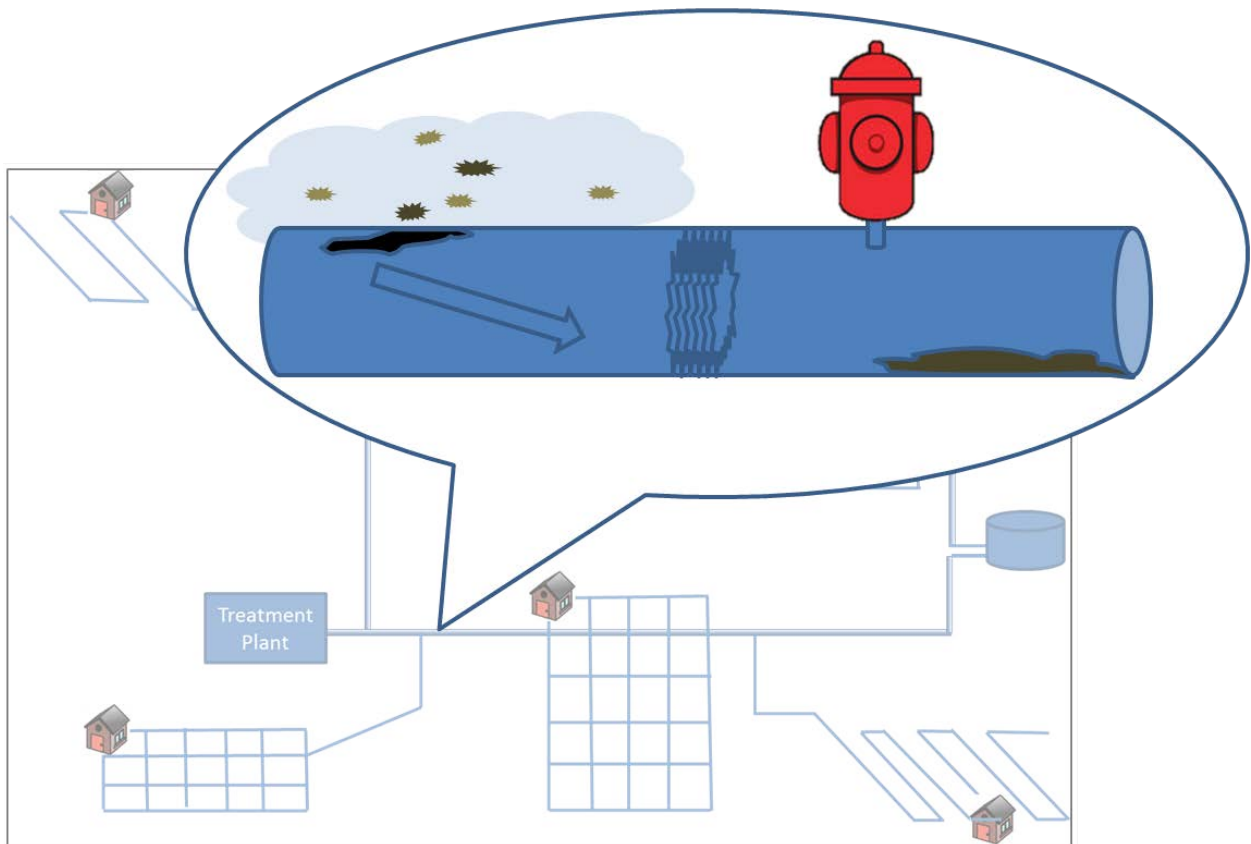


Revised Total Coliform Rule

Assessment and Compliance Training

Water Supplier Training

Participant Guide



Bureau of Safe Drinking Water

2016



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

RTCR Assessments – WATER SUPPLIER TRAINING

Agenda

| Elapsed time (min) | Lesson |
|---------------------------|--|
| 15 | Lesson 1: RTCR Basics and Sanitary Defects |
| 75 | Lesson 2: Level 1 Assessments |
| 40 | Lesson 3: Level 1 Scenario |
| 25 | Lesson 4: Level 2 Assessments |
| 25 | Lesson 5: PN and CCRs |

3 contact hours

Please note: All times are approximate.

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Appendices:

- Appendix A – Assessment Forms
- Appendix B: EPA Assessment Guidance Section 5: Corrective Actions
- Appendix C: PN & CCR
 - Example Tier 1 and three Tier 2 Templates (pp. C-1 through C-4)
 - Draft CCR Language (pp. C-5 through C-11)
 - PN & CCR Summary Table (pp. C-12 & C-13)
 - TC + Response Review (p. C-14)

Lesson 1

Intro and Sanitary Defects

Lesson 1: Intro and Sanitary Defects

Objectives:

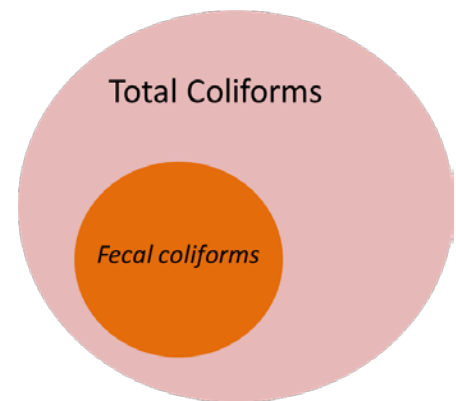
- Examine the causes of coliform contamination
- Define and analyze Sanitary Defects

The Revised Total Coliform Rule (RTCR) applies to all public water systems.

Coliforms (Indicator Organism)

Coliforms are found everywhere, but they are universally found in large numbers in the digestive tracts of warm blooded animals.

- Within the group of coliform bacteria are the fecal coliforms, which are specifically present in the gut and feces of warm blooded animals. This group includes *E. coli*, of which some strains are pathogenic.
- Testing for pathogens directly, such as *E. coli*, is expensive and time consuming. So, the Total Coliform test is used as an “indicator organism”.
- The presence of total coliform is a good indication of a potential pathway of microbial contamination, such as bacteria, viruses, parasitic protozoa, and their associated illnesses.
- A properly constructed and maintained water system should not have total coliform present.



RTCR Rule – April 1, 2016

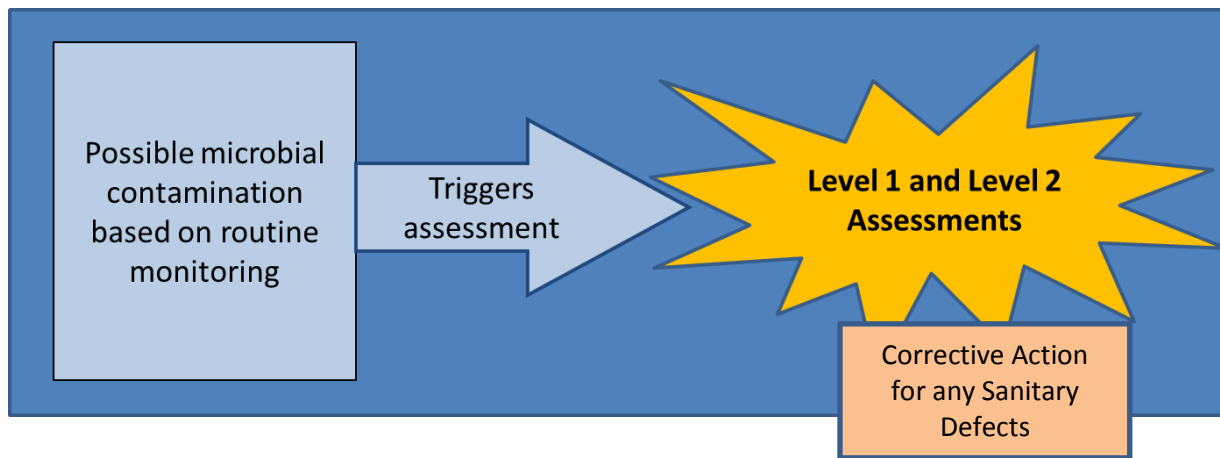
The rule was revised with the intent of increasing the protection of public health by reducing the number of pathways that fecal contamination can enter the drinking water distribution system.

- Eliminating these pathways should result in a decrease in fecal contamination in public water distribution systems, which in turn *should* reduce the potential risk from all waterborne pathogens including bacteria, viruses, parasitic protozoa, and their associated illnesses.

Level 1 and Level 2 Assessments:

EPA determined that total coliforms should be used as an indicator of system operation and condition rather than an immediate public health concern.

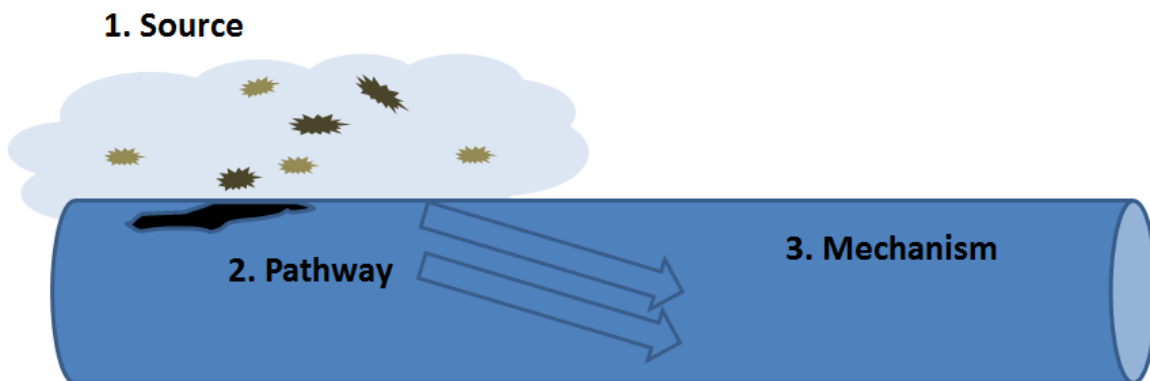
- The revised rule eliminates the MCL for total coliforms and moves to a treatment technique for total coliforms. Under the “treatment technique” requirements, the system has to conduct an assessment to identify any sanitary defects. **You can think of this as the “find and fix” approach.**



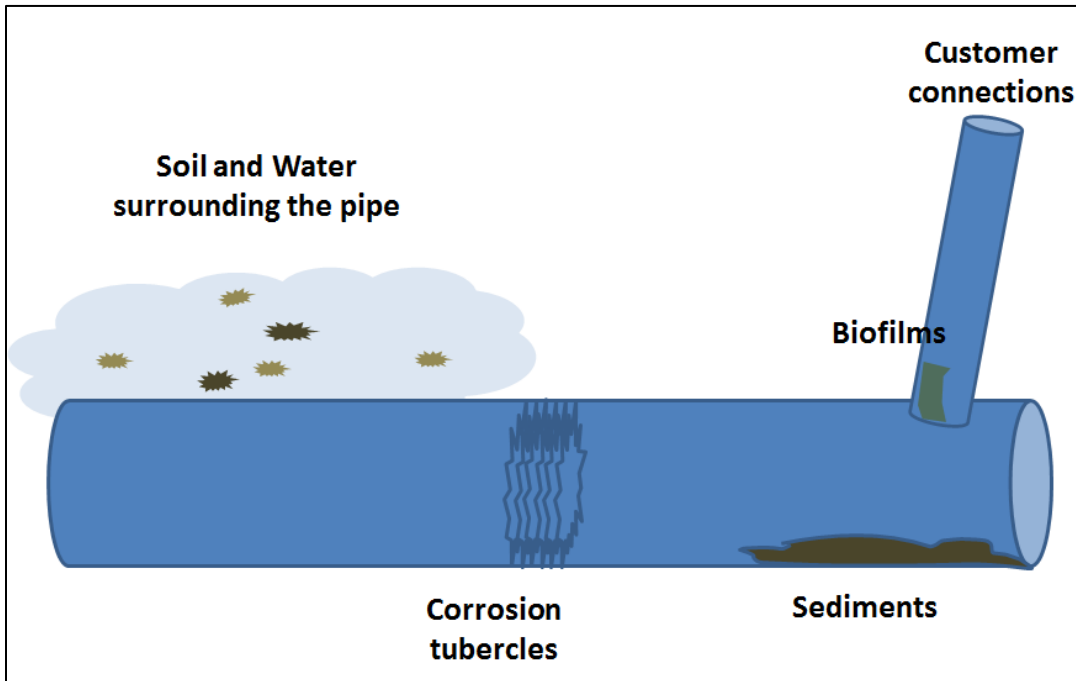
Causes of Contamination

Three aspects are needed:

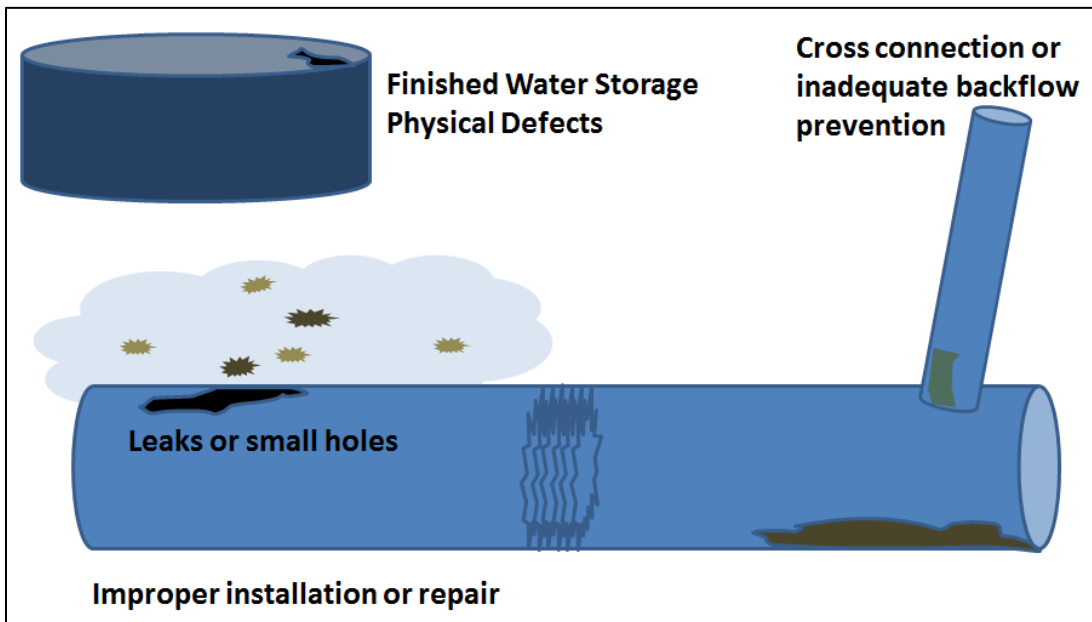
1. Source
2. Pathway
3. Mechanism



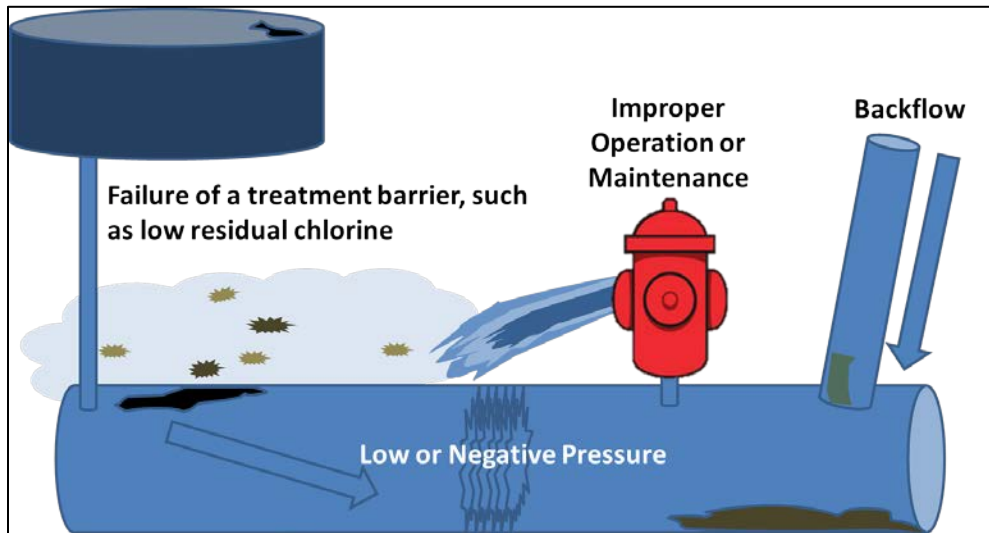
1. Sources of coliform contamination can include:



2. Pathways of microbial contamination can include:



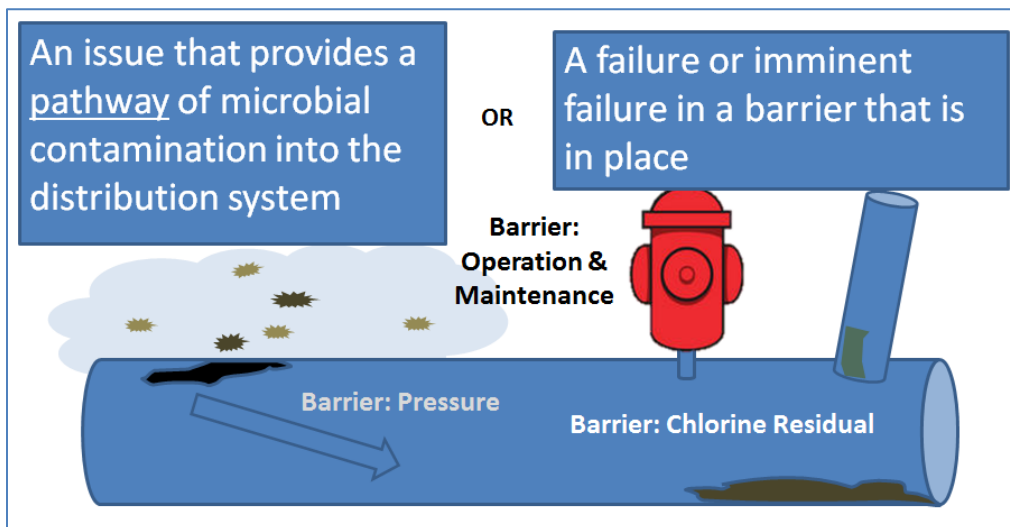
3. **Mechanisms** that allow coliform bacter to enter the distribution include:



Sanitary Defects

A Sanitary Defect is:

- A defect that could provide a **pathway** of entry for microbial contamination into the distribution system **OR**
- A defect that indicates a failure or imminent failure in a **barrier** that is already in place. Barriers include such things as: disinfectant residual, Proper O&M, system pressure, backflow prevention. A breakdown in one of these barriers provides the mechanism of contamination, discussed above.



