



Total Coliform Rule: A Handbook for Small Noncommunity Water Systems serving less than 3,300 persons

One of the Simple Tools for Effective Performance (STEP) Guide Series



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A. Is This Handbook for Me?

This handbook is designed for use by all small “non-community water systems” (NCWS) serving fewer than 3,300 persons. In comparison, community water systems (CWS) are those systems which serve at least 15 service connections or 25 residents year-round. **NCWS** are all other public water systems (PWS) and are one of two types: “transient” (systems that serve 25 or more non-residents for at least 60 days per year) and “non-transient” (systems that regularly serve at least 25 of the same non-residents for more than 6 months per year). Typical transient NCWS and non-transient NCWS include:

Transient

Parks
Restaurants
Rest Areas
And in some states places of worship (e.g., churches, temples)

Non-Transient

Hospitals
Schools
Factories
Office Buildings
Daycare/Childcare Centers

B. What is the Total Coliform Rule?

The Total Coliform Rule (TCR) is the Federal regulation under the Safe Drinking Water Act (SDWA) that sets maximum contaminant levels (MCLs) and monitoring requirements for certain biological contaminants. It requires every PWS to periodically collect samples and analyze them for bacteria called coliforms. The number of routine samples required each month, quarter, or year depends on your system size and source water (see chart on page 11). Samples must be collected according to a written “Sample Siting Plan” as discussed in Part H (page 13). **Since state or tribal primacy agency requirements may differ from the Federal TCR, it is recommended that you contact your state or tribal drinking water primacy agency (Appendices II and III) for more details and any additional requirements.**



C. Public Health and You

Regulated PWSs are required, under the SDWA, to provide water that meets federal standards to their customers 24 hours a day, 365 days a year. If the water supply becomes contaminated, consumers can become seriously ill. Operators, one of the most important assets of any public water system, should take many steps to ensure that the public is provided with safe drinking water. One of the most important steps is to regularly test for coliform bacteria.

Why is Ensuring Safe Drinking Water Important?

Contaminated drinking water is one of the oldest known public health concerns. Preventing waterborne disease is one of the primary objectives of any drinking water system. Although waterborne disease outbreaks are relatively uncommon in the United States, they do occur. In most cases, the results are diarrhea, cramps, nausea, and other symptoms. But in some cases—particularly among the young, the elderly, and persons with weakened immune systems—waterborne diseases can lead to severe illness.

The risk of waterborne disease is greatly reduced when the water system is designed and operated to provide multiple barriers of protection. The key barriers are:

- Source water protection
- Treatment
- Distribution system integrity
- Monitoring and public awareness



D. What is in My Water?

Pathogens are disease carrying organisms. Many different pathogens may be present in water. It is not practical to test for them all individually. Instead, we rely on monitoring for ***indicator organisms***, or coliform bacteria. Coliform bacteria may or may not be harmful themselves, but their occurrence indicates the potential presence of other harmful organisms. The indicator organisms we use for monitoring drinking water are called total coliforms.

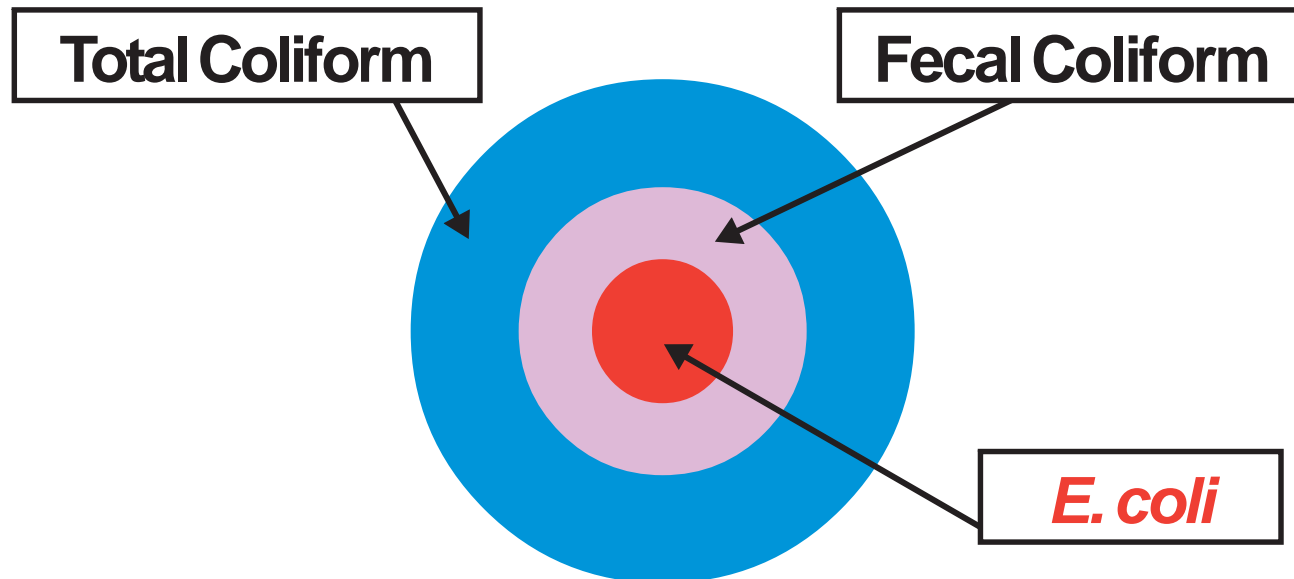


Total coliforms are a group of closely related bacteria that are generally harmless. They are natural and common inhabitants of the soil and surface waters (such as lakes and rivers). Their presence in your drinking water suggests that there has been a breach, failure, or other change in the integrity of the water system and that pathogens may have entered into your drinking water.

Total coliforms are inactivated, or made harmless, by treatment or die off naturally in a manner similar to most pathogens. **However, if total coliforms are found in a PWS, the system may be vulnerable to pathogens, whether pathogens are actually present or not. Additional sampling may be required to determine the extent of any contamination problem within your system. Detection of total coliforms is a warning sign that your system may also be vulnerable to fecal contamination.** This could be caused by any number of instances such as line breaks, cross-connections, or compromised

sources. You should attempt to determine the source of the total coliform contamination and address the problem as quickly as possible.

Detection of fecal coliforms (a subset of total coliforms) or *Escherichia coli* (*E. coli*—a subset of fecal coliforms) can indicate that your system is contaminated with fecal waste. Immediate steps to inform and protect your consumers may be necessary, as noted further on page 24. Fecal coliforms and *E. coli* are good indicators of fecal contamination and of the potential presence of waterborne pathogens associated with fecal contamination.



Barriers of detection. If coliforms are found in a sample the system is required to further test the sample for fecal coliform or *E. coli*. The diagram above shows why total coliform, when detected, must be tested further to determine if fecal coliforms, or even *E. coli* are present. **Not all total coliforms will have fecal coliform or *E. coli* within them.** Courtesy of Wyoming EPA.

E. Types of Samples

Testing for total coliforms is performed by collecting water samples. There are five types of samples that a NCWS generally takes. These are routine samples, repeat samples, additional routine samples, replacement samples, and special samples. (Routine and repeat samples are discussed in more detail later within this workbook.)

Compliance Samples

Routine Samples: Routine samples are those that you are required to take on a routine basis, whether that is annually, monthly, or quarterly. These samples, as well as the other types of samples noted below, are collected from representative locations throughout your water system in 100mL or 125mL containers (see Appendix I for proper sample collection procedures.) These samples, as with all coliform samples, should be submitted to a certified laboratory for testing within **30 hours** after collection.

