.
- 4) Open the sample bottle.

- a) Grasp the bottom of the same bottle.
 - b) Remove the cap and hold the exterior of the cap between your fingers while filling the sample bottle. Do not lay the cap down. Take care to not touch the mouth of the sample bottle or the inside of the cap with fingers as the sample could become contaminated.
 - c) The sample bottle must be open only during the collection of the sample.
- 5) Fill the sample bottle.
- a) Do not rinse out the sample bottle before collecting the sample. Do not remove any pills, powder, or liquid from the sample bottle. The sample bottle contains a small amount of sodium thiosulfate to neutralize any chlorine in the water.
 - b) Do not touch the rim or mouth of the sample bottle during collection of the sample.
 - c) Do not overflow the sample bottle. Fill the sample bottle to within ½" to 1" of the top or to the indicator line on the sample bottle.
- 6) Immediately recap the sample bottle tightly.

If there is any question as to whether a sample has become contaminated during collection, it must be discarded and a new one collected in a new sample bottle.

- 7) Deliver the sample to the laboratory as soon as possible.

Samples should be kept cool after collection and during transport to the laboratory. The laboratory must receive the sample so that analysis can be initiated within 30 hours after collection. Allow the laboratory adequate time to analyze the sample. Certified laboratories will not test samples greater than 30 hours old because the results will be invalid.

- 8) Additional information.
- a) A bacteriological sample report form is supplied with each sample bottle. The top half of the form is to be filled out in a legible manner using an indelible pen, rubber stamp, or typewriter. Do not use a fountain pen or other pens having water soluble ink.
 - b) Samples must be collected in sample bottles supplied by the certified laboratory.
 - c) Bacteriological sample report forms that have not been properly completed, including the name of the water system, PWS ID#, address, date and time of collection and signature of collector will not be accepted for bacteriological examination.

Appendix B
*Sample Siting Plan Template for Total Coliform Bacteria
Monitoring by Small Public Water Systems (< 3,301)*

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Sample Siting Plan Template for Total Coliform Monitoring by Small Public Water Systems (Serving Populations < 3,301)

System Name:			
Address:			
County:		PWSID#:	
Community:	Non-transient:	Transient:	
Date:			
Ohio EPA District Office Representative:			
Ohio EPA District Office Phone Number:			

INSTRUCTIONS

Public water systems are required to collect routine and repeat total coliform samples at sites that are representative of water throughout the distribution system according to a written sample siting plan. ¹ The purpose of this document is to provide you (the system) with a template you may use to prepare your sample siting plan. Please contact your Ohio EPA District Office representative with any questions.

Update your total coliform sample siting plan whenever any of the information changes. Annual verification of the information is recommended.

You are required to develop a written sample siting plan and sample accordingly. Maintain an up-to-date sampling plan at your facility where it can be easily reached by people responsible for collecting samples. If you contract with a laboratory to collect your samples for you, provide the laboratory with a copy of your completed sample siting plan.

Although your laboratory is required to provide Ohio EPA with the results of your tests for total coliform, occasionally errors will occur and a laboratory will fail to report these results. It remains your responsibility to **ensure Ohio EPA receives a copy of your total coliform test results**. You are required to keep copies of these results for 5 years. ²

Depending on the results of your total coliform sampling, **you may be required to post a public notice** explaining those results. ³ If this occurs, your district office representative will send you a letter that includes the appropriate public notice.