Sanitary Defects Activity



Sanitary Defect (sanə,terē dēfekt) Definition:

- A defect that could provide a pathway of entry for microbial contamination into the distribution system **OR**
- A defect that indicates a failure or imminent failure in a barrier that is already in place.

Which of the following “issues” would you consider sanitary defects?

| Sanitary Defect? (yes/no) | | Issue |
|------------------------------|---|--|
| Y | N | 1. Wellhead with sanitary seal and vent, but the vent screen is missing |
| Y | N | 2. Coliform contaminated soil surrounding distribution piping |
| Y | N | 3. Inadequate disinfection after distribution pipe repair |
| Y | N | 4. Outdated emergency response plan |
| Y | N | 5. The system uses a continuous (online) chlorine monitor and the waste line is connected directly to the sanitary sewer without an air gap. |
| Y | N | 6. No detectable chlorine residual at the outlet of a storage tank during a draw cycle. |
| Y | N | 7. Low water pressure (less than 20 psi) in one section of the distribution system. |
| Y | N | 8. Not a certified operator running a community water system |
| Y | N | 9. Main break |
| Y | N | 10. Poor distribution system operation and maintenance (O&M), such as not having an established flushing program |

Key Points:

1. The Find and Fix approach is focused on correcting sanitary defects.
2. Contamination in a distribution system requires all of the following:
 - a. Source,
 - b. Pathway
 - c. Mechanism
3. A Sanitary Defect is:
 - A defect that could provide a **pathway** of entry for microbial contamination into the distribution system **OR**
 - A defect that indicates a failure or imminent failure in a **barrier** that is already in place.

Lesson 2

Level 1 Assessments

Lesson 2: Level 1 Assessments

Objectives:

After this lesson, you'll be able to

- Define a Level 1 Assessment
- Determine if a system triggers a Level 1 Assessment
- Identify who should conduct a Level 1 Assessment at the water system
- Identify the key aspects to the Level 1 Assessment and Corrective Action Form
- Explain how to submit the Level 1 Assessment Form

Level 1 Assessments

Definition: A Level 1 Assessment is an evaluation of a public water system used to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and when possible the likely reason that the system triggered the assessment.

The **purpose** of the assessment process is to reduce potential pathways of contamination by finding and fixing issues including:

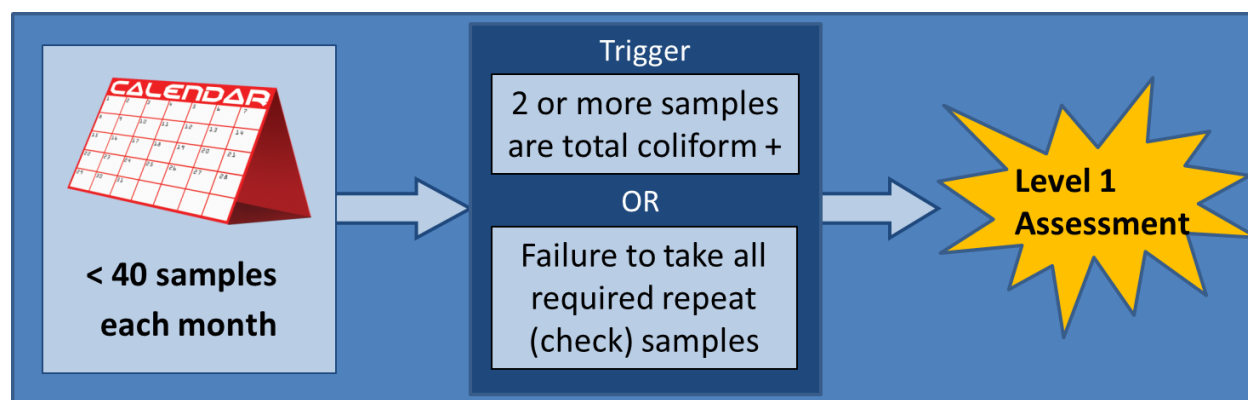
1. Sanitary Defects
2. Defects in Sampling Practices

Level 1 Assessment Triggers

Medium and small sized water systems that collect less than 40 samples a month

For systems that collect less than 40 samples a month, there are two triggers that require a system to conduct a Level 1 Assessment:

1. Two or more samples are total coliform positive in one month, this could be two routine samples or a routine and a check sample **OR**
2. The system fails to take all required repeat (check) samples following a positive.



ACTIVITY #1: Assessment Trigger Small/Medium System

Anytown water system serves a population of 12,500 and collects 10 samples per month.

- On April 2nd they collected a sample at a routine monitoring location and the result came back total coliform positive.
- On April 4th they collected two check samples, both of which came back negative for total coliform.
- The rest of their routine samples for the month were negative for total coliforms.

Did they trigger a Level 1 Assessment? Explain.

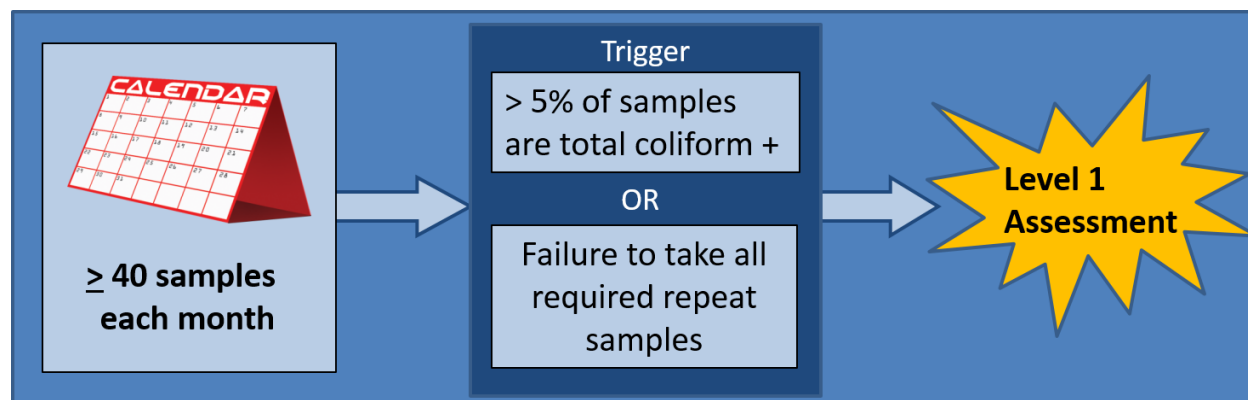
Large-sized water systems that collect 40 or more samples a month

For systems that collect 40 or more samples a month, there are two triggers that require a system to conduct a Level 1 Assessment:

1. When greater than 5% of the samples collected in a month are total coliform positive (this includes routine and check samples combined).

OR

2. The system fails to take all required repeat (check) samples following a positive.



Example of the first trigger:

Water system has a population of 45,000 and collects 50 samples per month.

- 5% of 50 is 2.5
- Since the trigger is that *greater than* 5% of their samples need to be positive, 3 or more positive samples would trigger a Level 1 Assessment for this system.

ACTIVITY #2: Assessment Trigger Larger System

Billsburg water system serves a population of 54,000 and collects 60 samples per month (5% of 60 is 3).

- During the first week of April they collected 15 routine samples, one of which was total coliform positive.
- They collected three check samples and one came back positive for total coliform.
- They collected three additional check samples and all of these samples came back negative for total coliform.
- During the third week of the month they had another routine positive sample and collected three more check samples.
- All of the check samples for the second positive came back negative for total coliform.

Did they trigger a Level 1 Assessment? Explain.

| |
|---|
| Who Should Conduct a Level 1 Assessment? |
|---|

A Level 1 Assessment must be conducted by personnel qualified to operate and maintain the water system's facilities.

Examples include:

- The owner of the system
- A certified operator if they have one
- A maintenance worker
- A plumber

NOTE: The individual who conducts the assessment should be same person that routinely takes care of the system and is most familiar with it.

Level 1 Assessment and Corrective Action Form

Water systems are **required to use this form** for submitting the assessment to DEP.

Six parts to the Form:

- Part I: General Information
- Part II: Positive Sample Information
- Part III: Sampling Issue Descriptions and Corrective Actions
- Part IV: Assessment Questions
- Part V: Issue Descriptions and Corrective Actions
- Part VI: Verification

Tools and Resources for Conducting a Level 1 Assessment:

- Environmental Protection Agency's *Revised Total Coliform Rule Assessment and Corrective Actions Guidance Manual*.
- Positive sample information about the positive samples that occurred during the monitoring period that triggered the assessment
- Existing water quality data that was collected from the source, entry point and distribution system
- Assessor with a clear understanding of the water system and the treatment

Assessor should contact the Sanitarian if they don't understand what a question is asking or how to answer it.

Important Notes on the Level 1 Form:

Part II:

- A separate table should be completed for each positive sample.
- If a system triggers a Level 1 assessment and then has additional positive samples later in the month, they should include **all** of the positive samples on their assessment form.
- The three questions below the basic sample information are there to determine if there was a defect in any of the sampling practices
 - The NO answer box is grayed out for each of the three questions. The gray boxes mean that there was an issue found with the sampling practices.
 - Sampling issues found are not sanitary defects; however they should still be corrected (discussed more below in regard to Part III below).

Part III:

In this part, the assessor explains what sampling issues were found as part of the assessment (from Part II), what corrective actions are going to be taken to correct the issue, and the schedule they are going to follow while correcting it.

Remember, sampling issues are NOT considered sanitary defects; however they should still be corrected.

Example Sampling Issue Description and Corrective Action:

| Positive Sample # | 1 | Question # | 3 |
|--|---|---|---|
| Sampling Issue Description | | Corrective Action and Completion Schedule | |
| <p><i>After speaking with the sample collector from our lab, it was determined that the sample was collected from a kitchen sink that was leaking.</i></p> | | <p><i>After expressing our concern with the lab about their sampler collecting a sample from a leaking faucet, they have agreed to run a proper sample collection refresher course for all of their sample collectors. They will also provide detailed sample collection protocols for their sample collectors to take with them in the field. The lab indicated that these actions will occur within the next month.</i></p> | |

Part IV:

Divided into seven sections (A-G)

- Contains questions designed for specific portions of the water system
- There are three possible answers YES, NO, or N/A to each question. The N/A is blacked out for some of the questions, where N/A would not be appropriate. For these questions the answer must be YES or NO.
- Any time the assessor checks an answer that is located in a gray box, it is an issue and a potential sanitary defect, and must be explained in Part V of the form.

Part V:

In this part, the Assessor explains what issues were found in Part IV assessment, what corrective actions are going to be taken to correct the issue, and the schedule they are going to follow while correcting it.

- Each "gray box" checked in Part IV of the form must be transferred and explained in Part V.

- The Assessor indicates which issues are sanitary defects; this is the key difference between part III and part V. Sanitary defects must have a corrective action identified (second column).

Example Issue Description and Corrective Action:

| | | | |
|--|----------|--|----------|
| Section Letter | E | Question # | 4 |
| Issue Description | | Corrective Action and Completion Schedule | |
| <p><i>The sediment filter located prior to our UV light hadn't been changed on the appropriate frequency resulting in it becoming dirty and clogged.</i></p> | | <p><i>The sediment filter was replaced on October 5, 2016. The sediment filter housing was properly cleaned and disinfected prior to putting the new filter in place and the maintenance supervisor has been informed to now change the filter once a month instead of once a quarter.</i></p> | |
| <p>Sanitary Defect: YES: <input checked="" type="checkbox"/> NO: <input type="checkbox"/></p> | | | |

Important Note: It is advised that the water system contact DEP prior to completing any corrective action that goes above and beyond normal system maintenance.

- For example, making a change to treatment or construction requires a permit to complete the corrective action and failure to do so would result in a violation.
- Systems should also contact DEP for any situation that would require one hour notice. For example, if our example issue description was that the UV bulb had burned out, the water system would be required to contact DEP within one hour.

Issues Not Checked as Sanitary Defects

There are situations where the assessor may have answered a question in a gray shaded box; however, the issue is determined to not be a sanitary defect by the water system.

Example: If the assessor answered "YES" to question number 1 in section F, which indicates that the water system has had line breaks or large firefighting events, but then writes this explanation:

"The water system experienced two line breaks within the past two months, both breaks were repaired under pressure and in accordance with AWWA Standard C651; therefore we do not feel that these were sanitary defects."

In this case a description is still necessary because a shaded box was checked; however a corrective action would not be necessary for this issue.

Part VI.

The purpose of this part is for the Assessor and Responsible Official to certify that the information provided on the assessment form is accurate and true.

The assessor checks a box to certify that the assessment was completed in accordance with the EPA *RTCR Assessments and Corrective Actions Guidance Manual*, if either of the following occurred:

- The assessor conducts the assessment and none of the questions are answered in a gray shaded box **OR**
- The only issues found are determined to *NOT* be a sanitary defect (this includes any water system that only finds issues with sampling procedures)

The EPA manual is available on the EPA website and will soon be added to the DEP RTCR website. The link to the document is: <http://tinyurl.com/EPA-assessments>

Level 1 Assessment Submission

Proposed Chapter 109.701(9) and 109.705 as well as the federal RTCR, require that a water system shall complete an assessment and submit a report to the Department within 30 days of learning that they triggered the assessment.

Trigger Date for Too Many Positive Samples:

If the water system triggers the assessment because of too many positive samples, the trigger date is the **analysis date of the positive sample** that caused the trigger.

- This means water systems should be keeping track of the number of positive samples in the month.
- Labs notify systems of a positive sample result within 1 hour of analysis. By keeping track of the positives, the system will know when an assessment is triggered.

Failure to submit the assessment within 30 days is a Tier 2 Treatment Technique Violation.

Example:

- Water system that serves 3,500 individuals
- Required to collect 4 routine coliform samples per month
- Here are the results:

| May | | | | | | |
|-----|-----|-----|----------------------|--------------------------------|----------------------------------|-----|
| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| 1 | 2 | 3 | 4 Routine Sample | 5 Analysis Date (Positive) | 6 3 Check Samples (Negative) | 7 |
| 8 | 9 | 10 | 11 Routine Sample | 12 Analysis Date (Negative) | 13 | 14 |
| 15 | 16 | 17 | 18 Routine Sample | 19 Analysis Date (Positive) | 20 3 Check Samples (Negative) | 21 |
| 22 | 23 | 24 | 25 Routine Sample | 26 Analysis Date (Negative) | 27 | 28 |
| 29 | 30 | 31 | | | | |

Was a Level 1 assessment triggered? _____

If yes, what is the trigger date? _____

Trigger Date for Failure to Collect All Check Samples:

If the water system triggers the assessment because it fails to collect all of the required check samples, the trigger date is the **day after the analysis date of the positive routine sample** (this represents the date that they should have taken the correct amount of check samples).

Failure to submit the assessment within 30 days is a Tier 2 Treatment Technique Violation.