Repeat Samples: These compliance samples are required each time a coliform positive sample is detected and must be collected within 24 hours after you receive notification of a positive coliform result. These samples confirm any positive detection of coliform bacteria and help to identify the extent of the coliform contamination within your system, the type of coliform present, and the location or source of the contamination. Samples above and beyond the repeat sample requirement may be collected until either the system no longer detects the presence of any coliform bacteria or until the source of the contamination has been identified, eliminated, and/or prevented. It is important to note that a minimum of five routine samples are required for the month immediately following a positive coliform sample.

Non-Compliance Samples

Additional Samples: This type of sample refers to any additional non-compliance samples required by your state or tribal primacy agency in order to help identify the extent of the contamination, provide better information about water quality, or to provide further monitoring of the water within the NCWS.

Replacement Samples: If a compliance sample is collected and does not get analyzed, it may be replaced by a new sample. There are several reasons why a certified laboratory may not analyze samples:

1. The sample may be outdated or too old,
2. The sample container may be broken upon arrival at the lab,
3. The sample container may have leaked,
4. The sample amount may be not be enough (remember, 100mL is the minimum),
5. The sample does not indicate a date or time to tell the lab how old it is,
6. The sample may have been frozen.



Special Samples: These, too, are non-compliance samples that are collected due to repairs, complaints, or maintenance reasons. Collection of these types of samples is often necessary to ensure that coliform has not entered your distribution system as a result of events such as water line repairs, line breaks, or routine maintenance.

F. Sampling Requirements: How Many Bacteriological Samples are Required and When?

The TCR requires NCWS which use ground water (not under the direct influence of surface water) and which serve 25 to 1,000 persons to collect at least 1 routine total coliform sample per quarter. Systems which serve 1,001 to 2,500 persons must collect at least 2 routine total coliform samples per month, and those serving 2,501 to 3,300 must collect at least 3 routine total coliform samples per month. If you have reduced monitoring, as prescribed by EPA or your state or tribal primacy agency, the sampling frequency could be 1 sample per calendar year. Contact your state or tribal drinking water program office to see if you are eligible for reduced monitoring.

For example, a seasonal restaurant that serves hundreds of people a day during the summer (July – September) must sample according to its designated monthly sampling schedule for July, August, and September. If the restaurant serves only a few hundred people a month during the rest of the year, the state or tribal primacy agency may allow (in writing) the system to reduce sampling to once per quarter for the off-season. However, in no case may the state or tribal primacy agency reduce the sampling frequency to less than 1 sample per year.



Surface water NCWSs and NCWSs using ground water under the direct influence (GWUDI) of surface water must take multiple routine samples. You may be required to take more than 1 sample per month since the numbers of samples is based on population served (see next page).

Minimum Number of Routine Bacteriological Samples Required (NCWS)		
Type of System	Population Served	Minimum Number of Routine Samples
Ground Water (GW)	25-1,000	1 sample per quarter or year*
	1,001-2,500	2 samples per quarter or year
	2,501-3,300	3 samples per quarter or year
Type of System	Population Served	Minimum Number of Routine Samples
Surface Water (SW) or Ground Water Under the Direct Influence of Surface Water (GWUDI)	25-1,000	1 sample per month
	1,001-2,500	2 samples per month
	2,501-3,300	3 samples per month

* 1st Quarter - January, February, March; 2nd Quarter - April, May, June; 3rd Quarter - July, August, September; 4th Quarter - October, November, December.

Remember that additional sampling is encouraged to identify the extent of the coliform present, if any, within your water system. This chart lists only the Federal minimum required number of routine samples. As mentioned previously, the presence of total coliforms is a warning sign that your system is vulnerable to contamination. It does not necessarily mean that your system has fecal contamination.

G. Where Should I Sample?

Remember, the purpose of sampling is not to draw “clean” samples, but to identify any coliform contamination so it can be dealt with promptly. The TCR requires each small NCWS to sample for coliforms according to a sample siting plan, which must be made available to the state or tribal primacy agency for review and approval. Having a written sample collection protocol helps ensure that all sampling is done correctly, even when water system personnel change.

The sample siting plan specifies where in the building or distribution system routine samples (samples required to be taken regularly) will be drawn in order to ensure that they are “representative” of the water supplied to every consumer.

Representative samples that accurately reflect the quality of the finished water are crucial because if coliforms are in the water supply, they may not be found uniformly throughout the distribution system. The sample siting plan may sometimes include repeat sampling sites to be used if a sample drawn from a routine sampling point tests positive for coliforms.



H. How to Develop a Sample Siting Plan

The details of a sample siting plan depend on the characteristics of the system for which it is developed and on the requirements of the state or tribal primacy agency. Contact your state or tribal primacy agency to see if there are any required forms or if there are specific requirements in addition to those mentioned in this handbook. A list of primacy agencies can be found in the back of this handbook. Things to consider when preparing a sample siting plan include:

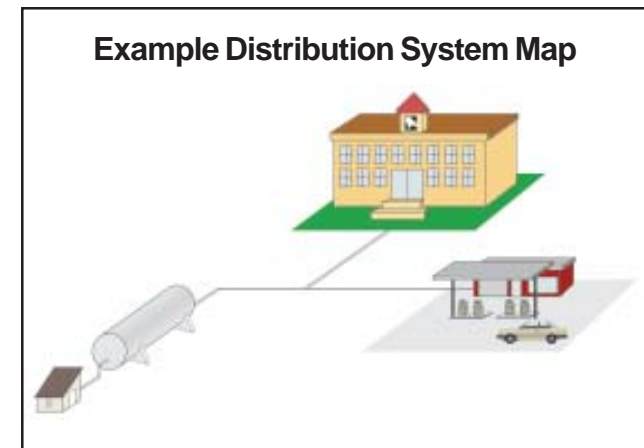
- The location and type of water sources, treatment facilities, storage tanks, pressure stations, and service connections.
- The location of dead-end pipes, loops, and other areas of the piping system's configuration.
- Cross connection hazards and shared connections.
- Areas of low water pressure and slow water movement.
- Varying population densities.

A Basic Sample Siting Plan

A basic sample siting plan may have three components: **a map of the distribution system, a narrative description of the plan, and a program plan of action.** Check with your state or tribal primacy agency if they have specific requirements for sample siting plans.

Distribution System Map or Schematic: This provides the layout of the distribution system and may show:

- All water sources and their entry points into the distribution system.
- The system locations served by each water source (if the waters from the various sources are not combined prior to distribution).
- Treatment facilities, such as filtration and disinfection stations.
- Storage tanks.
- Routine sampling sites.
- Repeat sampling sites.
- Interconnections and critical valves.
- Pipe material and size.
- Location of blowoffs/flushing points.
- Dead-end mains and/or known trouble areas.



Plan Description: At a minimum, the description of the sample siting plan should include, but not be limited to:

- Water system name, contact person(s), telephone number(s), and address(es).
- Water system identification number.
- Water source name(s).
- Storage volume.
- Treatment facility description (process used, source[s] treated, location, etc.).
- Total population served.
- Number of service connections.