CONTACT INFORMATION

The following people are thoroughly familiar with this sample siting plan and are authorized to implement all or part of the plan as necessary:

NAME	ADDRESS	PHONE

Primary person responsible for collecting samples: _____

Phone: _____

Backup person responsible for collecting samples: _____

Phone: _____

ADDITIONAL INFORMATION FOR SMALL COMMUNITY PUBLIC WATER SYSTEMS

Map(s) of the distribution system can be located at:

Copies of this plan, along with the Contingency Plan, are maintained at the following locations:

1. _____
2. _____
3. _____
4. _____

ROUTINE SAMPLING

NOTE: Triggered Source Water Monitoring for Ground Water Systems

Ground water systems, as defined in 3745-81-01 of the OAC may be required to conduct TSWM as determined by Ohio EPA. TSWM may be required if the following conditions exist: the system does not provide at least 4-log treatment of viruses as approved by the director, and is notified that a routine total coliform sample is positive that has not been invalidated. ⁷

1. Number of routine total coliform sample(s) required: _____ per month/quarter (circle one)
2. Using the table provided below, designate sampling locations for each routine sample required and the associated 4 repeat sampling locations.

Purpose	Tap Name & Address	Phone Number
1. Routine sample location		
a. Repeat sample at routine sample location		
b. Repeat sample location within 5 service connections upstream of the routine sample site		
c. Repeat sample location within 5 service connections downstream of the routine sample site		
d. Additional repeat sample location within 5 service connections upstream or downstream of the routine sample site		
2. Routine sample location		
a. Repeat sample at routine sample location		
b. Repeat sample location within 5 service connections upstream or the routine sample site		
c. Repeat sample location within 5 service connections downstream of the routine sample site		
d. Repeat sample location within 5 service connections upstream or downstream of the routine sample site		

Purpose	Tap Name & Address	Phone Number
3. Routine sample location		
a. Repeat sample at routine sample location		
b. Repeat sample location within 5 service connections downstream of the routine sample site		
c. Repeat sample location within 5 service connections downstream of the routine sample site		
d. Additional repeat sample location within 5 service connections upstream or downstream of the routine sample site		
4. Routine sample location		
a. Repeat sample at routine sample location		
b. Repeat sample location within 5 service connections downstream of the routine sample site		
c. Repeat sample location within 5 service connections downstream of the routine sample site		
d. Additional repeat sample location within 5 service connections upstream or downstream of the routine sample site		

3. Are you a community or nontransient noncommunity public water system that adds chlorine or chloramines as a disinfectant? Yes No (circle one)

If so, before you take the routine or repeat total coliform sample(s), measure the total chlorine residual using a DPD colorimetric test kit with a digital display and a precision of 0.1 mg/L or another analytical method as described in Ohio Administrative Code rule 3745-8127(C)(1). Allow the tap to run for 3 to 5 minutes before measuring the residual. Then disinfect the tap and proceed with total coliform sampling.

4. Collect your total coliform routine samples at the locations designated above. Follow the instructions for total coliform sample collection located in Appendix A.

5. You will need to provide your laboratory with the following information for each sample or your sample will not be analyzed: facility name, PWSID, sample collection date and time, sample collector, name of sample tap, and DS000 for "Sample ID". Clearly mark each sample as **routine**.

ANALYZING THE SAMPLES

6. All of your total coliform bacteria routine sample must be analyzed within 30 hours of collection at laboratory certified by Ohio EPA or the results will not be valid and you will have to collect more samples.⁴

The certified laboratories your system contract with include:

	Primary laboratory	Backup laboratory
Name		
Address		
Phone		
Lab Certification Number		
Days and times lab will accept samples		

REPEAT SAMPLING

7. If a routine sample result is total coliform positive you must take repeat samples within 24 hours of notification.⁵
- a) Measure total chlorine before taking total coliform samples, if required as in Step 3.
 - b) Collect as set of 4 repeat samples from the taps designated as repeat sample locations in the table in Step 2.
 - c) Clearly mark each sample as repeat.
 - d) Ohio EPA must receive all repeat sample results no later than the end of the next business day after the result was obtained. Your system will receive a monitoring violation and be required to issue a Tier 1 public notice if Ohio EPA does not receive all repeat sample results as required.

Repeat Monitoring Tips

Avoid outside taps, taps that swivel, and hose bibs.

The first tap is the sample one used for the routine samples.

In addition, select 3 other taps as identified in Step 2.