For example, a system collects a sample on May 4th, which is analyzed to be positive for coliform on May 5th. The system collects 2 check samples on May 6th.

| May | | | | | | |
|-----|-----|-----|---------------------|-------------------------------|---------------------------------|-----|
| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| 1 | 2 | 3 | 4 Routine Sample | 5 Analysis Date (Positive) | 6 2 Check Samples (Negative) | 7 |

What is the trigger date? _____

Methods for Assessment Submission

- Regular Mail
- Certified Mail
- Fax (contact Sanitarian first)
- Scanned copy of form via E-mail (contact Sanitarian first)
- Hand Deliver to District Office

Mail delivery:

For regular mail or certified mail, it is important that water systems send it to the correct address listed on pages 10-12 of the form. They just need to look up the county that their system is located in and then see which office to send it to.

- *For counties marked with an asterisk (*), address to the appropriate County Health Department (CHD), which is an agent of DEP for the Safe Drinking Water Program."*

Important Note: DEP needs to receive the Assessment form within the 30 day timeframe so those systems submitting via mail will need to account for postal delivery time.

Level 1 Submission – DEP Determines Assessment is Insufficient

If the assessment is determined to be insufficient the department will notify the water system and request that the **water system** contact the department **within 14 days for a consultation**.

- The clock for the 14 day timeframe begins the date of the notification (the date of the letter, phone call, or e-mail from DEP).
- Once the state rule is final, this 14 day consultation will be a regulation and failing to consult will incur a Tier 3 reporting violation under Chapter 109.

Revised Assessment Required:

- If during the consultation with DEP it is determined that a revised assessment is required, the water system has **30 days from the date of consultation to submit a revised assessment**.
- In determining the due date, the "date of consultation" acts as the "trigger date".
- A system will incur a **treatment technique violation** that requires Tier 2 PN if either of the following occur.
 - The system fails to submit the revised assessment within the 30 day timeframe **OR**
 - The revised assessment that they submit is still insufficient. In other words, "two strikes and you are out".

Key Points:

- Two triggers for a Level 1 Assessment:
 - 2 or more TC+ samples OR >5% of samples TC+
 - Failure to take all repeat (check) samples
- Level 1 Assessment must be completed by personnel qualified to operate and maintain system.
- Level 1 Assessment form and instructions developed by DEP, water systems must use DEP form.
- Systems have 30 days to submit the completed assessment form
- Systems must consult with DEP within 14 days of notification from the DEP that assessment is insufficient
- Systems have 30 days from the date of consultation to submit a revised assessment

Lesson 3

Level 1 Assessment Scenario

Lesson 3: Level 1 Scenario Activity

Scenario Set-Up: Part 1

Public Water System: Yertown Community Water System

Yertown is nestled in the heart of Fawndale County with a population of 1,300 people.

Responsible Official: Jim Green (Township Supervisor)

Certified Operator: Cal E. Formhanz

The following is relevant information on the Yertown public water system:

Average Production: 70,500 GPD

Design Capacity: 190,000 GPD

Sources:

2 wells:

The system has two groundwater wells that both pump to the same treatment building

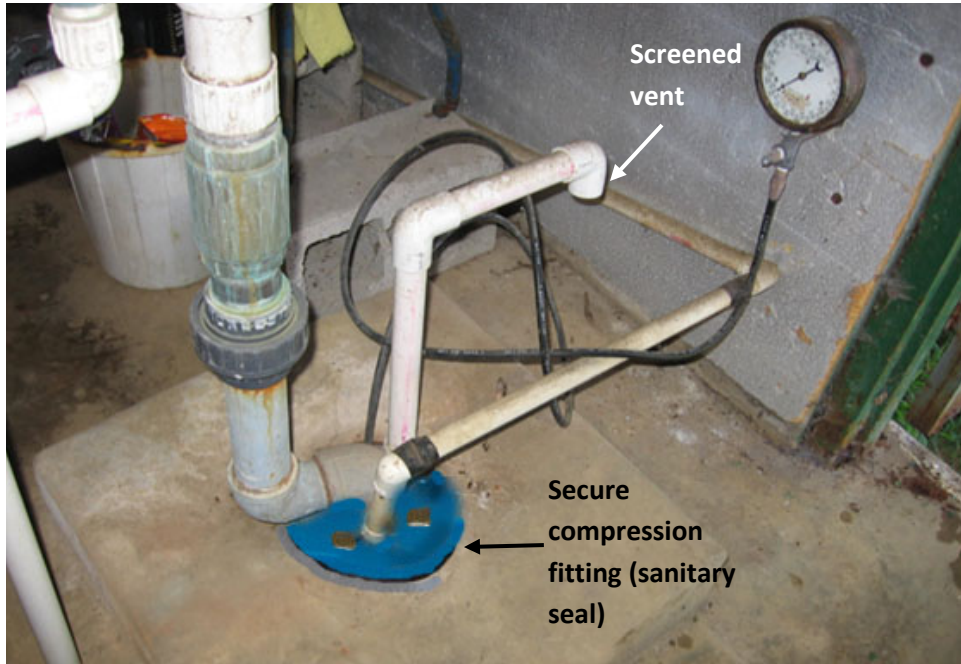
- Well #1 is located within the treatment building
- Well #2 is located about 100 feet from the building.

See pictures of both wells below.

Purchased interconnect:

The system also purchases an average of 30,000 gallons per day from East Park Borough, which is the neighboring town. East Park Borough is a medium size system that collects 10 routine coliform samples every month. The purchased water enters Yertown through an interconnect in the northwest side of the system.

Well #1 in treatment building:



Well #2



Treatment:

Treatment consists of the following:

Disinfection:

- Hypochlorite liquid disinfection
 - Note: Wells are blended prior to treatment

Iron removal

- Ion Exchange unit

Chlorine system picture:



Coliform monitoring:

- Required to collect 2 samples per month, but the system has three locations (see map):
 - South side of town in Pine Tree Estates (701)
 - Convenience Store (Business District) (702)
 - Residential area on the north side of town (703)

Storage:

- One 200,000 gallon concreted tank located near the treatment building
- Tank was installed in 2013

Scenario Part 1: Level 1 Assessment

After the first round of sampling in April 2016, Yertown received the following coliform results:

| Location ID | Location | Date Collected | Date Analyzed | Type | Total Coliform | <i>E. coli</i> | Free Chlorine Residual (mg/L) |
|-------------|-------------------|----------------|---------------|---------|----------------|----------------|-------------------------------|
| 702 | Convenience Store | 4/6/2016 | 4/7/2016 | Routine | + | - | 0.21 |
| 702 | Convenience Store | 4/7/2016 | 4/8/2016 | Check | + | - | 0.23 |
| 702 | Eng Engineering | 4/7/2016 | 4/8/2016 | Check | - | - | 0.22 |
| 702 | Print Shop | 4/7/2016 | 4/8/2016 | Check | + | - | 0.27 |

Scenario Activity Instructions:

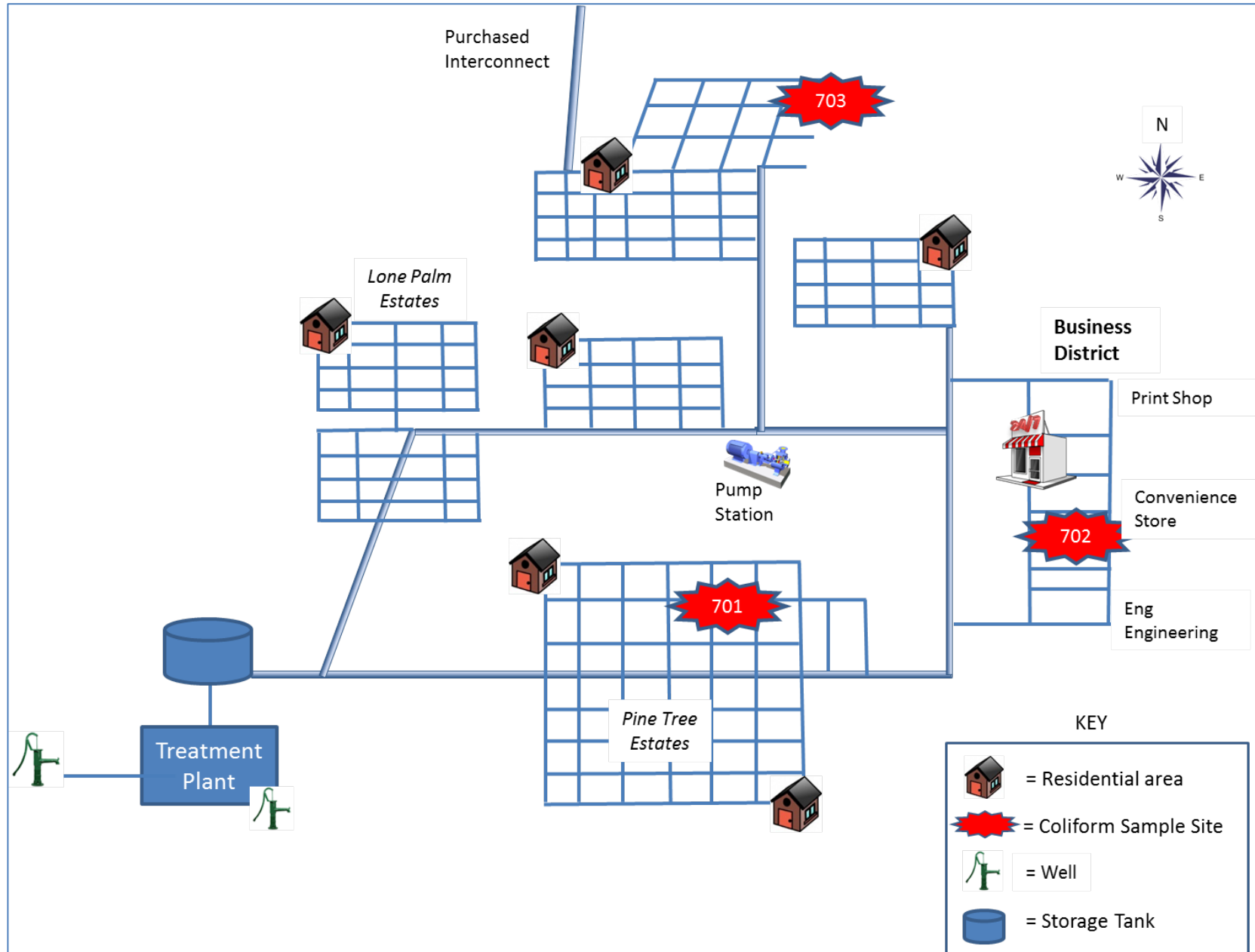
In this activity, you will begin the Level 1 Assessment using the information given above in addition to information collected from the selling system below.

1. Part I "General Information" on the Level 1 Assessment form has been completed already
2. Complete Part II "Positive Sample Information". There is missing positive sample data.
3. Complete Part IV "Assessment Questions": A. Source-Well and D. Source-Purchased (B and C are N/A)
 - o For A, use the pictures and the information provided on the previous pages (3-1 to 3-3)
 - o For "D", use the Selling System Information below

Additional Information from Selling System:

You contact East Park on April 9th and find out the following:

2. East Park's recent coliform results were as follows:
 - a. January: All samples negative for coliform
 - b. February: All samples negative for coliform
 - c. March: All samples negative for coliform
 - d. April: First week of samples were analyzed and all were negative for coliform.
3. Additional water quality data, such as pH and chlorine residuals, have all been normal over the last 3 months.
4. Within the selling system, there were two small line breaks in January which required valving off limited areas of the distribution and repairing the affected section. The breaks were properly repaired following the required disinfection methods (AWWA Standard C-651). All of the follow-up coliform samples were negative.
5. The selling system's distribution system pressure is consistently maintained.
6. The selling system stated that there has not been any water related customer complaints within the past two months.



Lesson 4

Level 2 Assessments

Lesson 4: Level 2 Assessments

Objectives:

After this lesson, you will be able to:

- Define the Level 2 Assessment
- Identify the Level 2 Assessment triggers
- Determine who should conduct a Level 2 Assessment
- Describe the differences between the Level 1 & Level 2 Assessment and Corrective Action Forms

What is a Level 2 Assessment?

Definition:

“An evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and when possible the likely reason that the system triggered the assessment.”

A Level 2 Assessment “**provides a more detailed examination of the system** (including the system’s monitoring and operational practices) than does a Level 1 assessment through the use of more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices.”

As part of the Assessment, water systems are expected to examine and collect water quality data from:

- Raw water
- Entry points
- Distribution/plumbing system

This is in addition to a detailed investigation into their monitoring and operational practices.

Level 2 Triggers

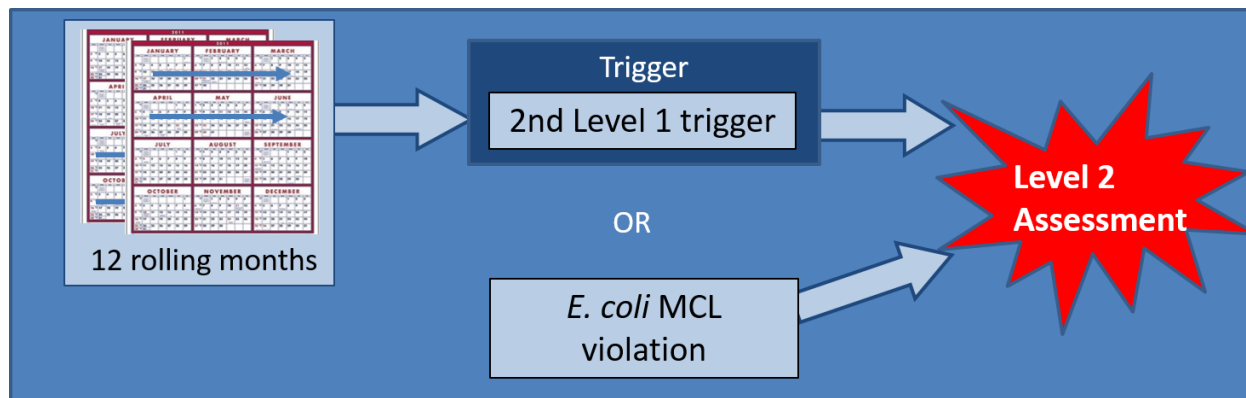
Unlike the Level 1 Assessment triggers, the triggers for a Level 2 Assessment are not separated by the amount of samples that a system collects each month.

- The triggers are the same for all system types and sizes.

There are two triggers for a Level 2 Assessment:

1. A system triggers another Level 1 Assessment within a rolling 12 month period
2. A system has an *E. coli* MCL violation

Visual representation of triggers:



Rolling 12 month period:

A rolling 12 months means that the year timeframe begins the month that the first Level 1 Assessment is triggered, it does not reset for being in a new calendar year (i.e. January).

- For example, if a system triggers a Level 1 Assessment on the 3rd of May and they trigger another Level 1 Assessment on April 30th of the following year, since it is within the same rolling 12 month timeframe the second assessment would become a Level 2.

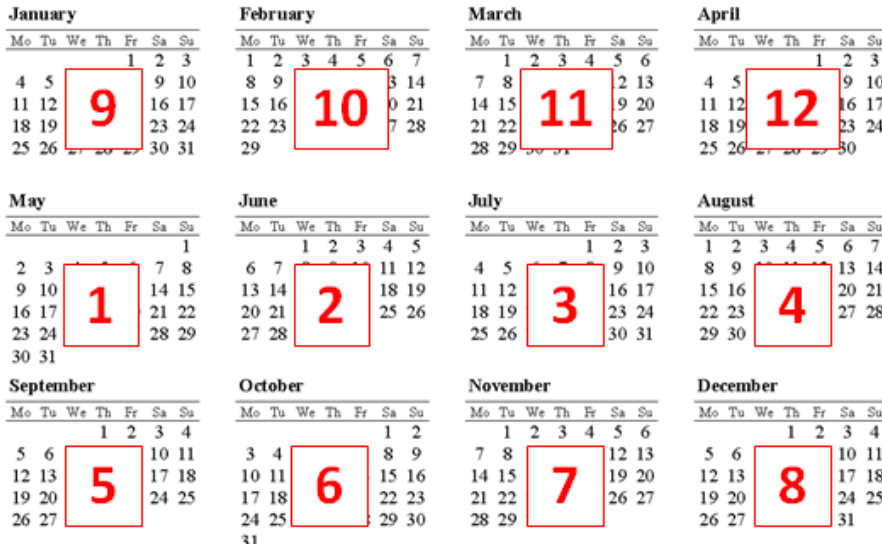
| May 2016 | | | | | | |
|----------|-----|-----|-----|-----|-----|-----|
| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

| April 2017 | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|
| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

Level 1 Trigger Date + Level 1 Trigger Date = **Level 2 Assessment**

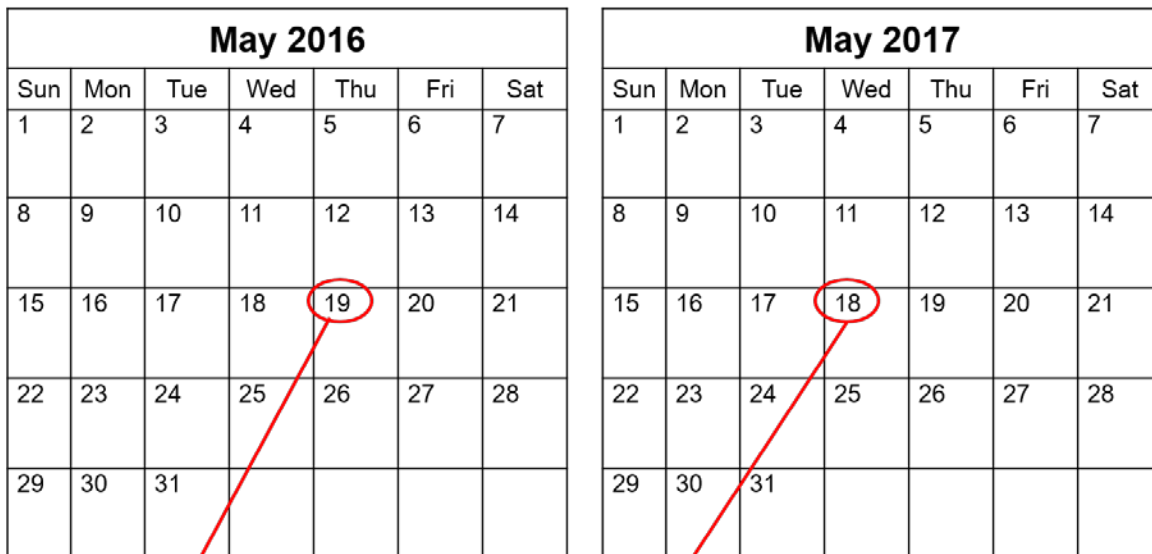
Another way to look at the 12 month rolling period:

If a system triggered a Level 1 in May 2016, that would be “month 1” and they count through the entire year until they get to month 12. You can see that the rolling 12 months is different than a rolling 365 days.