PUBLIC WATER SYSTEM DESCRIPTION	
DATE:	September 11, 2001
WATERWORKS NAME:	Bill's Campground
PWSID:	AT0001111
CERTIFIED CLASS:	Class V Water System
COUNTY/CITY:	Any County
OWNER:	Pearl E. Eyes 5300 Ocean Blvd. Anytown, USA
PHONE NUMBER:	(555) 555-5555
OPERATOR:	John Doe II
TYPE OF TREATMENT:	Hypo-Chlorination
SOURCE:	Groundwater (One well)
DESIGN CAPACITY:	25 Existing campsite connections (65 people)
DESCRIPTION OF SYSTEM:	
<p><u>Well</u> - This well is located at the northeast corner of the campground near the entrance. The well is drilled to a total depth of 300 feet, and is cased and grouted. The well is equipped with a submersible pump, which discharges water into a 500-gallon pressure storage tank from where the water flows into the distribution system. The six-inch well casing is properly vented and sealed. A sampling tap and meter are provided in the well discharge line.</p>	
<p><u>Pressure Tank</u> - Storage consists of a 500-gallon pressure tank. The pressure tank is enclosed by the cinderblock well house. A pressure gauge is installed on the pressure tank.</p>	
<p><u>Design Basis</u></p>	
<p>1. Based on existing connections: 25 campsite connections</p>	
<p>2. Based on source: no data available on source capacity</p>	
<p>3. Based on storage:</p>	
<p>500/3 gallons</p> <p>-----</p> <p>150 gallons/campsite connection = 1 campsite connection</p>	

Program Plan of Action: This section of the sample siting plan should identify:

- The date the site sampling plan was prepared (and revision date if applicable). The plan needs to represent all distribution areas and all areas of concern.
- The number of routine sample sites and their locations.
- The sample collection schedule. This is an approved schedule from your state or tribal primacy agency. As a NCWS, you may be required to sample at least once per year.
- If the system is on an annual, monthly, or quarterly rotation cycle (as applicable). It is desirable to rotate through each sample site three or four times a monitoring period to better obtain representative samples. For example, a restaurant's rotation cycle could include one sample obtained from the women's bathroom during the first month, one from the kitchen during the second month, and one from a service station where wait-staff fill water pitchers during the third month.
- A description of the five routine sampling sites that will be used for routine sampling after the presence of coliforms has been confirmed. This occurs in the next month in which you will serve consumers.
- A brief description of the sample collection techniques used. This will help minimize the possibility for false positive samples due to improper collection techniques.
- The schedule for flushing the distribution system's lines. This procedure is vital in reducing the possibility of coliform and biofilm build-up.
- The name and telephone number of the person who prepared the sample siting plan.

I. Sampling Sites

Your sample site(s) should be selected carefully so that you obtain a representative sample for your entire system, whether your system consists of one building or multiple buildings. It is especially important to identify and include in the sample siting plan the areas that may adversely affect the microbiological quality of the water. Faucets and specially installed sampling taps are the two most common types of sampling sites. If faucets are to be used, each faucet should be examined carefully to ensure its suitability. To learn how to properly collect a bacteriological sample, please refer to the procedures in Appendix I.



Some examples of **unsuitable sample sites** are:

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

J. What if I Have a Sample that is Positive for Coliform Bacteria?

As noted earlier in this step guide, if any of your routine samples test positive for the presence of total coliforms, you must collect additional samples called repeat samples. NCWS serving 25-1,000 are required to collect a minimum of 4 repeat samples and NCWS serving 1,001 to 3,300 are required to collect a minimum of 3 repeat samples for each coliform-positive bacteriological sample with a coliform detection. Samples must come from the following locations when additional taps for sampling are available:

- One sample from the same location as the positive sample;
- One sample within 5 service connections upstream;
- One sample within 5 service connections downstream; and
- For systems serving 25-1,000, a fourth sample from any other sampling site on your approved sample siting plan.

Repeat samples are collected to confirm whether or not there is an actual contamination problem within your water system. A set of repeat samples must be collected within 24 hours of the system being notified of the positive result. The minimum number of repeat samples required is based on the number of positive routine samples and population served, regardless of the water source.

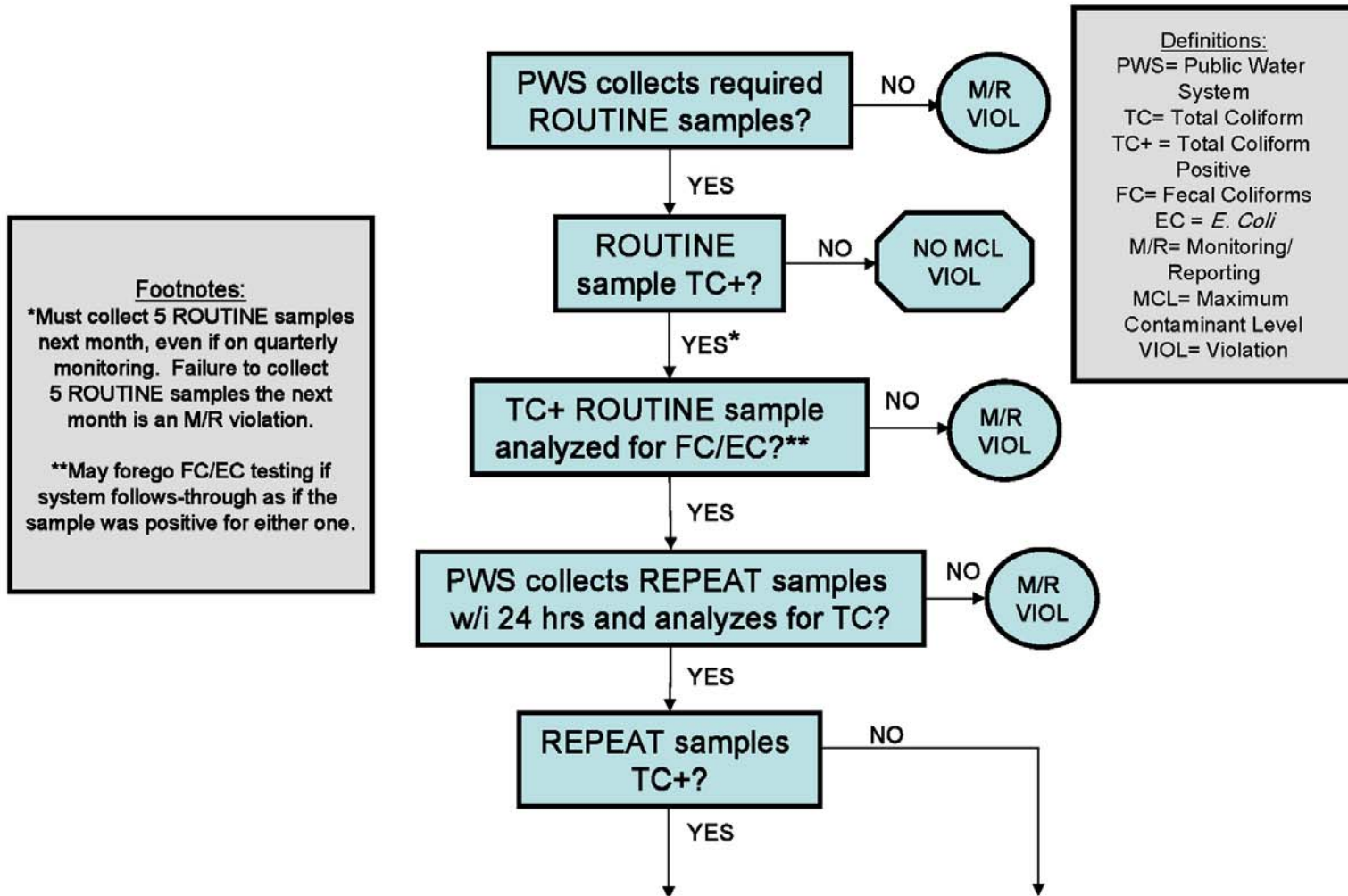
Repeat Sampling Chart	
Population Served	Repeat Samples per Positive Routine Sample
25-1,000	4
1,001-2,500	3
2,501-3,300	3