If there are not 3 other taps available a single tap may be used more than once, but the water must run continuously between samples for no less than 5 minutes (if you are also required to check total chlorine residual, you only need to measure it once).

8. If any of the repeat samples are total coliform positive, contact your district office representative immediately for additional instructions. At the very least you will be required to post a public notice and investigate the source of the total coliform positive samples.

SAMPLING THE MONTH FOLLOWING A TOTAL COLIFORM POSITIVE SAMPLE

9. You will be required to collect **at least 5 routine total coliform samples** the month following the total coliform positive. Repeat samples do not count towards this requirement.
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Ohio Administrative Code (OAC) references for requirements:

1. OAC rule 3745-81-21 (A)
2. OAC rule 3745-81-33 (A)
3. OAC rule 3745-81-32 (B)(1)(c), (C)(1)(a), and (D)(1)(a)
4. OAC rule 3745-81-27 (D)(1)
5. OAC rule 3745-81-21 (B)(1)
6. OAC rules 3745-81-21 (B)(1), 3745-81-27 (D)(1), and 3745-89-08 (B)
7. OAC rule 3745-81-42 (For more information on whether this requirement may apply to your public water system, please contact your Ohio EPA district office.)

Appendix C

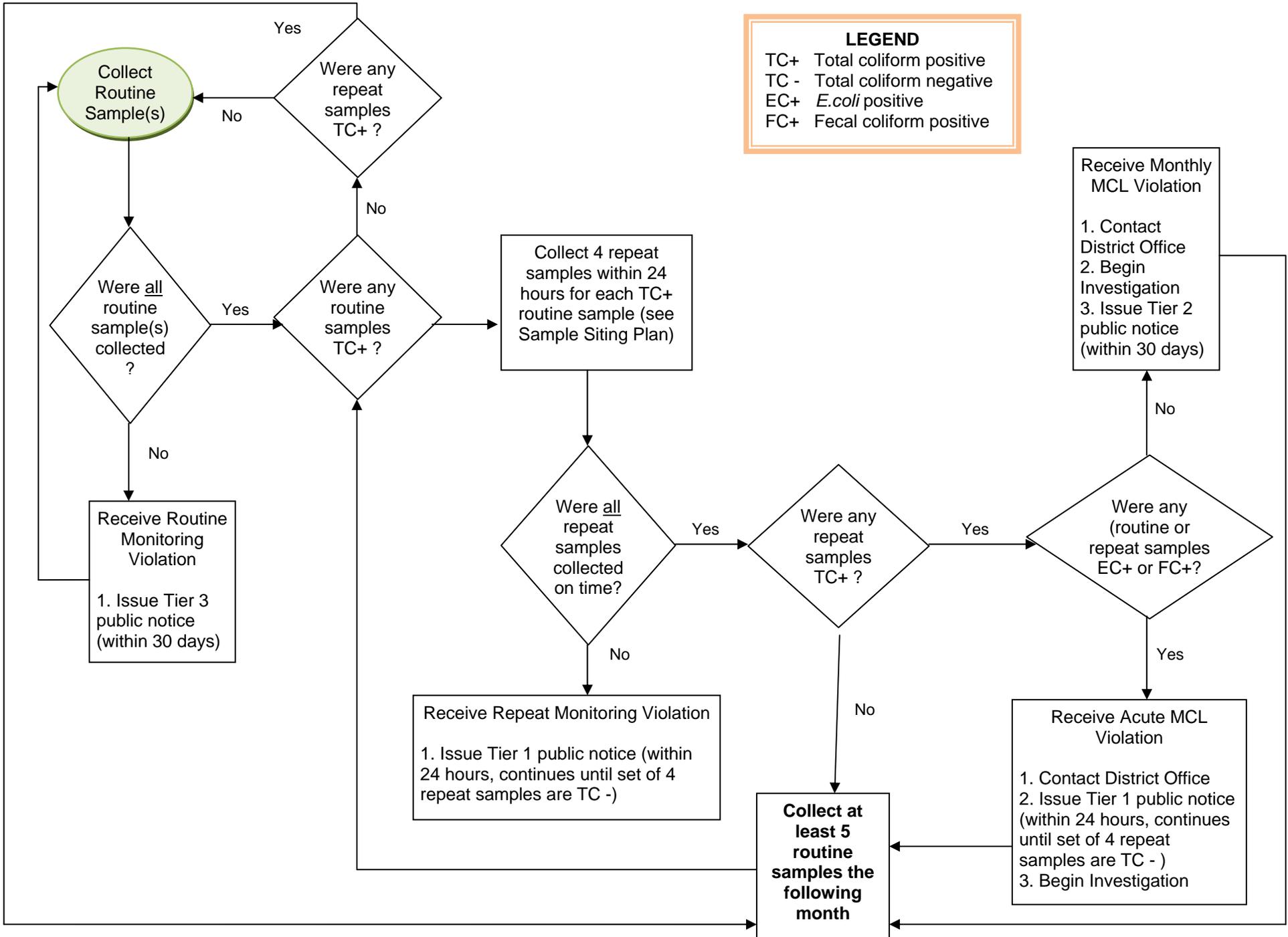
Flowchart: Interpretation of Total Coliform Bacteria Results