Example 2: 12 month rolling period:

- System triggers the first Level 1 Assessment on the 19th of May in 2016
- And another Level 1 Assessment on May 18th of the following year
- The system has begun a new 12 month timeframe and would therefore be required to just conduct another Level 1.



Level 1 Trigger Date + Level 1 Trigger Date = **Level 1 Assessment**

ACTIVITY #1: Level 2 Trigger

1) Notown Water System serves a population of 2,600 and collects 3 samples per month.

- On April 11, 2016 they collected a sample at a routine monitoring location and on April 12, 2016 the result came back total coliform positive.
- On April 13, 2016 they collected three check samples that were analyzed on April 14, 2016, one sample was positive and the other two were negative for total coliform.
- The rest of their routine samples for the month were negative for total coliforms.

Circle the correct answer below:

- a) This system triggered a Level 1 Assessment
- b) This system triggered a Level 2 Assessment
- c) No Assessment Triggered

2) If they triggered an assessment, what would the trigger date be?**3) Notown Water System continues to collect monthly coliform samples and doesn't have another positive until the following year:**

- On March 29, 2017 they collected a sample at a routine monitoring location and on March 30, 2017 the result came back total coliform positive.
- On March 31, 2017 they collected two check samples that were analyzed on April 1, 2017 and the results came back negative.
- The rest of their routine samples for the month were negative for total coliforms.

Circle the correct answer below:

- a) This system triggered a Level 1 Assessment
- b) This system triggered a Level 2 Assessment
- c) No Assessment Triggered

4) If they triggered an assessment, what would the trigger date be?

E. Coli MCL violations

The second Level 2 Assessment Trigger is when a system fails to meet the *E. coli* MCL.

A water system is in violation of the *E. coli* MCL if any of the following occur:

| Sample Result Type: ROUTINE | Sample Result Type CHECK | E. coli MCL Violation |
|--------------------------------|---|--------------------------|
| <i>EC+</i> | TC+ | YES |
| <i>EC+</i> | Any missing check sample | YES |
| TC+ | <i>EC+</i> | YES |
| TC+ | TC+ (but no <i>E. coli</i> analyses) | YES |

ACTIVITY #2: Level 2 *E. coli* MCL Trigger

Indicate if each scenario below is a violation of the *E. coli* MCL by putting a check mark under the appropriate column (YES or NO)

| Scenario | E. Coli MCL Violation | |
|---|--------------------------|----|
| | YES | NO |
| Water Company A collects a routine sample that is positive for <i>E. coli</i> (<i>EC+</i>). All three check samples come back negative for coliform bacteria (TC-). | | |
| Water Company B collects a routine sample that is positive for total coliform (TC+). One of the three check samples collected is <i>EC+</i> . | | |
| Water Company C collects a routine sample that is <i>EC+</i> . They collect two check samples, both are TC-. | | |
| Water Company D collects a routine sample that is <i>EC+</i> during the first week of the month; all of their check samples are negative. Their second routine sample of the month also comes back <i>EC+</i> with all of the check samples negative. | | |
| Water Company E collects a routine sample that is TC+ and collects three checks samples. One check sample is TC+ and no <i>E. coli</i> analysis was conducted. | | |
| Water Company F collects a routine sample that is TC+ and collects two check samples, both are TC-. | | |
| Water Company G collects a routine sample that is <i>EC+</i> and one of the three check samples is TC+. | | |

Who Conducts Level 2 Assessment?

Once DEP has a final rule in place, (expected October 2016) a Level 2 Assessment must be conducted by an individual who is appropriately certified for the size and treatment technologies of the water system being assessed.

- It is acceptable and encouraged that the Assessor uses the assistance of other individuals with expertise on various portions of the water system when answering assessment questions.
- Even if the Assessor (certified operator) uses assistance from others they are the one who is ultimately responsible for signing the assessment form and overseeing the assessment process.

Note: It would be acceptable for a large water system that has a plant operator certified for everything except Class E (distribution), and a distribution operator with a Class E license to both sign the form. This should only occur for large systems where there may not be one individual with all certifications and they have designated two as the operator(s) in responsible charge.

Level 2 Assessment Form

Part I: General Information

Part II: Positive Sample Information

Part III: Sampling Issue Descriptions and Corrective Actions

Part IV: Assessment Questions

Part V: Issue Descriptions and Corrective Actions

Part VI: Verification

Key Differences from Level 1 Assessment Form

Part I

- The form asks for the assessor's DEP client ID and the individual's operator class and subclass certifications. The Level 2 assessor needs to be an individual appropriately certified to operate the water system being assessed.
- The assessor is required to identify the reason for level 2 assessment was triggered:
 - Because of an *E. coli* MCL violation **OR**
 - Because this is the 2nd level 1 assessment in a rolling 12 months
- If the assessment was triggered because of an *E. coli* MCL, the assessor must identify which sample from the positive sample boxes in Part II. were positive for *E. coli*.

Part IV

- Rather than a combined section for Distribution/Plumbing as in the Level 1 form, the Level 2 form splits this section into:
 - Section F for plumbing systems with single service connections only,
 - Public water systems that have a single building such as a restaurant or an apartment building.
 - Section G for the distribution system for any system that has multiple service connections.
- You'll notice a lot more questions under each section. Since Level 2 is a more detailed evaluation of the water system, the questions are more focused. The assessor is required to take a deeper look at the various aspects of their system including water quality monitoring at the source, entry point, and distribution system.
- It is acceptable and even encouraged that the Assessor solicits assistance from individuals who may have expertise in different portions of the water system when completing this portion of the assessment.
 - For example, an operator who works primarily in the distribution system may be the most appropriate individual to answer questions about distribution pressures and line breaks.
 - However, an engineer who oversaw the installation of a storage tank may be the most knowledgeable about collecting representative samples from the tank.
 - Other individuals such as hydrogeologists and lab analysts could be useful when answering source or water quality monitoring questions.
 - The purpose of the assessment is to conduct the most in depth evaluation of the system as possible; if consulting with additional personnel from the water system allows the Assessor to accomplish this goal then it is recommended.
- There is no longer a question above the source sections that ask which sources were used the 30 days prior to triggering the assessment. The reason why there is no longer a question here is that for a Level 2 Assessment a water system is not allowed to only evaluate a portion of their system as they did in the Level 1 Assessment.

| |
|--------------------------------------|
| Level 2 Assessment Submission |
|--------------------------------------|

The submission process for a Level 2 Assessment is the same as it was for the Level 1 Assessment:

- Systems have 30 days to submit the completed assessment form (must be received by DEP within 30 days).
- Systems must consult with DEP within 14 days of notification sent from the DEP that the assessment is insufficient.
- Systems have 30 days from the date of consultation to submit a revised assessment.

Assessment Trigger Dates for an *E. coli* MCL Violation:

| Sample Result Type: ROUTINE | Sample Result Type CHECK | Assessment Trigger Date |
|--------------------------------|--------------------------------------|---|
| <i>EC+</i> | TC+ | Analysis date of TC+ check |
| <i>EC+</i> | Any missing check sample | Day after analysis date of <i>EC+</i> routine |
| TC+ | <i>EC+</i> | Analysis date of <i>EC+</i> check |
| TC+ | TC+ (but no <i>E. coli</i> analyses) | Analysis date of TC+ check that had no <i>EC</i> analysis conducted |

Key Points:

- Level 2 Assessment is a more in depth evaluation of the water system
- Two triggers for a Level 2 Assessment:
 - 2nd Level 1 in a rolling 12 months
 - *E. coli* MCL violation
- Level 2 Assessment form and instructions developed by DEP must be used by water systems
- Level 2 Assessment must be completed by an appropriately certified operator
 - May be assisted by personnel with expertise on specific portions of the system
- Submission Deadlines:
 - **30 days** to submit the completed assessment form
 - **14 days** to consult with DEP
 - **30 days** from the date of consultation to submit a revised assessment

Lesson 5

PN and CCRs

Lesson 5: Public Notification and Consumer Confidence Reports

Lesson Objectives

After this lesson you will be able to:

- Determine when to issue public notification (PN)
- Decide which Tier level of PN to issue
- Discuss the Consumer Confidence Report (CCR) requirements
- Locate examples of new RTCR PN templates for Tier 1 and some Tier 2 situations.

PN Deadlines

| RTCR Public Notice Deadlines for Public Water Systems (PWSs) | | | |
|--|-------------------------|---------------------|---|
| Tier | Deadline to Contact DEP | Deadline for Notice | PWS Violation and Situation Description |
| 1 | 1 hour | 24 hours | <p><u>Acute threat to public health:</u></p> <ul style="list-style-type: none"> • <i>E. coli</i> MCL violation |
| 2 | 1 hour | 30 days | <p><u>No immediate threat to public health:</u></p> <ul style="list-style-type: none"> • Failure to conduct an assessment; • Failure to take corrective action; • Seasonal system failure to complete the start-up procedure |
| 3 | 48 hours | 1 year | <p><u>No direct impact to public health:</u></p> <ul style="list-style-type: none"> • Failure to submit completed assessment forms; • Failure to maintain proper records; • Seasonal system failure to submit certification of completion of the start-up procedure |

Important Note: One Hour Reporting

While conducting an assessment, if an issue is discovered that requires 1 hour notification, the water system must call DEP within 1 hour

- Don't wait until submitting the assessment

For example, during an assessment, a system may discover a loss of positive pressure in the distribution system. This should be reported to DEP within 1 hour. The next page contains the complete list of situations that require 1 hour reporting under Chapter 109.

Chapter 109.701(a)

(3) *One-hour reporting requirements.* A public water supplier shall report the circumstances to the Department within 1 hour of discovery for the following violations or situations:

- (i) A primary MCL or an MRDL has been exceeded or a treatment technique requirement has been violated under Subchapter B, K, L or M.
- (ii) A sample result requires the collection of check samples under § 109.301.
- (iii) Circumstances exist which may adversely affect the quality or quantity of drinking water including, but not limited to:
 - (A) The occurrence of a waterborne disease outbreak.
 - (B) A failure or significant interruption in key water treatment processes.
 - (C) A natural disaster that disrupts the water supply or distribution system.
 - (D) A chemical spill.
 - (E) An unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination.
 - (F) An overfeed of a drinking water treatment chemical that exceeds a published maximum use value, such as National Sanitation Foundation's "Maximum Use Value," as applicable.
 - (G) A situation that causes a loss of positive water pressure in any portion of the distribution system where there is evidence of contamination or a water supplier suspects a high risk of contamination.
 - (H) A lack of resources that adversely affect operations, such as staff shortages, notification by the power utility of planned lengthy power outages or imminent depletion of treatment chemical inventories.

| |
|---|
| Specific Situations for Each Tier Classification |
|---|

1. Tier 1 *E. coli* MCL Violations Requiring Notice Within 24 Hours:

| RTCR Table: Tier 1 <i>E. coli</i> MCL Violations | |
|--|--|
| Routine Sample | Check Sample |
| <i>E. coli</i> + | Total Coliform + |
| <i>E. coli</i> + | Failure to take all required check samples |
| Total Coliform + | <i>E. coli</i> + |
| Total Coliform + | Total Coliform + and failure to analyze for <i>E. coli</i> |

2. Tier 2 Violations Requiring Notice Within 30 Days

- a. Failure to complete a Level 1 assessment.
- b. Failure to complete a Level 2 assessment.
- c. Failure to perform a corrective action for a sanitary defect identified during a Level 1 or Level 2 assessment.
- d. For seasonal noncommunity water systems (NCWS), failure to follow state-approved start-up procedures prior to serving water to the public.

3. Tier 3 Violations and Other Situations Requiring notice Within 1 Year

- a. Monitoring Violations:
 - Failure to take every required routine sample
 - Failure to analyze for *E. coli* following a **total coliform-positive** routine sample
- b. Reporting Violations:
 - Failure to submit a monitoring report or completed assessment form after a PWS properly conducts monitoring or assessment in a timely manner.
 - Failure to notify the state of an *E. coli*+ sample result in a timely manner.
 - For seasonal NCWS, failure to submit certification of completion of state-approved start-up procedure (when written records show start-up was performed and sampling showed no contamination.)
- c. Recordkeeping Violations:
 - Failure to maintain assessment forms, corrective action documentation or other summary documentation of sanitary defects for at least 5 years.
 - Failure to maintain a record of any check sample taken that meets state criteria for an extension of the 24-hour period for collecting check samples.

Public Notice Templates

RTRC Public Notification Template examples in Appendix C:

- Tier 1 PN for Violating the *E. coli* MCL.
- Tier 2 PN for Failure to complete a Level 1 assessment.
- Tier 2 PN for Failure to complete a Level 2 assessment (related to *E. coli*.)
- Tier 2 PN for Failure to perform a corrective action for a sanitary defect (related to total coliform.)

List of all PN Templates – RTRC website:

All of the RTRC Tier 2 and Tier 3 templates will be available by May 1st at the RTRC website: <http://tinyurl.com/ParTRC2> . The total list of RTRC templates is as follows:

- Tier 1 PN for Violating the *E. coli* MCL.
- Tier 2 PN for Failure to Complete a Level 1 Assessment
- Tier 2 PN for Failure to Complete a Level 2 assessment (related to *E. coli*)
- Tier 2 PN for Failure to Complete a Level 2 assessment (triggered by a second Level 1 assessment)
- Tier 2 PN for Failure to Perform corrective actions (related to total coliform)
- Tier 2 PN for Failure to Perform corrective actions (related to *E. coli*)
- Tier 2 PN Seasonal System Failure to Complete Start-Up Procedure Prior to Serving Water
- Tier 3 PN for Failure to Report an *E. coli* MCL Violation or positive sample
- Tier 3 PN for Failure to Submit a completed assessment form
- Tier 3 PN for Seasonal System Failure to Submit Certification of Completion of a Start-Up Procedure Prior to Serving Water

Public Notification (PN) Exercise

Directions: For each question below, circle the correct answer.

1. Failure to perform a Level 2 assessment
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 - d. No PN required
2. Total coliform-positive routine sample followed by an *E. coli*+ check sample
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 - d. No PN required
3. Total coliform-positive routine (*E. coli* not present) followed by a total coliform-positive check (*E. coli* not present); PWS collects less than 40 samples/month
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 - d. No PN required
4. A system completes their Level 1 assessment sample within 30 days of the trigger date, but fails to submit it within 30 days of the trigger date.
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 - d. No PN required

| |
|----------------------------|
| PN Delivery Methods |
|----------------------------|

| Public Notice Delivery Methods for PWSs | | |
|--|---------------------|---|
| Tier | Deadline for Notice | Delivery Methods |
| 1 | 24 hours | <ul style="list-style-type: none"> • CWS: Provide direct delivery of public notice to each service connection using one or more of the following methods: hand delivery, electronic mail, automatic telephone dialing systems, or another form of direct delivery approved in writing by DEP. <ul style="list-style-type: none"> ○ Provide public notice to transient and nontransient service connections (if applicable) by using appropriate broadcast media (radio or television). • NCWS/Seasonal: Post in a conspicuous location* for at least 7 days |
| 2 | 30 days | <ul style="list-style-type: none"> • CWS: Mail or other direct delivery, and any other method as needed to reach others • NCWS/Seasonal: Post in a conspicuous location* for at least 7 days |
| 3 | 1 year | <ul style="list-style-type: none"> • CWS: Mail or other direct delivery, and any other method as needed to reach others (e.g. via the CCR) • NCWS/Seasonal: Post in a conspicuous location* for at least 7 days |

* Conspicuous location: A location frequented by consumers (some examples might be to hang on a cash register at a restaurant, on the front door of wherever you check in at a campground or above a water fountain at a park.)