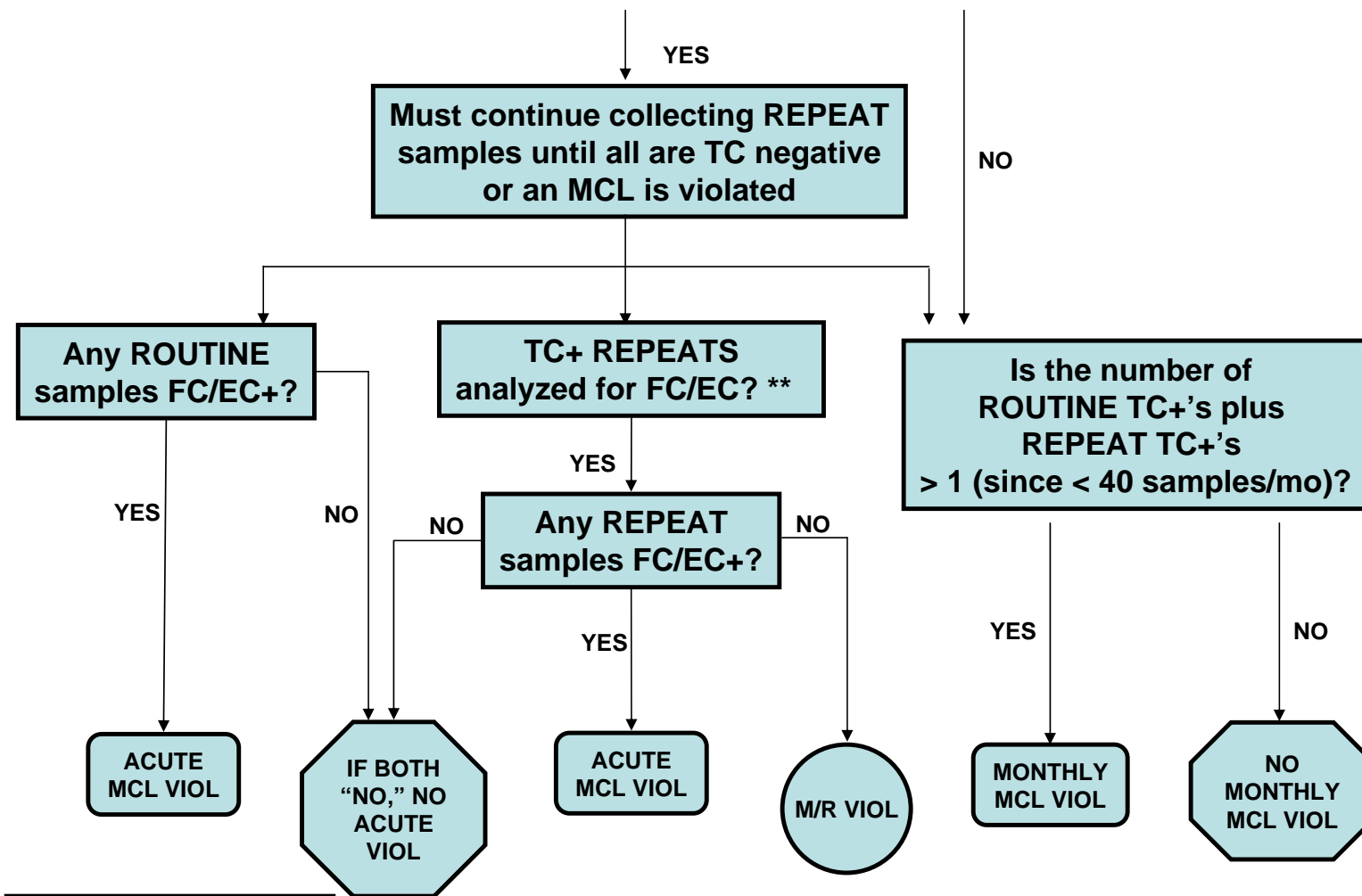
Please refer to the TCR Flow Chart (pages 20 and 21) to assist you in determining if you are required by the TCR to take additional samples. This chart will also assist you in determining if your system is meeting the compliance standards of the TCR.

Following detection of total coliforms in any routine or repeat sample, you are also required to collect 5 routine samples the next month you serve water to consumers. If none of the 5 routine samples test positive for the presence of total coliforms, you may resume collecting your usual number of routine samples the next month or quarter you are required to sample.

A potential urgent health risk exists if any sample, routine or repeat, tests positive for fecal coliform or *E. coli*. Per requirements established within the Public Notification Rule (Tier 1), when you are notified by your laboratory of any repeat sample testing positive for fecal coliforms or *E. coli*, you must notify the state or tribal primacy agency by the end of the day you are notified, or before the end of the next business day if the state or tribal primacy agency office is closed, and notify the public within 24 hours.

Total Coliform Rule Compliance Flow Chart



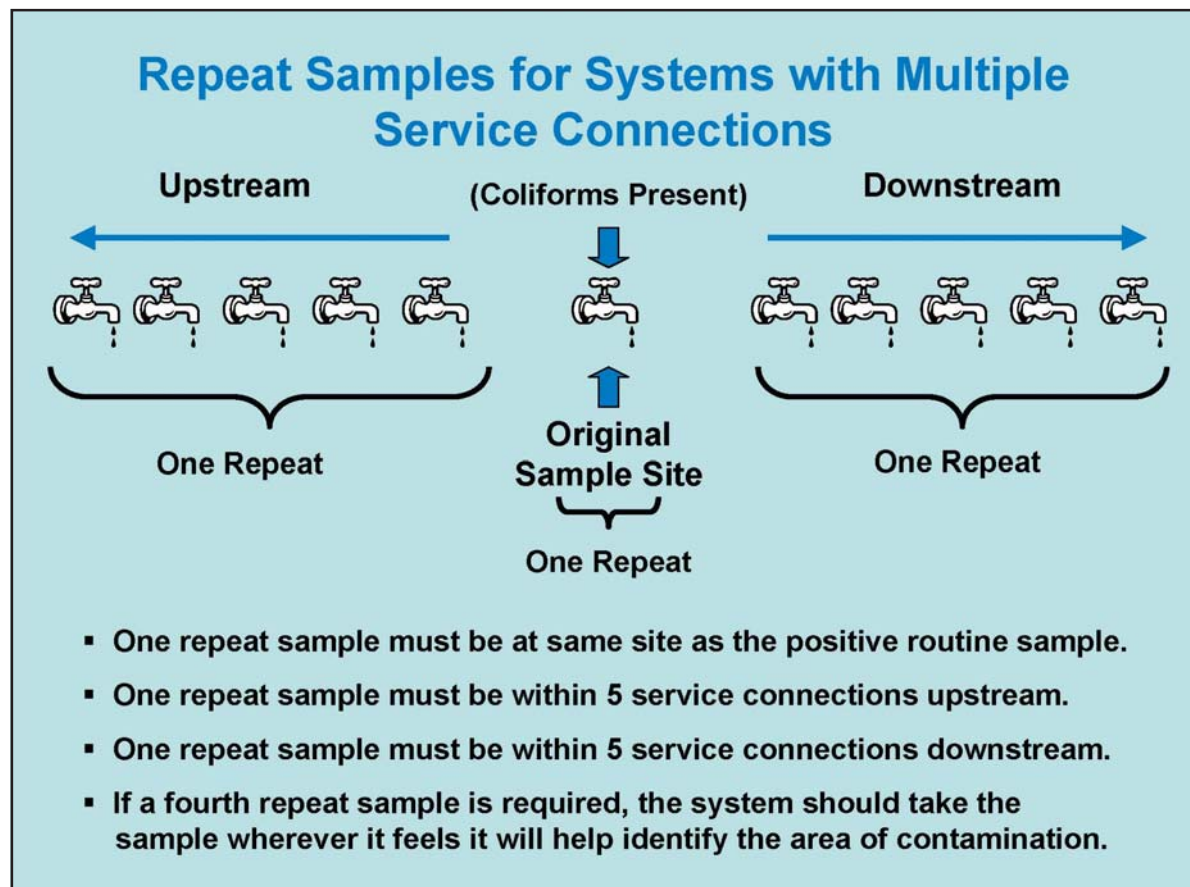


Reminder: Sample collection and transport must enable the laboratory to begin analysis within 30 hrs of collection.