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Interpretation of Total Coliform Bacteria Results for Systems Serving Less Than 3,301 Persons

LEGEND

TC+ Total coliform positive
 TC - Total coliform negative
 EC+ *E.coli* positive
 FC+ Fecal coliform positive



Appendix D
Disinfection of Public Water System Wells

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A. Requirements

In accordance with Ohio Administrative Code rule 3745-9-08, all wells are to be properly disinfected by chlorination before being placed into service or returned to service after repair. A summary of the well disinfection procedure specified in the rule is provided below.

B. Procedure

1. All loose debris, sediment, mineral encrustation and bacterial slime must be removed from the well prior to disinfection.
2. Disinfectant must be slowly poured into the well by wetting the inside casing walls, drop pipe, and electrical cable.
3. Disinfectant concentration in the water column must initially be at least 100 milligrams per liter chlorine. AWWA specification C654-03 can be consulted to determine the necessary amount of sodium or calcium hypochlorite needed. Also, the following formula can be used:

$$(R)^2(D)(0.000272) = \text{_____ gallons of bleach containing 6\% sodium hypochlorite}$$

R = radius of the well in inches

D = depth of water in the well in feet

EXAMPLE

6-inch well

40 feet of water in the well

$$(3)^2(40)(0.000272) = 0.097 \text{ gallons (approximately 0.1 gallons)}$$

Therefore: 0.1 gallons of bleach containing 6% sodium hypochlorite will establish a chlorine residual of 100 mg/L in a 6-inch well that has 40 feet of water.

4. Water in the well must be agitated or surged to ensure even dispersal of the disinfectant throughout the entire water column. Recirculating water back into the well casing from an outside spigot may distribute chlorine throughout the water column if the well pump is located at the bottom of the well.
5. Cap the well and allow it to stand without pumping for at least eight hours.
6. After disinfection, a well shall be flushed and total chlorine undetectable for a minimum of 15 minutes before sampling. The well may be placed in service when 2 consecutive samples collected from the well at least 30 minutes apart are total coliform negative. Microbiological and total chlorine samples shall be analyzed in accordance with Chapter 3745-89 and rule 3745-81-27 of the Administrative Code.

7. If any of the bacterial samples taken from the well in step 6 are reported as total coliform positive, then repeat steps 1 through 6.
8. If the water is reported as total coliform positive after repeating the procedure 2 times, contact your Ohio EPA district office.

Notes: When calcium hypochlorite is used for disinfection, the tablets or granules must be completely dissolved in water prior to placement into the well.

Sodium hypochlorite solution with fragrance additives must not be used for disinfection.