Note that due to the quickly changing nature of NCWS consumers, we are recommending that noncommunity systems post Tier 2 and Tier 3 public notice ASAP even though they can technically wait additional time to do so.

Consumer Confidence Reports (CCRs)

- A Community Water System (CWS) with *E. coli* + sample results must include the total number of positive samples in the table of detected contaminants.
- A CWS that detects *E. coli* and has violated the *E. coli* MCL must include a description of the MCL violation.
- A CWS that triggered a Level 1 or Level 2 assessment must inform their customers of:
 - The number of assessments required and completed
 - The corrective actions required and completed.
 - The reasons for conducting assessments and corrective actions.
 - Whether the CWS has failed to complete any required assessments or corrective actions.

Reminder: If the timing is appropriate, the CCR can be used for Tier 3 PN notification.

Example CCR Language is included in Appendix C.

PN Scenario Exercises

Directions: For each question below, circle the correct answer.

(Note: The 2 Appendices that may be helpful when doing this exercise are the PN & CCR Summary Table and the RTCR total coliform-positive Response Review.)

PN Scenario #1:

The West City CWS uses ground water and serves 3,500 people, so they are required to take 4 routine total coliform samples a month.

- During their routine sampling the first week of June 2017, one of their routine samples is **total coliform-positive** (*E. coli not present*)
 - In response, they collect a set of 3 check samples in accordance with their sample siting plan. One of the check samples is **total coliform-positive** (*E. coli not present*).
 - The system completes a Level 1 Assessment by the last week of July and submits it the first week of August, but both the completion and submission dates end up being 30 days past the trigger deadline.
1. Which public notification tier is required?
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 2. **True or False:** West City's CCR must include a summary of the corrective actions completed as a result of the Level 1 Assessment.

PN Scenario #2:

The Jeffsburg CWS serves 10,000 people, so they are required to take 10 routine total coliform samples a month.

- During the second week of April 2018, they are informed that one of their routine samples is **total coliform-positive**.
- In response, they collect a set of 3 check samples in accordance with their sample siting plan. One of the check samples is found to be ***E. coli* +**.
 1. Which public notification tier is required?
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 - d. No PN is required
 2. Has an assessment been triggered and if so, what type?
 - a. Yes – a Level 1 assessment
 - b. Yes – a Level 2 assessment
 - c. No assessment has been triggered

PN Scenario #3:

The Wake-Up Coffeehouse is a NCWS that also serves some food. The system collects one routine coliform sample a month.

- During the second week of September 2017, their routine coliform sample was **total coliform-positive**.
- In response, the NCWS collected a set of 3 check samples and one was found to be **total coliform-positive**.
- *E. coli* was not found in any of the samples.
 1. Which public notification tier is required?
 - a. Tier 1
 - b. Tier 2
 - c. Tier 3
 - d. No PN is required
 2. Has an assessment been triggered and if so, what type?
 - a. Yes – a Level 1 assessment
 - b. Yes – a Level 2 assessment
 - c. No assessment has been triggered

Key Points

- RTCR Public Notification:
 - ***E. coli*** MCL violations require Tier 1 PN.
 - Failure to conduct an assessment or to take corrective action requires Tier 2 PN
 - Failure to submit completed assessment forms or to maintain proper records requires Tier 3 PN.
- Community water systems must document *E. coli*+ samples, assessments triggered and any Tier 1 or Tier 2 situations in their CCR.
- Example PN Tier 1 and some Tier 2 templates can be found in the workbook appendix.

Appendix A

Assessment Forms



Note: *If this is your second Level 1 Assessment in the past 12 months this may NOT be the correct form, you should contact your local DEP office before proceeding.*

Interim Final

INSTRUCTIONS FOR LEVEL 1 ASSESSMENT AND CORRECTIVE ACTION FORM

GENERAL INFORMATION

The Environmental Protection Agency's (EPA) Revised Total Coliform Rule (RTCR) requires all public water supply systems (PWS) to complete a Level 1 Assessment in response to the triggers identified in 40 CFR Part 141.859. The purpose of the Level 1 Assessment is to identify the possible presence of sanitary defects and defects in distribution system coliform monitoring practices. The Level 1 Assessment must be conducted by personnel qualified to operate and maintain the water system's facilities (Assessor).

A sanitary defect is a defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place. If a sanitary defect is identified during the assessment, the Assessor must describe the sanitary defect, what corrective actions were completed, and a proposed timetable for corrective actions not yet completed. It is important to note that this form does not replace the need to contact the Department of Environmental Protection (DEP) or issue public notice for the situations specified in 25 Pa. Code Chapter 109.

Level 1 Assessments must be submitted to the DEP within 30 days of a PWS triggering the assessment. If upon review, the DEP determines that the assessment is insufficient, the PWS will be notified. Consultation between the DEP and the PWS should occur within 14 days of notification.

For assistance with proper completion of a Level 1 Assessment, the Assessor should consult the EPA's *Revised Total Coliform Rule Assessments and Corrective Actions Guidance Manual* which can be obtained at the following link: www.epa.gov/dwreginfo/revised-total-coliform-rule-assessments-and-corrective-actions

ITEM-BY-ITEM INSTRUCTIONS

Part I. General Information

The purpose of Part I. is to identify the public water system that is submitting the Level 1 Assessment form.

PWS Name: Name of the public water system (PWS)

PWS ID: The seven-digit PWS identification number assigned by DEP

Name of Responsible Official: Name of the responsible official for the PWS

Phone #: Phone number of the PWS responsible official

PWS Address: Mailing address of the PWS

E-mail: E-mail address where a "received receipt" should be sent indicating that the DEP received the form

Name of Assessor: Name of the individual conducting the Level 1 Assessment for the water system

Date Completed: Date that the Level 1 Assessment was completed

Part II. Positive Sample Information

The purpose of Part II. is to identify specific information about any positive coliform sample results during the monthly monitoring period. This information includes: sample location and ID#, sample date and collector, chlorine residual data, and questions regarding sample collection.

There are four positive sample tables under this part requiring identical information; a separate table should be used for each positive sample. Therefore, if a system had one positive monthly sample then only one table should be completed. If there were positive results at multiple locations within the distribution system or multiple positive samples at one location, including check samples, then additional tables should be completed. If more than four samples were positive, there are additional tables listed on page 7 of this form.

When completing the positive sample tables in this part, the Assessor should interview the individual who collected each sample in order to provide accurate data. To assist the Assessor in answering the questions at the bottom of each table, refer to the EPA *RTCR Assessments and Corrective Actions Guidance Manual* page 3-7, for sample collection information.

Positive Sample Table:

- **Sample Location ID#:** The unique three digit ID # used to identify total coliform sampling locations (specified in the total coliform sample siting plan)
- **Sample Location:** The name or address (including tap location) used when referring to the sampling location, (e.g. 50 Water Lane, Kitchen Sink Tap). This should be the same location description that is specified in the total coliform sample siting plan.
- **Positive Sample Date:** The date that the positive sample was collected.
- **Name of Sample Collector:** The name of the individual from either the water system or the laboratory who collected the sample.
- **Chlorine Residual at Time of Sample Collection:** In the first box, check free, total, or not measured to describe the residual monitoring conducted. In the second box, write the residual amount in mg/L that was measured.
- **Was the sample collected according to the total coliform sample siting plan?** Answer this question by checking either YES or NO. Each PWS is required to have a total coliform sample siting plan which specifies where and when all samples are to be collected each month, including information for check samples. If the samples were collected in accordance with this plan then the Assessor should check YES. If the samples were NOT collected in accordance with this plan (different location or schedule) then the Assessor should check NO.
- **Was the condition of the sample tap appropriate for collection?** Answer this question by checking either YES or NO. Any sample tap used for total coliform sample collection should be clean, free of leaks and debris, and be located away from possible sources of bacteriological contamination. If any of these conditions were not met the Assessor should check NO.
- **Were the samples collected in accordance with proper sample collection protocols?** Answer this question by checking either YES or NO. The sample collector must follow proper collection protocols including but not limited to removing the aerator, flushing the tap until water temperature has stabilized, and avoiding contact with the inside of the sample bottle or cap. If sample collection protocols were not properly followed then the Assessor should check NO.

Note: *If the shaded NO box is checked as the answer to any of the three questions listed above, the Assessor should consider it to be an issue and should complete a table under Part III. Sampling Issue Descriptions and Corrective Actions.*

Part III: Sampling Issue Descriptions and Corrective Actions

The purpose of Part III. is for the Assessor to indicate what sampling related issues were found during the assessment, describe what corrective actions will be taken to resolve the sampling issues and in what timeframe. This part should only be used to describe an issue found in *Part II. Positive Sample Information.* Under this part, there are four tables; if more than four sampling issues were found, the Assessor should use the tables on page 8 of this form to identify additional issues. The Assessor may print and attach to the back of the form as many additional page 8 tables as are needed; only one issue should be listed in each table.

Sampling Issue Descriptions and Corrective Actions Table:

- **Positive Sample#:** In this box, the Assessor should indicate what positive sample number from Part II. the issue was discovered in.
- **Question#:** In this box, the Assessor should indicate what question within the positive sample box the issue is relating to.

Example: If the Assessor answered NO to question #3 under Positive Sample #1 then they should enter **1** in the *Positive Sample#* box and **3** in the *Question #* box.

- **Issue-Description:** In this box, the Assessor should describe in detail the issue that was determined. This box must be completed for any answer that was checked in a shaded box (i.e. the answer was NO).

Example sampling issue description: The Assessor had checked the shaded box for question #3 for positive sample #1 and wrote the following issue description: *“After speaking with the sample collector from our lab, it was determined that the sample was collected from a kitchen sink that was leaking.”*

- **Corrective Action and Completion Schedule:** In this box, the Assessor should describe the corrective action(s) that the system has taken or plans to take to correct the sampling issue as well as the proposed schedule the PWS will follow while correcting the issue.

Example Corrective Action and Completion Schedule: Using the sampling issue example from above, an appropriate corrective action could be: *“After expressing our concern with the lab about their sampler collecting a sample from a leaking faucet, they have agreed to run a proper sample collection refresher course for all of their sample collectors. They will also provide detailed sample collection protocols for their sample collectors to take with them in the field. The lab indicated that these actions will occur within the next month.”*

Example of a Completed Sampling Issue Descriptions and Corrective Actions Table

| | | | |
|---|---|--|---|
| Positive Sample # | 1 | Question # | 3 |
| Sampling Issue Description | | Corrective Action and Completion Schedule | |
| <i>After speaking with the sample collector from our lab, it was determined that the sample was collected from a kitchen sink that was leaking.</i> | | <i>After expressing our concern with the lab about their sampler collecting a sample from a leaking faucet, they have agreed to run a proper sample collection refresher course for all of their sample collectors. They will also provide detailed sample collection protocols for their sample collectors to take with them in the field. The lab indicated that these actions will occur within the next month.</i> | |

Part IV. Assessment Questions

The purpose of Part IV. is to assist the Assessor in conducting a detailed investigation of the public water system by answering questions relating to specific portions of the system. This part is broken into seven sections (A-G) relating to the following areas of a public water system; source (well, spring, surface water, or purchased source), treatment process, distribution/plumbing system, and finished water storage. Each section contains questions specific to that heading which should be answered by checking the box under the appropriate answer (YES, NO, or N/A). For any question where the N/A column is blacked out the Assessor must answer the question with a YES or NO.

If the Assessor needs additional information on how to assess the various portions of the water supply, please see pages 3-6 through 3-20 of the EPA *RTCR Assessments & Corrective Actions Guidance Manual*.

Note: *Any time the answer to a question is checked in a gray shaded box, the Assessor should consider this to be an issue and complete a table under Part V. Issue Descriptions and Corrective Actions.*

If a section does not apply to a PWS (i.e., the “source-well” section would not apply to a PWS with surface water sources only), then the Assessor should check the box above the section and continue to the next one. Every PWS should answer the questions in *Section E. Distribution / Plumbing System*.

Instructions regarding sections A-C: Above the numbered questions for each non purchased source section, there is a fill in the blank question that asks the Assessor which sources were used during any of the 30 days prior to the water system triggering the assessment. For a Level 1 Assessment, the Assessor is only required to look at those sources indicated in the answer of these questions while conducting the assessment, however, it is recommended to assess all sources used by the public water system.

If the Assessor is unsure of what is being asked or does not know how to answer any of the questions in Part IV., he/she may contact the local Sanitarian for further assistance.

Part V: Issue Descriptions and Corrective Actions

The purpose of Part V. is for the Assessor to indicate what non sampling issues were found during the assessment, and for any issue determined to be a sanitary defect, describe what corrective actions will be taken to resolve the issue and in what timeframe. Prior to completing corrective actions, it is advised that the PWS contact and consult with the DEP. Under this part, there are four tables; if more than four issues were found, the Assessor should use the tables on page 9 of this form to identify additional issues. The Assessor may print and attach to the back of the form as many additional page 9 tables as are needed; only one issue should be listed in each table. For more information on corrective actions, the Assessor should reference pages 5-1 through 5-29 in the EPA *RTCR Assessments and Corrective Actions Guidance Manual*.

Issue Descriptions and Corrective Actions Table:

The top two boxes in the table ask the Assessor to identify what portion of the Assessment Form the issue was discovered in.

- **Section Letter:** In this box, the Assessor should indicate what section letter from Part IV. the issue was discovered in.
- **Question#:** In this box, the Assessor should indicate what question within the section letter identified above the issue is relating to.

Example: If the Assessor answered NO to question #4 under *Section E. Treatment Process* then they should enter E in the *Section Letter* box and 4 in the *Question #* box.

- **Issue-Description:** In this box, the Assessor should describe in detail the issue that was determined. This box must be completed for any answer that was checked in a shaded box.

Example description for an issue needing a corrective action: The Assessor had checked the shaded box for question E 1 and wrote the following issue description. *“The sediment filter located prior to our UV light hadn’t been changed on the appropriate frequency resulting in it becoming dirty and clogged.”*

Example description for an issue NOT needing a corrective action: The Assessor had checked the shaded box for question F 1, which indicates that line breaks, repairs or large firefighting events had occurred in the two months prior to triggering the assessment. The Assessor wrote the following issue description. *“The water system experienced two line breaks within the past two months, both breaks were repaired under pressure and in accordance with AWWA Standard C651, therefore we do not feel that these were sanitary defects.”* In this case a description is still necessary because a shaded box was checked; however a corrective action would not be necessary for this issue.

- **Sanitary Defect:** At the bottom of the issue description box there is a place for the Assessor to indicate whether or not the issue is a sanitary defect. Any issue that is found during the assessment that needs to be corrected should be considered a sanitary defect, because without correction the issue could provide a pathway of entry for microbial contamination into the distribution system or indicate the failure or imminent failure in a barrier that is already in place. Therefore, if the issue is determined to be a sanitary defect and

the Assessor checks YES, then the Corrective Action and Completion Schedule box in the table must be completed.

As a reminder, issues found with the sample collection practices (from the questions in *Part II.* of the form) are not sanitary defects because they do not provide a pathway of entry for microbial contamination into the distribution system. However, they are issues that should be addressed in *Part III.* and may require a corrective action.

- Corrective Action and Completion Schedule:** In this box, the Assessor should describe the corrective action(s) that the system has taken or plans to take to correct the sanitary defect or issue. In addition, this box is used to specify the proposed schedule the PWS will follow while implementing any corrective actions not yet completed. The proposed schedule should be as detailed as possible and include specific dates.

To help prevent unnecessary violations, it is advised that the PWS contact the DEP prior to completing any corrective actions. After speaking with the DEP, the PWS should complete all actions that can be corrected immediately and indicate what corrective action was taken and the timeframe in which it was resolved.