NOTE: This table is for information only and is not intended to be a substitute for federal or state regulations.

Multiple Service Connections and Where to Sample

Some NCWSs may have multiple service connections (in addition to multiple sampling points). A service connection is a water line providing service to a facility. Separate buildings that are part of the same complex or facility and are served by the same NCWS may not always be considered separate service connections. Consult your state or tribal primacy agency if you are unsure whether your system has multiple service connections.



Single Service Connections and Where to Sample

Systems with only one service connection can choose repeat sample locations in order to determine if the contamination is localized. Some NCWSs will have only one sample location, but most will have several. At least one repeat sample must be collected from the same sample location as the original coliform-positive sample. If you have multiple sample locations available (i.e., multiple taps), you should collect the remaining repeat samples from representative sites at opposite ends of the facility served by your system. Unless otherwise authorized by your state or tribal primacy agency, systems with a single service connection should collect all repeat samples the same day, even if it means they are collected from the same tap in rapid succession. Some states or tribal primacy agencies may allow systems with a single service connection to collect the required set of repeat samples over a four-day period or make other arrangements.

K. What Happens if Repeat Samples are Positive?

Public Notification and Compliance

This section will help to better explain violations associated with bacteriological sampling. You may also reference the chart on pages 20 and 21 for further guidance. As with any public notification requirement, it is recommended that you contact your state or tribal primacy agency for any further notification and compliance issues immediately upon detection of coliform-positive samples. If you have a total coliform-positive routine sample followed by a fecal coliform- or *E. coli*-positive repeat sample (or a fecal coliform- or *E. coli*-positive routine sample followed by a total coliform-positive repeat sample), this is a serious potential health risk. This creates an **acute**, or short-term, violation that may have a more immediate health effect. Please refer to the following:

Procedures for ACUTE (Tier 1) Violations

1. Notify the state or tribal primacy agency by the end of the day you are notified or before the end of the next business day if the state or tribal primacy agency office is closed.
2. Notify the public within 24 hours by posting or hand delivery. You may also elect to notify the public by television, radio, or other methods approved by the state or tribal primacy agency.

Note: Consider providing consumers with bottled water until the problem has been solved.

A less serious but still significant potential health risk exists if more than one sample (routine and/or repeat) in a month is total coliform-positive. This creates a **monthly** MCL violation. If you are notified by your laboratory of the repeat or second routine total coliform-positive sample results, you must:

Procedures for Monthly MCL (Tier 2) Violations

1. Notify the state or tribal primacy agency by the end of the next business day.
2. Notify the public within 30 days by mail, hand delivery, or other methods approved by the state or tribal primacy agency.

A system that has failed to comply with a TCR requirement (for example, the sample siting plan requirement, failure to take a routine or repeat sample, or failure to perform a fecal coliform/*E. coli* test) has committed a **monitoring** violation and must:

Procedures for Monitoring (Tier 3) Violations

1. Within 365 days, notification to the public must be conducted in accordance with general public notification requirements approved by the state or tribal primacy agency.

Federal regulations detail how, when, and at what frequency notices for violations should be provided. Because different violations have different requirements, you should contact your state or tribal primacy agency for assistance when a public notice is needed.

Monthly Monitoring Worksheets

This handbook contains simple monthly monitoring worksheets to help you keep track of your TCR sampling and sample results. (While the monitoring worksheets presented here can be a useful management tool, system operators are reminded that the original laboratory results must be kept on file as well.) These worksheets can help you ensure that you collect the right number of routine samples each month. These worksheets will also help you ensure that you collect the appropriate number of repeat samples in the event that any routine samples are total coliform-positive. Finally, the worksheets will help you organize your follow-up if you have a monthly MCL violation (if you have more than one routine and/or repeat samples that are total coliform-positive) or you have an acute MCL violation (triggered by fecal coliform/*E. coli* positives).

The following pages explain how to use the worksheet. An example is also included showing the worksheet and what follow-up would be needed. Finally, a couple of blank worksheets are provided. You can copy a blank worksheet for future use or call the Safe Drinking Water Hotline at 1-800-426-4791 and request publication number EPA 816-R-01-017B for additional worksheets.

It should be noted that some Primacy Agencies (typically the state regulatory agency, except in a few cases) may have their own monitoring worksheets that small community drinking water systems are required to complete. The worksheets contained in this section should not replace monitoring forms required by your state or tribal primacy agency.

Using the TCR Monthly Monitoring Worksheets

This section presents instructions for completing the TCR Monthly Monitoring Worksheets. Each step presented here corresponds to a numbered section of the sample TCR worksheet on page 27.

Step #1

Enter date and location of routine sample

- Enter date when routine sampling occurred.
- Record specific location information (e.g., street address) for the routine sample location.
- The sample sites chosen must be representative of water throughout the distribution system according to a written sample siting plan (see Appendix I).

Step #2

Indicate routine total coliform test result(s)

- Enter date when laboratory results became known to the system.
- Your laboratory will report whether total coliforms are present or absent in a given sample. Circle “+” if coliforms are present, or circle “-” if coliforms are absent.

Step #3

Indicate routine fecal (or *E. coli*) test result(s) (if applicable)

- Any routine total coliform test sample that indicates the presence of coliform will also be tested for the presence of fecal coliforms or *E. coli* by the laboratory.
- Lab analysis results for fecal coliform or *E. coli* will also be reported either as present or absent in a given sample. Circle “+” if fecal coliforms or *E. coli* are present, or circle “-” if fecal coliforms or *E. coli* are absent. **Note: If a routine total coliform test sample indicates the absence of coliforms, neither “+” or “-” should be circled since a fecal coliform or *E. coli* test was not performed.**

Step #4

Repeat Sampling

- If **any one** of the routine total coliform samples shows the presence of coliforms, repeat samples are required. If you collect only one routine sample per month, then you must collect four repeat samples. If you collect two or three routine samples per month, then you must collect three repeat samples.

Step #4A

Enter date and location of *repeat* samples (if applicable)

- Enter date when routine sampling occurred. Note that repeat sampling is required **within 24 hours**, or the next business day, after the system is notified of the presence of total coliforms in any one of its samples. **All** repeat samples must be collected on the same day.
- Record specific location information (e.g., street address) for each repeat sample location.
- The repeat sample locations chosen must include one sample from the same tap as the original routine sample testing “present,” one sample within five service connections upstream, one sample within five service connections downstream, and (if required) a fourth repeat sample taken anywhere in the distribution system. A description of these Repeat Sampling Sites should also be included in your sample siting plan (see Appendix I).

Step #4B

Indicate *repeat* total coliform test results

- Enter date when laboratory results became known to the system.
- Lab analysis results for total coliforms will be reported as either present or absent in a given sample. Circle “+” if coliforms are present, or circle “-” if coliforms are absent.

Step #4C

Indicate *repeat* fecal coliform or *E. coli* test results

- Any repeat sample that shows the presence of coliforms will also be tested for the presence of fecal coliforms or *E. coli* by the laboratory.
- Lab analysis results for fecal coliforms or *E. coli* will be reported as either present or absent in a given sample. Circle “+” if fecal coliforms or *E. coli* are present, or circle “-” if fecal coliforms or *E. coli* are absent. **Note: If a repeat total coliform test sample indicates the absence of coliforms, then neither “+” or “-” should be circled since a fecal coliform or *E. coli* test was not performed.**

Step #5

Immediate follow-up actions

- Certain **immediate** follow-up actions need to be undertaken based on the sample results (both routine and repeat).