Example for a Corrective Action that has already occurred: Using the sediment filter example from above, an appropriate corrective action would be *“The sediment filter was replaced on DATE FILTER REPLACED. The sediment filter housing was properly cleaned and disinfected prior to putting the new filter in place and the maintenance supervisor has been informed to now change the filter once a month instead of once a quarter.”*

Example for a Corrective Action that has not yet occurred: However, if the issue was that the sanitary seal well cap on the well was broken and had not yet been replaced the Assessor would indicate here when the PWS planned to replace the broken well cap. Such as *“The PWS has an appointment with XYZ Well Drilling Company to replace the sanitary seal well cap on DATE WELL CAP WILL BE REPLACED.”*

Example of a Completed Issue Descriptions and Corrective Actions Table

| | | | |
|---|---|---|---|
| Section Letter | E | Question # | 4 |
| Issue Description | | Corrective Action and Completion Schedule | |
| <i>The sediment filter located prior to our UV light hadn't been changed on the appropriate frequency resulting in it becoming dirty and clogged.</i> | | <i>The sediment filter was replaced on October 5, 2016. The sediment filter housing was properly cleaned and disinfected prior to putting the new filter in place and the maintenance supervisor has been informed to now change the filter once a month instead of once a quarter.</i> | |
| Sanitary Defect: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> | | | |

Part VI: Verification

The purpose of Part VI. is for the Assessor and Responsible Official to certify that the information provided in the form is accurate and correct by signing and dating the form under this part.

If no sanitary defects were found during the assessment, the Assessor should check the box under this part which states:

“If no sanitary defects were found during the assessment, check this box to certify that the assessment was completed in accordance with the EPA RTCR Assessments and Corrective Actions Guidance Manual”

Once signed, the completed assessment form must be submitted to the appropriate DEP office within 30 days of the PWS triggering a Level 1 Assessment.

Instructions

The completed form should be addressed to: PA DEP – Safe Drinking Water, at the address of the appropriate office having jurisdiction over the water company (from the list on pages 10-12 of the assessment form). For counties marked with an asterisk (*), address to the appropriate County Health Department (CHD), which is an agent of DEP for the Safe Drinking Water Program.

If upon review, DEP determines that the assessment is insufficient, DEP will notify the PWS. Consultation between the DEP and the PWS should occur within 14 days of notification.

Note: *If this is your second Level 1 Assessment in the past 12 months this may NOT be the correct form, you should contact your local DEP office before proceeding.*

Interim Final
LEVEL 1 ASSESSMENT AND CORRECTIVE ACTION FORM

I. General Information

| | |
|--------------------------------------|------------------------|
| PWS Name: | PWSID #: |
| Name of Responsible Official: | Phone #: |
| PWS Address: | E-mail: |
| Name of Assessor: | Date Completed: |

II. Positive Sample Information* *Use page 7 to report additional positive monthly samples

| | | |
|--|----------------------|--|
| Positive Sample #1: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

| | | |
|--|----------------------|--|
| Positive Sample #2: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

| | | |
|--|----------------------|--|
| Positive Sample #3: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

| | | |
|--|----------------------|--|
| Positive Sample #4: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

III. Sampling Issue Descriptions and Corrective Actions

Note: A separate table should be completed for every question from Part II. that is answered in a shaded box.

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

IV. Assessment Questions

A. Source – Well

**If PWS does not use a well source check here and skip to section B .*

| Which well source(s) were used during any of the 30 days prior to triggering the assessment? _____ Questions | Answer to Question | | |
|---|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are any of the wells located in a pit? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Are the exposed portions of all well casings in good condition? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Do all wells have a secured sanitary seal well cap? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are the sanitary seal well caps vented and screened? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Is there an air gap between all well vents and the ground surface? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Have there been any unusual weather events that may have impacted the well sources? | <input type="checkbox"/> | <input type="checkbox"/> | |

B. Source – Spring

**If PWS does not use a spring source check here and skip to section C .*

| Which spring source(s) were used during any of the 30 days prior to triggering the assessment? _____ Questions | Answer to Question | | |
|---|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are all of the spring boxes locked? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Are drainage ditches and surface flow diverted away from the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Are the spring boxes maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are overflow vents and drain pipes screened? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Have there been unusual weather events that may have impacted the spring sources? | <input type="checkbox"/> | <input type="checkbox"/> | |

C. Source – Surface Water

**If PWS does not use a surface water source check here and skip to section D .*

| Which surface water source(s) were used during any of the 30 days prior to triggering the assessment? _____ Questions | Answer to Question | | |
|--|--------------------------|--------------------------|-----|
| | YES | NO | N/A |
| 1. Are all of the surface water intakes screened and maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Have severe weather events such as heavy rainfall, rapid snowmelt, drought, or reservoir turnover occurred? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Are you aware of new sources of contamination in the watershed? | <input type="checkbox"/> | <input type="checkbox"/> | |

D. Source – Purchased (Surface Water or Groundwater)

**If PWS does not use a purchased source check here and skip to section E .*

| The selling PWS should be contacted prior to answering these questions. Questions | Answer to Question | | |
|--|--------------------------|--------------------------|-----|
| | YES | NO | N/A |
| 1. Was selling PWS contacted in order to accurately answer the questions in this section? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Did the selling system have any positive sample results within two months of the assessment being triggered? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Does water quality data collected within the selling system show results indicative of an issue? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Had line breaks and repairs, or large firefighting events occurred within the selling system within two months of the assessment being triggered? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. Is the distribution system pressure maintained within the selling system? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Had the selling system received any water related customer complaints within two months of the assessment being triggered? | <input type="checkbox"/> | <input type="checkbox"/> | |

E. Treatment Process

**If PWS does not utilize any treatment check here and skip to section F .*

| Questions | Answer to Question | | |
|--|--------------------------|--------------------------|-----|
| | YES | NO | N/A |
| 1. Have there been interruptions in any treatment processes? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Have there been changes to any treatment processes? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Does water quality data collected at the treatment plant indicate inadequate and/or inappropriate treatment of water? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are all treatment processes being maintained and operational? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. Is there an air gap between treatment instrumentation and waste lines? | <input type="checkbox"/> | <input type="checkbox"/> | |

F. Distribution / Plumbing System

| Questions | Answer to Question | | |
|---|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Have line breaks and repairs, or large firefighting events occurred in the past two months? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. If samples were collected from inside a building, has there been any recent plumbing work conducted at the site? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. If samples were collected from the inside of a building, does the site have supplementary water treatment installed? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Is the system pressure maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. Has a cross connection survey been conducted in the past year? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Are pump stations maintained and equipment operational? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Does water quality data collected in the system show results indicative of an issue? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Have any water related customer complaints been received? | <input type="checkbox"/> | <input type="checkbox"/> | |

G. Finished Water Storage

**If PWS has no finished water storage, check here and skip to Part V. .*

| Questions | Answer to Question | | |
|---|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are all vents and overflow pipes screened? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Are all tanks maintained and free of rust, holes and leaks? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Are signs of vandalism visible? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are roof hatches and manhole openings tightly covered and locked? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Do downspouts and overflow pipes drain water away from structures? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

V. Issue Descriptions and Corrective Actions

Note: A separate table should be completed for every question from Part IV. that is answered in a shaded box.

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

VI. Verification

I hereby certify that the information contained herein is true and correct to the best of my knowledge, information and belief.

***If no sanitary defects were found during the assessment, check this box to certify that the assessment was completed in accordance with the EPA *RTCR Assessments and Corrective Actions Guidance Manual*:**

| | |
|--|--------------|
| Assessor's Signature: | Date: |
| Responsible Official's Signature: | Date: |

NOTES:

- The completed form must be submitted to DEP within 30 days of a public water system triggering a Level 1 Assessment.
- The completed form is to be addressed to: PA DEP – Safe Drinking Water, at the address from the list on pages 10-12 of the appropriate district office having jurisdiction over the public water system. For counties marked with an asterisk (*), address to the appropriate County Health Department (CHD), which is an agent of DEP for the Safe Drinking Water Program.

VII. State Review NOTE: This table is to be completed by the DEP representative reviewing the assessment

| | | |
|---|--|---|
| Name of Reviewer: | | Date Reviewed: |
| Assessment Sufficient: YES <input type="checkbox"/> NO <input type="checkbox"/> | | Consultation Required*: YES <input type="checkbox"/> NO <input type="checkbox"/> |
| Corrective Actions Completed: YES <input type="checkbox"/> NO <input type="checkbox"/> N/A: <input type="checkbox"/> | | Proposed Schedule Acceptable: YES <input type="checkbox"/> NO <input type="checkbox"/> |
| Likely Reason for Positive Samples Determined: YES <input type="checkbox"/> NO <input type="checkbox"/> | | Assessment Level Reset: YES <input type="checkbox"/> NO <input type="checkbox"/> |
| Signature of Reviewer: | | |
| Signature of Supervisor: | | Date: |

***Note:** If consultation with the water system occurs, the DEP reviewer should complete an "Assessment Consultation Form" and attach it to the back of the assessment.

Reporting for Additional Positive Samples (continued from Part II., page 1)

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L | |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L | |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L | |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L | |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L | |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

Reporting for additional Sampling Issue Descriptions and Corrective Actions (cont. from Part III., page 2)

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

Reporting for additional Issue Descriptions and Corrective Actions (continued from Part V., page 5)

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

DEP Office and County Health Department Contact Information by County

| County | Address | Telephone # | Fax # |
|------------|--|--|--|
| Adams | York District Office 150 Roosevelt Ave., Ste. 200, York, PA 17401 | 717-771-4481 | 717-845-3496 |
| Allegheny | Allegheny County Health Department 3901 Penn Ave., Bldg. 5, Pittsburgh, PA 15224 | 412-578-8047 | 412-578-8053 |
| Armstrong | New Stanton District Office 131 Broadview Rd., New Stanton, PA 15672 | 724-925-5500 | 724-925-5557 |
| Beaver | Beaver Falls District Office 715 15 th St., Beaver Falls, PA 15010 | 724-847-5270 | 724-847-5281 |
| Bedford | Altoona District Office 3001 Fairway Dr., Altoona, PA 16602 | 814-946-7292 | 814-949-7938 |
| Berks | Reading District Office 1005 Cross Roads Blvd., Reading, PA 19605 | 610-916-0100 | 610-916-0110 |
| Blair | Altoona District Office 3001 Fairway Dr., Altoona, PA 16602 | 814-946-7292 | 814-949-7938 |
| Bradford | Mansfield District Office 600 Gateway Dr., Mansfield, PA 16933 | 570-662-0830 | 570-662-0843 |
| Bucks | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | 484-250-5980 | 484-250-5971 |
| Butler | New Castle District Office 121 N. Mill St., New Castle, PA 16101 | 724-656-3160 | 724-656-3267 |
| Cambria | Cambria District Office 286 Industrial Park Rd., Ebensburg, PA 15931 | 814-472-1900 | 814-472-1861 |
| Cameron | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Carbon | Pottsville District Office 5 W. Laurel Blvd., Pottsville, PA 17901 | 570-621-3118 | 570-621-3430 |
| Centre | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Chester | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | 484-250-5980 | 484-250-5971 |
| Clarion | Knox District Office P.O. Box 669, Knox, PA 16232 | 814-797-1191 | 814-797-2706 |
| Clearfield | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Clinton | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Columbia | Sunbury District Office 309 N. 5 th St., Ste D, Sunbury, PA 17801 | 570-988-5500 | 570-988-5507 |
| Crawford | Northwest Regional Office 230 Chestnut St., Meadville, PA 16335 | 814 -332-6899 | 814-332-6121 |
| Cumberland | York District Office 150 Roosevelt Ave., Ste. 200, York, PA 17401 | 717-771-4481 | 717-845-3496 |
| Dauphin | Southcentral Regional Office 909 Elmerton Ave., Harrisburg, PA 17110 | 717-705-4708 | 717-705-4930 |
| Delaware | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | 484-250-5980 | 484-250-5971 |
| Elk | Warren District Office 321 N. State St., North Warren, PA 16365 | 814-723-3273 | 814-723-0964 |
| Erie | <i>For Community & Nontransient PWS:</i> Warren District Office 321 N. State St. North Warren, PA 16365 | <i>For Transient PWS:</i> Erie County Health Dept. Drinking Water Program 606 W. Second St. Erie, PA 16507 | <u>Warren:</u> 814-723-3273 <u>Erie CHD:</u> 814-451-6700 |

| County | Address | | Telephone # | Fax # |
|----------------|--|---|------------------------------------|--------------|
| Fayette | California District Office 25 Technology Dr., Coal Center, PA 15423 | | 724-769-1100 | 724-769-1102 |
| Forest | Warren District Office 321 N. State St., North Warren, PA 16365 | | 814-723-3273 | 814-723-0964 |
| Franklin | York District Office 150 Roosevelt Ave., Ste. 200, York, PA 17401 | | 717-771-4481 | 717-845-3496 |
| Fulton | York District Office 150 Roosevelt Ave., Ste. 200, York, PA 17401 | | 717-771-4481 | 717-845-3496 |
| Greene | California District Office 25 Technology Dr., Coal Center, PA 15423 | | 724-769-1100 | 724-769-1102 |
| Huntingdon | Altoona District Office 3001 Fairway Dr., Altoona, PA 16602-4473 | | 814-946-7292 | 814-949-7938 |
| Indiana | Cambria District Office 286 Industrial Park Rd., Ebensburg, PA 15931-4119 | | 814-472-1900 | 814-472-1861 |
| Jefferson | Knox District Office P.O. Box 669, Knox, PA 16232 | | 814-797-1191 | 814-797-2706 |
| Juniata | Southcentral Regional Office 909 Elmerton Ave., Harrisburg, PA 17110 | | 717-705-4708 | 717-705-4930 |
| Lackawanna | Scranton District Office 321 Spruce St., Ste. 300, Scranton, PA 18503 | | 570-963-4521 | 570-963-3421 |
| Lancaster | Lancaster District Office 1661 Old Philadelphia Pike, Lancaster, PA 17602 | | 717-299-7601 | 717-396-7178 |
| Lawrence | New Castle District Office 121 N. Mill St., New Castle, PA 16101 | | 724-656-3160 | 724-656-3267 |
| Lebanon | Lancaster District Office 1661 Old Philadelphia Pike, Lancaster, PA 17602 | | 717-299-7601 | 717-396-7178 |
| Lehigh | Bethlehem District Office 4530 Bath Pike, Bethlehem, PA 18017 | | 610-861-2070 | 610-861-2072 |
| Luzerne | Northeast Regional Office 2 Public Square, Wilkes-Barre, PA 18701-1915 | | 570-826-2511 | 570-830-3017 |
| Lycoming | Northcentral Regional Office 208 W. Third St., Ste. 101, Williamsport, PA 17701 | | 570-327-3490 | 570-327-3565 |
| McKean | Warren District Office 321 N. State St., North Warren, PA 16365 | | 814-723-3273 | 814-723-0964 |
| Mercer | <i>Southern Mercer County:</i> | <i>Northern Mercer County:</i> | <u>New Castle:</u> 724-656-3160 | 724-656-3267 |
| | New Castle District Office 121 N. Mill St. New Castle, PA 16101 | Northwest Regional Office 230 Chestnut St., Meadville, PA 16335 | <u>Meadville:</u> 814 -332-6899 | 814-332-6121 |
| Mifflin | Altoona District Office 3001 Fairway Dr., Altoona, PA 16602-4473 | | 814-946-7292 | 814-949-7938 |
| Monroe | Pocono District Office 2174B Route 611, Swiftwater, PA 18370 | | 570-895-4040 | 570-895-4041 |
| Montgomery | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | | 484-250-5980 | 484-250-5971 |
| Montour | Sunbury District Office 309 N. 5 th St., Ste. D, Sunbury, PA 17801 | | 570-988-5500 | 570-988-5507 |
| Northampton | Bethlehem District Office 4530 Bath Pike, Bethlehem, PA 18017 | | 610-861-2070 | 610-861-2072 |
| Northumberland | Sunbury District Office 309 N. 5 th St., Ste. D, Sunbury, PA 17801 | | 570-988-5500 | 570-988-5507 |
| Perry | Southcentral Regional Office 909 Elmerton Ave., Harrisburg, PA 17110 | | 717-705-4708 | 717-705-4930 |
| Philadelphia | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | | 484-250-5980 | 484-250-5971 |

| County | Address | Telephone # | Fax # |
|--------------|--|--------------|--------------|
| Pike | Pocono District Office 2174B Route 611, Swiftwater, PA 18370 | 570-895-4040 | 570-895-4041 |
| Potter | Mansfield District Office 600 Gateway Dr., Mansfield, PA 16933 | 570-662-0830 | 570-662-0843 |
| Schuylkill | Pottsville District Office 5 W. Laurel Blvd., Pottsville, PA 17901-2454 | 570-621-3118 | 570-621-3430 |
| Snyder | Sunbury District Office 309 N. 5 th St., Ste. D, Sunbury, PA 17801 | 570-988-5500 | 570-988-5507 |
| Somerset | Cambria District Office 286 Industrial Park Rd., Ebensburg, PA 15931-4119 | 814-472-1900 | 814-472-1861 |
| Sullivan | Northcentral Regional Office 208 W. Third St., Ste. 101, Williamsport, PA 17701 | 570-327-0830 | 570-327-0843 |
| Susquehanna | Scranton District Office 321 Spruce St., Ste. 300, Scranton, PA 18503 | 570-963-4521 | 570-963-3421 |
| Tioga | Mansfield District Office 600 Gateway Dr., Mansfield, PA 16933 | 570-662-0830 | 570-662-0843 |
| Union | Sunbury District Office 309 N. 5 th St., Ste. D, Sunbury, PA 17801 | 570-988-5500 | 570-988-5507 |
| Venango | New Castle District Office 121 N. Mill St., New Castle, PA 16101 | 724-656-3160 | 724-656-3267 |
| Warren | Warren District Office 321 N. State St., North Warren, PA 16365 | 814-723-3273 | 814-723-0964 |
| Washington | Beaver Falls District Office 715 15 th St., Beaver Falls, PA 15010 | 724-847-5270 | 724-847-5281 |
| Wayne | Scranton District Office 321 Spruce St., Ste. 300, Scranton, PA 18503 | 570-963-4521 | 570-963-3421 |
| Westmoreland | New Stanton District Office 131 Broadview Rd., New Stanton, PA 15672 | 724-925-5500 | 724-925-5557 |
| Wyoming | Northeast Regional Office 2 Public Square, Wilkes-Barre, PA 18701-1915 | 570-826-2511 | 570-830-3017 |
| York | York District Office 150 Roosevelt Ave., Ste. 200 York, PA 17401 | 717-771-4481 | 717-845-3496 |

Interim Final

INSTRUCTIONS FOR LEVEL 2 ASSESSMENT AND CORRECTIVE ACTION FORM

GENERAL INFORMATION

The Environmental Protection Agency's (EPA) Revised Total Coliform Rule (RTCR) requires all public water supply systems (PWS) to complete a Level 2 Assessment in response to the triggers identified in 40 CFR Part 141.859. The purpose of the Level 2 Assessment is to identify the possible presence of sanitary defects and defects in distribution system coliform monitoring practices. This evaluation provides a more detailed examination of the PWS than a Level 1 Assessment. The Level 2 Assessment must be conducted by an operator (Assessor) that is properly certified with the class and subclasses required for the PWS being assessed. However, it is acceptable and encouraged that the Assessor utilizes the assistance of other individuals with expertise on various portions of the water system when answering assessment questions.

A sanitary defect is a defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place. If a sanitary defect is identified during the assessment, the Assessor must describe the sanitary defect, what corrective actions were completed, and a proposed timetable for corrective actions not yet completed. It is important to note that this form does not replace the need to contact the Department of Environmental Protection (DEP) or issue public notice for the situations specified in 25 Pa. Code Chapter 109.

Level 2 Assessments must be submitted to the DEP within 30 days of a PWS triggering the assessment. If upon review, the DEP determines that the assessment is insufficient, the PWS will be notified. Consultation between the DEP and the PWS should occur within 14 days of notification.

For assistance with proper completion of a Level 2 Assessment, the Assessor should consult the EPA's *Revised Total Coliform Rule Assessments and Corrective Actions Guidance Manual* which can be obtained at the following link: <http://www.epa.gov/dwreginfo/revised-total-coliform-rule-assessments-and-corrective-actions>

ITEM-BY-ITEM INSTRUCTIONS

Part I. General Information

The purpose of Part I. is to identify the public water system that is submitting the Level 2 Assessment form.

PWS Name: Name of the public water system (PWS)

PWS ID: The seven-digit PWS identification number assigned by DEP

Name of Responsible Official: Name of the responsible official for the PWS

Phone #: Phone number of the PWS responsible official

PWS Address: Mailing address of the PWS

E-mail: E-mail address where a "received receipt" should be sent indicating that the DEP received the form

Name of Assessor: Name of the Assessor (as defined in the first paragraph of these instructions) conducting the Level 2 Assessment for the water system

Date Completed: Date that the Level 2 Assessment was completed

Assessor's DEP Client ID: The DEP client ID of the Assessor

Classes & Subclasses: The operator classes and subclasses held by the Assessor

Level 2 Trigger:

***E. Coli* MCL Violation:** Check YES if the Level 2 Assessment was triggered by an *E. Coli* MCL violation; check NO if it was triggered by a different issue.

If yes, which sample(s) from part II? If the assessment was triggered by an *E. Coli* MCL violation, indicate which sample number(s) from the tables in Part II. (page 1 and 9) caused the violation.

2nd Level 1 triggered in a rolling 12 months: Check YES if the Level 2 Assessment was triggered by two Level 1 Assessments being triggered within a rolling 12 month period, check NO if it was triggered by a different issue.

Part II. Positive Sample Information

The purpose of Part II. is to identify specific information about any positive coliform sample results during the monthly monitoring period. This information includes: sample location and ID#, sample date and collector, chlorine residual data, and questions regarding sample collection.

There are four positive sample tables under this part requiring identical information; a separate table should be used for each positive sample. Therefore, if a system had one positive monthly sample then only one table should be completed. If there were positive results at multiple locations within the distribution system or multiple positive samples at one location, including check samples, then additional tables should be completed. If more than four samples were positive, there are additional tables listed on page 9 of this form.

When completing the positive sample tables in this part, the Assessor should interview the individual who collected each sample in order to provide accurate data. To assist the Assessor in answering the questions at the bottom of each table, refer to the EPA *RTCR Assessments and Corrective Actions Guidance Manual* page 3-7, for sample collection information.

Positive Sample Table:

- **Sample Location ID#:** The unique three digit ID # used to identify total coliform sampling locations (specified in the total coliform sample siting plan)
- **Sample Location:** The name or address (including tap location) used when referring to the sampling location, (e.g. 50 Water Lane, Kitchen Sink Tap). This should be the same location description that is specified in the total coliform sample siting plan.
- **Positive Sample Date:** The date that the positive sample was collected.
- **Name of Sample Collector:** The name of the individual from either the water system or the laboratory who collected the sample.
- **Chlorine Residual at Time of Sample Collection:** In the first box, check free, total, or not measured to describe the residual monitoring conducted. In the second box, write the residual amount in mg/L that was measured.
- **Was the sample collected according to the total coliform sample siting plan?** Answer this question by checking either YES or NO. Each PWS is required to have a total coliform sample siting plan which specifies where and when all samples are to be collected each month, including information for check samples. If the samples were collected in accordance with this plan then the Assessor should check YES. If the samples were NOT collected in accordance with this plan (different location or schedule) then the Assessor should check NO.
- **Was the condition of the sample tap appropriate for collection?** Answer this question by checking either YES or NO. Any sample tap used for total coliform sample collection should be clean, free of leaks and debris, and be located away from possible sources of bacteriological contamination. If any of these conditions were not met the Assessor should check NO.
- **Were the samples collected in accordance with proper sample collection protocols?** Answer this question by checking either YES or NO. The sample collector must follow proper collection protocols such as removing the aerator, flushing the tap until water temperature has stabilized, and avoiding contact with the inside of the sample bottle or cap. If sample collection protocols were not properly followed then the Assessor should check NO.

Note: *If the shaded NO box is checked as the answer to any of the three questions listed above, the Assessor should consider it to be an issue and should complete a table under Part III. Sampling Issue Descriptions and Corrective Actions.*

Part III: Sampling Issue Descriptions and Corrective Actions

The purpose of Part III. is for the Assessor to indicate what sampling related issues were found during the assessment, describe what corrective actions will be taken to resolve the sampling issues and in what timeframe. This part should only be used to describe an issue found in *Part II. Positive Sample Information*. Under this part, there are four tables; if more than four sampling issues were found, the Assessor should use the tables on page 10 of this form to identify additional issues. The Assessor may print and attach to the back of the form as many additional page 10 tables as are needed; only one issue should be listed in each table.

Sampling Issue Descriptions and Corrective Actions Table:

- **Positive Sample#:** In this box, the Assessor should indicate what positive sample number from Part II. the issue was discovered in.
- **Question#:** In this box, the Assessor should indicate what question within the positive sample box the issue is relating to.

Example: If the Assessor answered NO to question #3 under Positive Sample #1 then they should enter **1** in the *Positive Sample #* box and **3** in the *Question #* box.

- **Issue-Description:** In this box, the Assessor should describe in detail the issue that was determined. This box must be completed for any answer that was checked in a shaded box (i.e. the answer was NO).

Example sampling issue description: The Assessor had checked the shaded box for question #3 for positive sample #1 and wrote the following issue description: *“After speaking with the sample collector from our lab, it was determined that the sample was collected from a kitchen sink that was leaking.”*

- **Corrective Action and Completion Schedule:** In this box, the Assessor should describe the corrective action(s) that the system has taken or plans to take to correct the sampling issue as well as the proposed schedule the PWS will follow while correcting the issue.

Example Corrective Action and Completion Schedule: Using the sampling issue example from above, an appropriate corrective action could be: *“After expressing our concern with the lab about their sampler collecting a sample from a leaking faucet, they have agreed to run a proper sample collection refresher course for all of their sample collectors. They will also provide detailed sample collection protocols for their sample collectors to take with them in the field. The lab indicated that these actions will occur within the next month.”*

Example of a Completed Sampling Issue Descriptions and Corrective Actions Table

| | | | |
|---|---|--|---|
| Positive Sample # | 1 | Question # | 3 |
| Sampling Issue Description | | Corrective Action and Completion Schedule | |
| <i>After speaking with the sample collector from our lab, it was determined that the sample was collected from a kitchen sink that was leaking.</i> | | <i>After expressing our concern with the lab about their sampler collecting a sample from a leaking faucet, they have agreed to run a proper sample collection refresher course for all of their sample collectors. They will also provide detailed sample collection protocols for their sample collectors to take with them in the field. The lab indicated that these actions will occur within the next month.</i> | |

Part IV. Assessment Questions

The purpose of Part IV. is to assist the Assessor in conducting a detailed investigation of the public water system by answering questions relating to specific portions of the system. This part is broken into eight sections (A-H) relating to the following areas of a PWS; source (well, spring, surface water or purchased source), treatment process, plumbing system or distribution system and finished water storage. Each section contains questions specific to that heading which should be answered by checking the box under the appropriate answer (YES, NO, or N/A). For any question where the N/A column is blacked out the Assessor must answer the question with a YES or NO.

If the Assessor needs additional information on how to assess the various portions of the water supply, please see pages 3-6 through 3-20 of the EPA *RTCR Assessments & Corrective Actions Guidance Manual*.

Note: Any time the answer to a question is checked in a gray shaded box, the Assessor should consider this to be an issue and complete a table under Part V. Issue Descriptions and Corrective Actions.

While completing this part of the assessment it is acceptable for the Assessor to utilize the assistance of other individuals with expertise on various portions of the water system. For example, an operator who works primarily in the distribution system may be the most appropriate individual to answer questions about distribution pressures and line breaks. However, an engineer who oversaw the installation of a storage tank may be the most knowledgeable about collecting representative samples from the tank. Other individuals such as hydrogeologists and lab analysts could be useful when answering source or water quality monitoring questions. The purpose of the assessment is to conduct the most in depth evaluation of the system as possible; if consulting with additional personnel from the water system allows the Assessor to accomplish this goal then it is recommended.

If a section does not apply to a PWS (i.e. the “source-well” section would not apply to a PWS with surface water sources only), then the Assessor should check the box above the section and continue to the next one.

Instructions regarding sections F and G: If a PWS has a single service connection, such as a restaurant or a community water system that is an apartment building, the Assessor should complete section *F. Plumbing System for a PWS with a Single Service Connection* and skip section G. However, if a PWS has multiple service connections such as a business park, state park, or a community water system with multiple homes, the Assessor should complete section *G. Distribution System for PWS with Multiple Service Connections*, and skip section F.

If the Assessor is unsure of what is being asked or does not know how to answer any of the questions in Part IV., he/she may contact the local Sanitarian for further assistance.

Part V: Issue Descriptions and Corrective Actions

The purpose of Part V. is for the Assessor to indicate what non sampling issues were found during the assessment, and for any issue determined to be a sanitary defect, describe what corrective actions will be taken to resolve the issue and in what timeframe. Prior to completing corrective actions, it is advised that the PWS contact and consult with the DEP. Under this part, there are four tables; if more than four issues were found, the Assessor should use the tables on page 11 of this form to identify additional issues. The Assessor may print and attach to the back of the form as many additional page 11 tables as are needed; only one issue should be listed in each table. For more information on corrective actions, the Assessor should reference pages 5-1 through 5-29 in the EPA *RTCR Assessments and Corrective Actions Guidance Manual*.

Issue Descriptions and Corrective Actions Table:

The top two boxes in the table ask the Assessor to identify what portion of the Assessment Form the issue was discovered in.

- **Section Letter:** In this box, the Assessor should indicate what section letter from Part IV. the issue was discovered in.
- **Question#:** In this box, the Assessor should indicate what question within the section letter identified above the issue is relating to.

Example: If the Assessor answered NO to question #4 under *Section E. Treatment Process* then they should enter E in the *Section Letter* box and 4 in the *Question #* box.

- **Issue-Description:** In this box, the Assessor should describe in detail the issue that was determined. This box must be completed for any answer that was checked in a shaded box.

Example description for an issue needing a corrective action: The Assessor had checked the shaded box for question G 3 and wrote the following issue description. *“A repair of a water line break occurred on INSERT DATE. After interviewing the contractor who repaired the break, we learned that the line was put back into service without adequately disinfecting it.”*

Example description for an issue NOT needing a corrective action: The Assessor had checked the shaded box for question G 1, which indicates that the water system has received customer complaints in the past two months. The Assessor wrote the following issue description. *“The PWS has received several complaints of high pressure in the Lowland Street portion of the water system. Complainants have been told that we do what is necessary to maintain pressure of between 25 psig and 150 psig throughout the distribution system and suggested that they install pressure reducers in their homes.”* In this case a description is still necessary because a shaded box was checked; however a corrective action would not be necessary for this issue.

- **Sanitary Defect:** At the bottom of the issue description box there is a place for the Assessor to indicate whether or not the issue is a sanitary defect. Any issue that is found during the assessment that needs to be corrected should be considered a sanitary defect, because without correction the issue could provide a pathway of entry for microbial contamination into the distribution system or indicate the failure or imminent failure in a barrier that is already in place. Therefore, if the issue is determined to be a sanitary defect and the Assessor checks YES, then the Corrective Action and Completion Schedule box in the table must be completed.

As a reminder, issues found with the sample collection practices (from the questions in *Part II.* of the form) are not sanitary defects because they do not provide a pathway of entry for microbial contamination into the distribution system. However, they are issues that should be addressed in *Part III.* and may require a corrective action.

- **Corrective Action and Completion Schedule:** In this box, the Assessor should describe the corrective action(s) that the system has taken or plans to take to correct the sanitary defect or issue. In addition, this box is used to specify the proposed schedule the PWS will follow while implementing any corrective actions not yet completed. The proposed schedule should be as detailed as possible and include specific dates.

To help prevent unnecessary violations, it is advised that the PWS contact the DEP prior to completing any corrective actions. After speaking with the DEP, the PWS should complete all actions that can be corrected immediately and indicate what corrective action was taken and the timeframe in which it was resolved.

Example for Corrective Action that has already occurred: Using the line repair example from above, an appropriate corrective action would be *“On INSERT DATES, additional chlorine residuals and coliform samples were collected in the vicinity of the break and indicated that the problem has been resolved. In addition, written SOPs, following AWWA Standard C651, have been created that contractors will be required to follow when repairing a break, including having someone from the water system witness the disinfection of the piping.”*

Example for Corrective Action that has not yet occurred: However, if the issue was that the sanitary seal well cap on the well was broken and had not yet been replaced the Assessor would indicate here when the PWS planned to replace the broken well cap. Such as *“The PWS has an appointment with XYZ Well Drilling Company to replace the sanitary seal well cap on DATE WELL CAP WILL BE REPLACED.”*

Example of a Completed Issue Descriptions and Corrective Actions Table

| Section Letter | G | Question # | 3 |
|---|---|--|---|
| Issue Description | | Corrective Action and Completion Schedule | |
| <i>A repair of a water line break occurred on December 10, 2016. After interviewing the contractor who repaired the break, we learned that the line was put back into service without being adequately disinfected.</i> | | <i>On December 15, 2016, additional chlorine residuals and coliform samples were collected in the vicinity of the break and indicated that the problem has been resolved. In addition, written SOPs, following AWWA Standard C651, have been created that contractors will be required to follow when repairing a break. The SOPs include having someone from the water system witness the disinfection of the piping.</i> | |
| Sanitary Defect: YES: <input checked="" type="checkbox"/> NO: <input type="checkbox"/> | | | |

Part VI: Verification

The purpose of Part VI. is for the Assessor and Responsible Official to certify that the information provided in the form is accurate and correct by signing and dating the form under this part.

If no sanitary defects were found during the assessment, the Assessor should check the box under this part which states:

“If no sanitary defects were found during the assessment, check this box to certify that the assessment was completed in accordance with the EPA RTCR Assessments and Corrective Actions Guidance Manual”

Once signed, the completed assessment form must be submitted to the appropriate DEP office within 30 days of the PWS triggering a Level 2 Assessment.