A. Notification.

If more than one sample (routine and/or repeat) in a month are total coliform-positive, you must notify the State by the end of the next business day and notify the public within 30 days.

If ANY sample (routine or repeat) tests positive for fecal coliforms or *E. coli*, you must notify the State THE DAY YOU RECEIVE THE RESULTS (or the next day if the State office is closed).

If a routine total coliform-positive sample is followed by a repeat sample that tests positive for fecal coliforms or *E. coli*, or a routine sample that tests positive for fecal coliforms or *E. coli* is followed by a repeat total coliform-positive sample, you must notify the State THE DAY YOU RECEIVE THE RESULTS (or the next day if the State office is closed) and notify the public WITHIN 24 HOURS.

B. Problem Identification.

If the cause of the coliform contamination is not known, the repeat samples should be used to help identify the source of the problem. The cause of the coliform contamination could be in the treatment process itself, or somewhere in the distribution system.

C. Corrective Measures Taken.

Any corrective actions or measures taken by the small community drinking water system **prior to or after** repeat testing should be noted.

- Record the follow-up actions taken in the space provided on the monitoring worksheets.

Example: System Serves Between 25 and 1,000 Persons

The example is for the month of November 2001.

The routine total coliform laboratory result showed that both total coliforms and fecal coliforms are present. Upon receiving these results on November 7, 2001, the system immediately notified the state that it had detected the presence of fecal coliforms in the routine sample. Repeat sampling was done.

Four repeat samples were collected as follow-up to the routine sample. Two of the four repeat samples showed that total coliforms were present. Fecal coliforms were absent from the repeat samples. This constitutes an acute MCL violation since there are fecal coliforms present in a routine sample and total coliforms are present in a repeat sample. The system must immediately (within 24 hours of knowing laboratory results) notify the state and the public.

The number of routine samples is increased to FIVE for the month of December. If all five December routine total coliform samples show that total coliforms are absent, then the system can resume its normal one sample per month schedule in January 2002.

Total Coliform Rule – Monthly Monitoring Worksheet

Month and Year _____

Date Sample Collected	Routine Sample Location	Date Results Known	Total Coliform Result (a,c) (Circle "+" if present, "-" if absent)	Fecal Coliform or <i>E. coli</i> Result (b,c) (Circle "+" if present, "-" if absent)	Date Sample Collected	Location	Date Results Known	Total Coliform Result (a,c) (Circle "+" if present, "-" if absent)	Fecal Coliform or <i>E. coli</i> Result (b,c) (Circle "+" if present, "-" if absent)		
						<ul style="list-style-type: none"> • One must be at same site as routine. • One must be within 5 taps upstream. • One must be within 5 taps downstream. • One additional sample anywhere within the distribution system (if a fourth repeat sample is required). 					
1.			+ / -	+ / -		1.1		+ / -	+ / -		
						1.2				+ / -	+ / -
						1.3				+ / -	+ / -
						1.4 (d)				+ / -	+ / -
2.			+ / -	+ / -		2.1		+ / -	+ / -		
						2.2				+ / -	+ / -
						2.3				+ / -	+ / -
3.			+ / -	+ / -		3.1		+ / -	+ / -		
						3.2				+ / -	+ / -
						3.3				+ / -	+ / -
4.			+ / -	+ / -		4.1		+ / -	+ / -		
						4.2				+ / -	+ / -
						4.3				+ / -	+ / -
5.			+ / -	+ / -		5.1		+ / -	+ / -		
						5.2				+ / -	+ / -
						5.3				+ / -	+ / -

(a) If more than one sample (routine and/or repeat) in a month is total coliform positive, you must notify the State by the end of the next business day and notify the public within 30 days.

(b) If ANY sample tests positive for fecal coliforms or *E. Coli* you must notify the State THE DAY YOU RECEIVE THE RESULTS (or the next day if the State office is closed).

(c) If a routine total coliform-positive sample is followed by a repeat sample that tests positive for fecal coliform or *E. coli*, or a routine sample that tests positive for fecal coliforms or *E. coli* is followed by a repeat total coliform-positive sample, you must notify the State THE DAY YOU RECEIVE THE RESULTS (or the next day if the State office is closed), and notify the public WITHIN 24 HOURS.

(d) Note: Four repeat samples for systems taking one routine sample per month.

Immediate Follow-Up Actions.

A. Notification

B. Problem Identification

C. Corrective Measures Taken

Total Coliform Rule – Monthly Monitoring Worksheet

Month and Year _____

Date Sample Collected	Routine Sample Location	Date Results Known	Total Coliform Result (a,c) (Circle "+" if present, "-" if absent)	Fecal Coliform or <i>E. coli</i> Result (b,c) (Circle "+" if present, "-" if absent)	Date Sample Collected	Location	Date Results Known	Total Coliform Result (a,c) (Circle "+" if present, "-" if absent)	Fecal Coliform or <i>E. coli</i> Result (b,c) (Circle "+" if present, "-" if absent)		
						<ul style="list-style-type: none"> • One must be at same site as routine. • One must be within 5 taps upstream. • One must be within 5 taps downstream. • One additional sample anywhere within the distribution system (if a fourth repeat sample is required). 					
1.			+ / -	+ / -		1.1		+ / -	+ / -		
						1.2				+ / -	+ / -
						1.3				+ / -	+ / -
						1.4 (d)				+ / -	+ / -
2.			+ / -	+ / -		2.1		+ / -	+ / -		
						2.2				+ / -	+ / -
						2.3				+ / -	+ / -
3.			+ / -	+ / -		3.1		+ / -	+ / -		
						3.2				+ / -	+ / -
						3.3				+ / -	+ / -
4.			+ / -	+ / -		4.1		+ / -	+ / -		
						4.2				+ / -	+ / -
						4.3				+ / -	+ / -
5.			+ / -	+ / -		5.1		+ / -	+ / -		
						5.2				+ / -	+ / -
						5.3				+ / -	+ / -

(a) If more than one sample (routine and/or repeat) in a month is total coliform positive, you must notify the State by the end of the next business day and notify the public within 30 days.

(b) If ANY sample tests positive for fecal coliforms or *E. Coli* you must notify the State THE DAY YOU RECEIVE THE RESULTS (or the next day if the State office is closed).

(c) If a routine total coliform-positive sample is followed by a repeat sample that tests positive for fecal coliform or *E. coli*, or a routine sample that tests positive for fecal coliforms or *E. coli* is followed by a repeat total coliform-positive sample, you must notify the State THE DAY YOU RECEIVE THE RESULTS (or the next day if the State office is closed), and notify the public WITHIN 24 HOURS.

(d) Note: Four repeat samples for systems taking one routine sample per month.

Immediate Follow-Up Actions.

A. Notification

B. Problem Identification

C. Corrective Measures Taken

Appendix I: How Do I Collect Samples Properly?

Sample Collection Techniques and Procedures

The laboratory that supplies the sampling containers normally provides instructions with the sampling kit for the type of monitoring you are doing. Refer to those instructions when provided. The following instructions and photographs illustrate the general sampling procedures for collecting coliform analysis monitoring samples.

A. Before you begin sampling. Before you begin sampling, it is important to have all of your supplies on hand. Here is a list of the suggested supplies you may need:

- Cooler for shipping and storage of your sample while in transit between collection point and lab
- Ice for your shipping cooler
- PVC or unsupported Neoprene gloves to keep sample from possible contamination
- 125mL sample bottle with sodium thiosulfate for chlorinated water systems
- Lab slips, labels, and markers for sample container identification



Additional Recommended Items are:

- Paper towel for drying off the outside of your sample container after sampling
- Plastic storage baggies for ice and sample container

B. Sampling Containers. Although different sizes and types of sampling containers may be used for collecting coliform samples, most laboratories supply 125mL sterilized, plastic bottles. A few laboratories may furnish single service, sterilized glass bottles.

C. Collecting a Clean Sample. As a general rule, proper washing of hands is highly recommended for the sample collector. Also, food, drink, and even 2nd hand cigarette

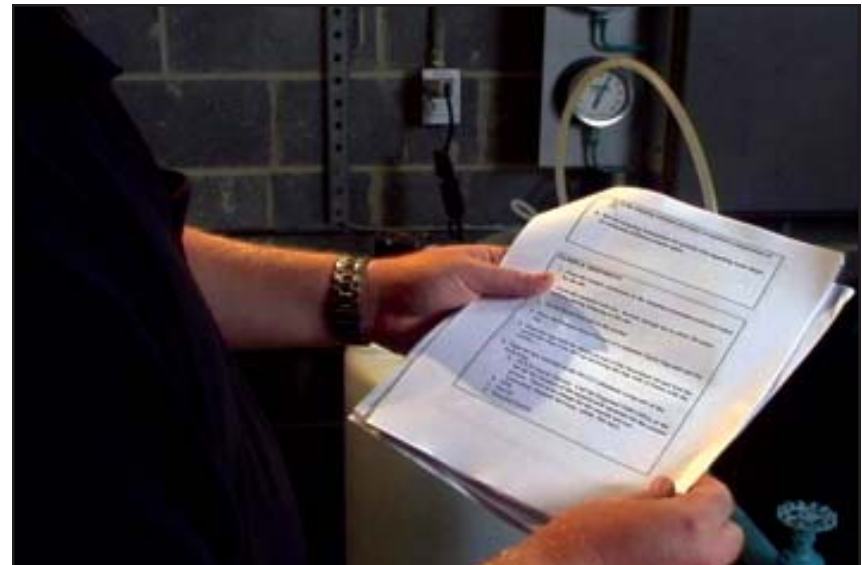


smoke should never come into contact with the sample or its containers. These foreign objects have been suspected of causing false results in samples, so be sure to practice good clean sample collection procedures.

D. Damaged Sample Containers. It is recommended that you not sample with any containers that appear to have been tampered with since this may cause an undesirable sample result.

E. Sampling Procedures. Follow the procedures recommended by the laboratory (if any) for sampling and addition of preservatives. The following steps describe the general sampling procedures to be followed for collecting TCR coliform and *E. coli* monitoring samples.

1. Sampling site selection: Select an approved sampling location as designated by your approved



sampling site plan. Faucets and specially-installed sampling taps are the two most common types of sampling sites. If faucets are to be used, each faucet should be examined carefully to ensure its suitability. Poor faucet design or placement may contribute to invalid sample results or fail to identify problems within your water system.

2. Remove any aerator, strainer, or hose that is present, as any of these may harbor bacteria and cause a false coliform positive sample result.
3. Optional Steps: Some sampling practices involve spraying the tap with a chlorine solution, or even flaming the tap. (This step is optional since many people believe this practice does not kill attached bacteria and is not necessary if the sampling tap is selected carefully.) Keep in mind that the average consumer will not perform such practices and it could be argued that doing so would not properly represent the water quality at the point where the consumer will use it.



4. Turn on the cold water and run the water to flush the tap. This typically takes 2-3 minutes. Then reduce the flow so that the stream is no greater than $\frac{1}{4}$ inch in diameter, or the width of a pencil. Check for steady flow. While the water is running, fill out the labels, tags, and laboratory forms. Apply the labels to the containers. Do not change the water flow once the sampling has started as that could dislodge microbial growth. Be sure to test for both the chlorine and the pH of the water and place the results on your lab slip.



5. Remove the bottle cap. Be careful not to contaminate the sample by touching the inside of the cap or the inside of the sample container with your fingers.

6. Position the bottle under the water flow. Hold the bottle in one hand and the cap in the other. Do not lay the cap down or put it in your pocket! Water dripping from your hands may also cause



contamination of the sample so extra care should be taken when collecting this sample. Fill the bottle to the shoulder or to about ¼ inch from the top. Many bottles have a 100ml fill line.

7. The sample container should be tightly capped. Blot the sample container with a paper towel to dry it off. Since ice is sometimes recommended for use in shipping, it is recommended that it be bagged separately to eliminate any contamination of the sample.
8. Turn the tap off. Replace the aerator, strainer, or hose.
9. Check that the information on the label is correct (or check the laboratory form and attach it to the bottle with a rubber band). Complete any additional laboratory forms that came with the sample bottle, including chain-of-custody form (if necessary).



10. IMPORTANT: The samples must reach the laboratory and the analysis must begin within 30 hours of collection. It is recommended that all samples be refrigerated or cooled to 4 degrees to 10 degrees Celsius (39 degrees to 50 degrees Fahrenheit). If the laboratory is nearby, refrigerate with ice packs, and deliver the samples there directly. If not, send the samples overnight by US mail or by an overnight courier.

Taping of the chest prior to shipping is also recommended since the container could be mistakenly opened during shipment. Also, be sure to tape any additional forms or sample documentation either inside or on the outside of the lid. If you have any additional questions, please contact your state or tribal drinking water program office for assistance.

If the laboratory has any additional recommendations or requirements, they should be understood and followed closely. If you have any additional questions, please contact your state or tribal drinking water program office for assistance.

Appendix II: Safe Drinking Water Act Primacy Agency Contacts

For additional information or to learn more about the laws in your state, please contact your state primacy agency.

State Contact Information	Web site	Phone Number
Alabama Department of Environmental Management: Water Supply Branch	www.adem.state.al.us/WaterDivision/Drinking/DWMainInfo.htm	(334) 271-7700
Alaska Department of Environmental Conservation: Drinking Water Program	www.state.ak.us/dec/eh/dw	(907) 269-7647
American Samoa Environmental Protection Agency	www.asg-gov.com/agencies/epa.asg.htm	(684) 633-2304
Arizona Department of Environmental Quality: Safe Drinking Water Program	www.azdeq.gov/enviro/water/dw/index.html	(602) 771-2300
Arkansas Department of Health: Division of Engineering	www.healthysarkansas.com/eng/	(501) 661-2623
California Department of Health Services: Division of Drinking Water and Environmental Management	www.dhs.ca.gov/ps/ddwem/technical/dwp/dwpindex.htm	(916) 449-5577
Colorado Department of Public Health and Environment: Drinking Water Program	www.cdphe.state.co.us/wq/drinking_water/drinking_water_program_home.htm	(303) 692-3500
Connecticut Department of Public Health: Drinking Water Division	www.dph.state.ct.us/BRS/water/dwd.htm	(860) 509-7333
Delaware Health and Social Services: Division of Public Health	www.state.de.us/dhss/dph/about.html	(302) 744-4700

State Contact Information	Web site	Phone Number
District of Columbia Environmental Protection Agency Region 3	www.epa.gov/reg3wapd/drinkingwater	(215) 814-2300
Florida Department of Environmental Protection: Drinking Water Program	www.dep.state.fl.us/water/drinkingwater/index.htm	(850) 245-8335
Georgia Department of Natural Resources: Water Resources Branch	www.gaepd.org/	(404) 657-5947
Guam Environmental Protection Agency: Water Programs Division	www.guamepa.govguam.net/programs/water	(671) 475-1658
Hawaii Department of Health: Environmental Health Division	www.hawaii.gov/health/environmental/water/sdwb/index.html	(808) 586-4258
Idaho Department of Environmental Quality: Water Quality Division	www.deq.state.id.us/water/	(208) 373-0194
Illinois Environmental Protection Agency: Bureau of Water	www.epa.state.il.us/water/index-pws.html	(217) 785-8653
Indiana Department of Environmental Management: Drinking Water Branch	www.in.gov/idem/water/dwb/	(317) 232-8603
Iowa Department of Natural Resources: Water Supply Program	www.iowadnr.com/water/drinking/index.html	(515) 725-0275
Kansas Department of Health and Environment: Bureau of Water	www.kdhe.state.ks.us/pws/	(785) 296-5503
Kentucky Department for Environmental Protection: Division of Water	www.water.ky.gov/dw	(502) 564-3410
Louisiana Office of Public Health: Safe Drinking Water Program	www.oph.dhh.louisiana.gov/engineerservice/safewater/	(225) 765-5038
Maine Maine Department of Health and Human Services: Drinking Water Program	www.state.me.us/dhs/eng/water/	(207) 287-2070

State Contact Information	Web site	Phone Number
Maryland Department of the Environment: Water Supply Program	www.mde.state.md.us/programs/WaterPrograms/Water_Supply/index.asp	(410) 537-3000
Massachusetts Department of Environmental Protection: Drinking Water Program	www.mass.gov/dep/brp/dws/dwshome.htm	(617) 292-5770
Michigan Department of Environmental Quality: Water Bureau	www.michigan.gov/deq	(517) 373-7917
Minnesota Department of Health: Drinking Water Protection Section	www.health.state.mn.us/divs/eh/water/index.html	(651) 215-0770
Mississippi Department of Health: Water Supply Division	www.msdh.state.ms.us/msdhsite/index.cfm/44,0,76,html	(601) 576-7518
Missouri Department of Natural Resources: Water Protection and Soil Conservation Division	www.dnr.state.mo.us/wpscd/wpcp/index.html	(573) 751-1300
Montana Department of Environmental Quality: Public Water Supply Program	www.deq.state.mt.us/wqinfo/pws/index.asp	(406) 444-4071
Nebraska Department of Health and Human Services: Public Water Supply Program	www.hhs.state.ne.us/enh/pwsindex.htm	(402) 471-0521
Nevada State Health Division: Safe Drinking Water Program	http://ndep.nv.gov/bsdsw/index.htm	(775) 687-6353
New Hampshire Department of Environmental Services: Water Division	www.des.state.nh.us/wseb/	(603) 271-2153
New Jersey Department of Environmental Protection: Water Supply Administration	www.state.nj.us/dep/watersupply/	(609) 292-5550
New Mexico Environment Department: Drinking Water Bureau	www.nmenv.state.nm.us/dwb/dwbtop.html	(505) 827-1400

State Contact Information	Web site	Phone Number
New York New York State Department of Health: Bureau of Water Supply Protection	www.health.state.ny.us/nysdoh/water/main.htm	(518) 402-7650
North Carolina Department of Environment and Natural Resources: Public Water Supply Section	www.deh.enr.state.nc.us/pws/	(919) 733-2321
North Dakota Department of Health: Division of Water Quality	www.health.state.nd.us/mf/	(701) 328-5211
Ohio Environmental Protection Agency: Division of Drinking and Ground Water	www.epa.state.oh.us/ddagw/	(614) 644-2752
Oklahoma Department of Environmental Quality: Water Quality Division	www.deq.state.ok.us/WQDnew/index.htm	(405) 702-8100
Oregon Department of Human Services: Drinking Water Program	http://oregon.gov/DHS/ph/dwp/index.shtml	(971) 673-0405
Pennsylvania Department of Environmental Protection: Office of Water Management	www.dep.state.pa.us/dep/deputate/watermgt/wsm/WSM.htm	(717) 772-4018
Puerto Rico Department of Health: Public Water Supply Supervision Program	www.epa.gov/region02/cepd/prlink.htm	(787) 977-5870
Rhode Island Department of Health: Office of Drinking Water Quality	www.health.ri.gov/environment/dwq/index.php	(401) 222-6867
South Carolina Department of Health and Environmental Control: Drinking Water Program	www.scdhec.net/eqc/water/html/dwater.html	(803) 898-4300
South Dakota Department of Environment and Natural Resources: Drinking Water Program	www.state.sd.us/denr/des/drinking/dwprg.htm	(605) 773-3754

State Contact Information	Web site	Phone Number
Tennessee Department of Environment and Conservation: Division of Water Supply	www.state.tn.us/environment/dws/index.html	(615) 532-0191
Texas Texas Commission on Environmental Quality	www.tceq.state.tx.us/nav/util_water/	(512) 239-4691
Utah Department of Environmental Quality: Division of Drinking Water	www.drinkingwater.utah.gov	(801) 536-4200
Vermont Vermont Agency of Natural Resources	www.anr.state.vt.us/dec/watersup/wsd.htm	(802) 241-3400
Virgin Islands Department of Planning and Natural Resources: Division of Environmental Protection	http://dpnr.gov.vi/dep/home.htm	(340) 773-1082
Virginia Department of Health: Office of Drinking Water	www.vdh.state.va.us/dw/index.asp	(804) 864-7500
Washington Division of Environmental Health: Office of Drinking Water	www.doh.wa.gov/ehp/dw/	(360) 236-3100
West Virginia Bureau for Public Health: Department of Health and Human Resources	www.wvdhhr.org/oehs/eed/	(304) 558-6715
Wisconsin Department of Natural Resources: Bureau of Drinking Water and Ground Water	www.dnr.state.wi.us/org/water/dwg/	(608) 266-0821
Wyoming EPA Region 8: Wyoming Drinking Water Program	www.epa.gov/region08/water/dwhome/wycon/wycon.html	(303) 312-6812

Appendix III: Tribal Contacts

For additional information or to learn more about the laws governing your tribe, use the contact information provided below.

US EPA Headquarters	Web site	Phone Number
American Indian Environmental Office	www.epa.gov/indian	(202) 564-0303

US EPA Tribal Coordinators	Web site	Phone Number
EPA Region 1	www.epa.gov/region01/govt/tribes/index.html	(888) 372-7341
EPA Region 2	www.epa.gov/region02/nations/index.html	(212) 637-3000
EPA Region 4	www.epa.gov/region04/ead/indian/index.htm	(404) 562-6939
EPA Region 5	www.epa.gov/region5/water/stpb	(312) 353-2123
EPA Region 6	www.epa.gov/region06/6xa/tribal.htm	(800) 887-6063
EPA Region 7	www.epa.gov/region07/government_tribal/index.htm	(913) 551-7003
EPA Region 8	www.epa.gov/region08/tribes	(303) 312-6312
EPA Region 9	www.epa.gov/region09/cross_pr/indian/index.html	(415) 947-8704
EPA Region 10	yosemite.epa.gov/r10/tribal.NSF	(206) 553-4011

Other Contacts	Web site	Phone Number
Administration for Native Americans	www.acf.dhhs.gov/programs/ana/	(877) 922-9262
Bureau of Indian Affairs	www.doi.gov/bureau-indian-affairs.html	(202) 208-3710
Indian Health Service	www.ihs.gov	(301) 443-3024
Native American Water Association	www.nawainc.org	(775) 782-6636

Appendix IV: Sources for More Information on Total Coliform

- The final text of the Total Coliform Rule: Federal Register Vol. 54, No 124. pp. 27544-27568
- Total Coliform Rule: A Quick Reference Guide, EPA 816-F-01-035: www.epa.gov/safewater/source/tcrquickrefguidev10.pdf
- EPA's Safe Drinking Water Hotline: 1-800-426-4791
- EPA's Safe Drinking Water Web site (www.epa.gov/safewater/tcr/tcr.html) describes the Total Coliform Rule and Potential Revisions and Distribution System Requirements.
- American Water Works Association: www.awwa.org
- Association of State Drinking Water Administrators: www.asdwa.org
- National Ground Water Association: www.ngwa.org
- National Rural Water Association: www.nrwa.org