The completed form should be addressed to: PA DEP – Safe Drinking Water, at the address of the appropriate office having jurisdiction over the water company (from the list on pages 12-14 of the assessment form). For counties marked with an asterisk (*), address to the appropriate County Health Department (CHD), which is an agent of DEP for the Safe Drinking Water Program.

If upon review, DEP determines that the assessment is insufficient, DEP will notify the PWS. Consultation between the DEP and the PWS should occur within 14 days of notification.

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LEVEL 2 ASSESSMENT AND CORRECTIVE ACTION FORM

I. General Information

| | | |
|--------------------------------------|--|--|
| PWS Name: | | PWSID #: |
| Name of Responsible Official: | | Phone #: |
| PWS Address: | | E-mail: |
| Name of Assessor: | | Date Completed: |
| Assessor's DEP Client ID: | | Classes & Subclasses: |
| Level 2 Trigger | E. Coli MCL Violation: YES <input type="checkbox"/> NO <input type="checkbox"/> | If yes, which sample(s) from part II? |
| | 2nd Level 1 triggered in rolling 12 months: YES <input type="checkbox"/> NO <input type="checkbox"/> | |

II. Positive Sample Information *Use page 9 to report additional positive monthly samples

| | | |
|--|-----------------------------|---|
| Positive Sample #1: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

| | | |
|--|-----------------------------|---|
| Positive Sample #2: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

| | | |
|--|-----------------------------|---|
| Positive Sample #3: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

| | | |
|--|-----------------------------|---|
| Positive Sample #4: | Sample Location ID#: | Sample Location: |
| Positive Sample Date: | | Name of Sample Collector: |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> NO <input type="checkbox"/> |

III. Sampling Issue Descriptions and Corrective Actions

Note: A separate table should be completed for every question from Part II. that is answered in a shaded box.

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

IV. Assessment Questions

A. Source – Well

**If PWS does not use a well source check here and skip to section B .*

| Questions | Answer to Question | | |
|--|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are any of the wells located in a pit? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Is the ground graded to prevent surface water flow towards the wells? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Do the well casings extend at least 18" above the ground? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are the exposed portions of all well casings in good condition? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Do all wells have a secured sanitary seal well cap? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Are the sanitary seal well caps vented and screened? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Is there an air gap between all well vents and the ground surface? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Are appropriate backflow prevention devices installed, maintained and tested on all cross connections? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Were raw water turbidity measurements collected as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 10. Does raw water quality data collected from any of the wells indicate issues with the source water quality? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Has source yield changed for any of the wells? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 12. Are there obvious sources of contamination in the vicinity of any of the wells? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 13. Have any of the well pumps recently been repaired or replaced? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 14. Are there signs of vandalism at any of the wells? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 15. Have there been any unusual weather events that may have impacted the wells? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 16. Have there been any sewer overflows or spills, chemical spills or other disturbances in the area of the wells? | <input type="checkbox"/> | <input type="checkbox"/> | |

B. Source – Spring

**If PWS does not use a spring source check here and skip to section C .*

| Questions | Answer to Question | | |
|--|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are all of the spring boxes locked? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Are drainage ditches and surface flow diverted away from the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Are the spring boxes maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are overflow vents and drain pipes screened? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Were raw water turbidity measurements collected as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Does raw water quality data collected from any of the springs indicate changes to the source water quality? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Has the source yield changed for any of the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 8. Are there obvious sources of contamination in the vicinity of any of the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. Are there signs of vandalism at any of the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 10. Have there been unusual weather events that may have impacted the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 11. Have there been any sewer overflows or spills, chemical spills or other disturbances in the area of the springs? | <input type="checkbox"/> | <input type="checkbox"/> | |

C. Source – Surface Water

**If PWS does not use a surface water source check here and skip to section D .*

| Questions | Answer to Question | | |
|---|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are all surface water intakes screened and maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Are the intake pump houses protected from unauthorized personnel? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Does raw water quality data collected at the time of the positive sample indicate an issue with the water quality of any surface water source? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are there obvious sources of contamination within the watersheds? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. Are there signs of vandalism at any surface water intake? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Have severe weather events such as heavy rainfall, rapid snowmelt, or drought occurred? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 7. Has seasonal turnover occurred in any reservoir? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Have there been any sewer overflows or spills, chemical spills or other disturbances in the area of any of the surface water sources? | <input type="checkbox"/> | <input type="checkbox"/> | |

D. Source – Purchased (Surface Water or Groundwater)

**If PWS does not use a purchased source check here and skip to section E .*

| Questions | Answer to Question | | |
|---|--------------------------|--------------------------|-----|
| | YES | NO | N/A |
| <i>The selling PWS should be contacted prior to answering these questions.</i> | | | |
| 1. Was the selling PWS contacted in order to accurately answer the questions in this section? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Did the selling system have any positive sample results within two months of the assessment being triggered? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Does water quality data collected <i>within the selling system</i> show results indicative of an issue? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Were additional coliform bacteria samples collected at the interconnection as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. Were additional chlorine measurements collected at the interconnection as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Does water quality data collected <i>at any interconnection</i> show results indicative of an issue? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 7. Are all interconnections free of leaks? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 8. Have line breaks and repairs, or large firefighting events occurred within the selling system within two months of the assessment being triggered? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. Is the distribution system pressure maintained within the selling system? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 10. Has the selling system received any water related customer complaints? | <input type="checkbox"/> | <input type="checkbox"/> | |

E. Treatment Process

**If PWS does not utilize any treatment check here and skip to section F .*

| Questions | Answer to Question | | |
|--|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Have there been interruptions in any treatment processes? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Has the treatment plant(s) or finished water pump(s) experienced any power interruptions? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Has there been any recent installation or repair of treatment equipment? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Have there been changes to any treatment processes? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. If the PWS collects only one chlorine measurement per day, were additional chlorine measurements collected as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Were coliform bacteria samples collected at the entry point as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 7. Does water quality data indicate inadequate/inappropriate treatment of water? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 8. Are all treatment processes operational and maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. Is there an air gap between treatment monitoring instrumentation and waste lines? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Has any surface water treatment plant failed to meet required CT values for any length of time? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Has any groundwater treatment plant failed to meet 4-log inactivation of viruses for any length of time? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Did treatment plant flow rates exceed the permitted capacity? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 13. Is the PWS meeting all permit special conditions? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Did a review of the turbidity data reveal any anomalies? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

F. Plumbing System for a PWS with a Single Service Connection

**If PWS has multiple service connections check here and skip to section G .*

| Questions | Answer to Question | | |
|--|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Has there been any recent plumbing work conducted at the site? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Has the system experienced low or negative pressure within the past two months? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. Are appropriate backflow prevention devices installed, maintained, and tested on all cross connections within the system? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Does water quality data collected in the plumbing system show results indicative of an issue? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. Have any water related customer complaints been received in the past two months? | <input type="checkbox"/> | <input type="checkbox"/> | |

G. Distribution System for PWS with Multiple Service Connections

**If PWS does not have multiple service connections check here and skip to section H .*

| Questions | Answer to Question | | |
|---|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Have any water related customer complaints been received in the past two months? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. Has the percent of unaccounted for water increased from historical levels? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. If line breaks have occurred in the past two months were they repaired in accordance with AWWA Standard C651? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. If samples were collected from the inside of a building, has there been any recent plumbing work conducted at the site? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. If samples were collected from the inside of a building, does the site have supplementary water treatment installed? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Were pressure measurements taken as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 7. Did pressure measurements collected as part of this investigation indicate that the system is experiencing low or negative pressure? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Have large firefighting events or other situations occurred in the past two months that have resulted in low pressure in any portion of the distribution system? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. Does the water system have a flushing program in place? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 10. Are fire hydrants and blow offs maintained and operational without leaks? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Are pump stations protected from unauthorized personnel? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Are pump stations maintained and equipment operational? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Are appropriate backflow prevention devices installed, maintained, and tested on all cross connections? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Are air relief valves maintained and operational without leaks? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Were additional chlorine measurements collected as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Were additional coliform bacteria samples collected as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 17. Does water quality data collected in the distribution system show results indicative of an issue? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 18. Is there any evidence of intentional contamination in the distribution system? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 19. Were any leaks discovered during the course of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | |

H. Finished Water Storage

**If PWS has no finished water storage, check here and skip to Part V. .*

| Questions | Answer to Question | | |
|--|--------------------------|--------------------------|--------------------------|
| | YES | NO | N/A |
| 1. Are all pressure tanks maintaining an appropriate minimum pressure? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Are all vents and overflow pipes screened? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Are all tanks maintained and free of rust, holes and leaks? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Are there any unsealed openings in the storage facilities such as access doors, vents or joints? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Are signs of vandalism visible? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Are roof hatches and manhole openings tightly covered and locked? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Do downspouts and overflow pipes drain water away from structures? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Has the interior of all tanks been inspected in the last twelve months? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Have water quality samples representative of water within the tanks been collected as part of this investigation? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

V. Issue Descriptions and Corrective Actions

Note: A separate table should be completed for every question from Part IV. that is answered in a shaded box.

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

| | | | |
|---|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES: <input type="checkbox"/> NO: <input type="checkbox"/> | | | |

VI. Verification

I hereby certify that the information contained herein is true and correct to the best of my knowledge, information and belief.

***If no sanitary defects were found during the assessment, check this box to certify that the assessment was completed in accordance with the EPA *RTCR Assessments and Corrective Actions Guidance Manual*:**

| | |
|--|--------------|
| Lead Assessor's Signature: | Date: |
| Responsible Official's Signature: | Date: |

NOTES:

- The completed form must be submitted to DEP within 30 days of a public water system triggering a Level 2 Assessment.
- The completed form is to be addressed to: PA DEP – Safe Drinking Water, at the address from the list on pages 12-14 of the appropriate district office having jurisdiction over the public water system. For counties marked with an asterisk (*), address to the appropriate County Health Department (CHD), which is an agent of DEP for the Safe Drinking Water Program.

VII. State Review NOTE: This table is to be completed by the DEP representative reviewing the assessment

| | | |
|---|--|---|
| Name of Reviewer: | | Date Reviewed: |
| Assessment Sufficient: YES <input type="checkbox"/> NO <input type="checkbox"/> | | Consultation Required*: YES <input type="checkbox"/> NO <input type="checkbox"/> |
| Corrective Actions Completed: YES <input type="checkbox"/> NO <input type="checkbox"/> N/A: <input type="checkbox"/> | | Proposed Schedule Acceptable: YES <input type="checkbox"/> NO <input type="checkbox"/> |
| Likely Reason for Positive Samples Determined: YES <input type="checkbox"/> NO <input type="checkbox"/> | | |
| Signature of Reviewer: | | |
| Signature of Supervisor: | | Date: |

***Note:** If consultation with the water system occurs, the DEP reviewer should complete an “*Assessment Consultation Form*” and attach it to the back of the assessment.

Reporting for Additional Positive Samples (continued from Part II., page 1)

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

| | | | |
|---|----------------------|------------------------------|-----------------------------|
| Positive Sample # : | Sample Location ID#: | Sample Location: | |
| Positive Sample Date: | | Name of Sample Collector: | |
| Chlorine Residual: Free <input type="checkbox"/> Total <input type="checkbox"/> Not Measured <input type="checkbox"/> | | | mg/L |
| 1. Was the sample collected according to the total coliform sample siting plan? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. Was the condition of the sample tap appropriate for collection? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. Were the samples collected in accordance with proper sample collection protocols? | | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

Reporting for additional Sampling Issue Descriptions and Corrective Actions (cont. from Part III., page 2)

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

| Positive Sample # | Question # |
|----------------------------|---|
| Sampling Issue Description | Corrective Action and Completion Schedule |
| | |

Reporting for additional Issue Descriptions and Corrective Actions (continued from Part V., page 5)

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

| | | | |
|--|--|--|--|
| Section Letter | | Question # | |
| Issue Description | | Corrective Action and Completion Schedule | |
| | | | |
| Sanitary Defect: YES <input type="checkbox"/> NO <input type="checkbox"/> | | | |

DEP Office and County Health Department Contact Information by County

| County | Address | Telephone # | Fax # |
|------------|--|--|--|
| Adams | York District Office 150 Roosevelt Ave., Ste. 200, York, PA 17401 | 717-771-4481 | 717-845-3496 |
| Allegheny | Allegheny County Health Department 3901 Penn Ave., Bldg. 5, Pittsburgh, PA 15224 | 412-578-8047 | 412-578-8053 |
| Armstrong | New Stanton District Office 131 Broadview Rd., New Stanton, PA 15672 | 724-925-5500 | 724-925-5557 |
| Beaver | Beaver Falls District Office 715 15 th St., Beaver Falls, PA 15010 | 724-847-5270 | 724-847-5281 |
| Bedford | Altoona District Office 3001 Fairway Dr., Altoona, PA 16602 | 814-946-7292 | 814-949-7938 |
| Berks | Reading District Office 1005 Cross Roads Blvd., Reading, PA 19605 | 610-916-0100 | 610-916-0110 |
| Blair | Altoona District Office 3001 Fairway Dr., Altoona, PA 16602 | 814-946-7292 | 814-949-7938 |
| Bradford | Mansfield District Office 600 Gateway Dr., Mansfield, PA 16933 | 570-662-0830 | 570-662-0843 |
| Bucks | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | 484-250-5980 | 484-250-5971 |
| Butler | New Castle District Office 121 N. Mill St., New Castle, PA 16101 | 724-656-3160 | 724-656-3267 |
| Cambria | Cambria District Office 286 Industrial Park Rd., Ebensburg, PA 15931 | 814-472-1900 | 814-472-1861 |
| Cameron | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Carbon | Pottsville District Office 5 W. Laurel Blvd., Pottsville, PA 17901 | 570-621-3118 | 570-621-3430 |
| Centre | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Chester | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | 484-250-5980 | 484-250-5971 |
| Clarion | Knox District Office P.O. Box 669, Knox, PA 16232 | 814-797-1191 | 814-797-2706 |
| Clearfield | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Clinton | Moshannon District Office 186 Enterprise Dr., Philipsburg, PA 16866 | 814-342-8200 | 814-342-8216 |
| Columbia | Sunbury District Office 309 N. 5 th St., Ste D, Sunbury, PA 17801 | 570-988-5500 | 570-988-5507 |
| Crawford | Northwest Regional Office 230 Chestnut St., Meadville, PA 16335 | 814 -332-6899 | 814-332-6121 |
| Cumberland | York District Office 150 Roosevelt Ave., Ste. 200, York, PA 17401 | 717-771-4481 | 717-845-3496 |
| Dauphin | Southcentral Regional Office 909 Elmerton Ave., Harrisburg, PA 17110 | 717-705-4708 | 717-705-4930 |
| Delaware | Southeast Regional Office 2 E. Main St., Norristown, PA 19401 | 484-250-5980 | 484-250-5971 |
| Elk | Warren District Office 321 N. State St., North Warren, PA 16365 | 814-723-3273 | 814-723-0964 |
| Erie | <i>For Community & Nontransient PWS:</i> Warren District Office 321 N. State St. North Warren, PA 16365 | <i>For Transient PWS:</i> Erie County Health Dept. Drinking Water Program 606 W. Second St. Erie, PA 16507 | <u>Warren:</u> 814-723-3273 <u>Erie CHD:</u> 814-451-6700 |

Appendix B
EPA Assessment Guidance Excerpt:
Section 5

5. Corrective Action

5.1. What is the RTCR's requirement regarding corrective action?

A corrective action is required when a PWS has triggered a Level 1 or Level 2 assessment because of total coliform and/or *E. coli* positive samples AND that assessment has identified a sanitary defect that could have caused the contamination (40 CFR 141.859(c)). It is also possible that no sanitary defect will be identified during a Level 1 or Level 2 assessment and if so, no corrective action will be required (see **Section 2.6** of this document in instances where no sanitary defect is identified) (40 CFR 141.859(b)(3)(i) and 141.859(b)(4)(i)). However, the state may recommend or require that the system take some sort of action (e.g., temporary disinfection) to make sure that the contamination is addressed even in the absence of an identified sanitary defect. See **Section 5.3** of this document for some of the best practices systems can take following a coliform detection or an assessment trigger.

PWSs are required to correct any sanitary defect found during an assessment.

The PWS should also consult with the state as necessary to complete corrective actions that the state will consider to be sufficient. The state may also initiate this consultation. This consultation should begin with the Level 1 or Level 2 assessment, which should outline the investigation that the system performed or will perform and the proposed actions to correct the problems that were identified. The system must submit a Level 1 or Level 2 assessment form to the state within 30 days after learning that it exceeded the trigger. The form must describe the sanitary defects detected (if any), the corrective actions completed and a proposed timetable for completing the corrective actions not already completed. A consultation with the state as early as possible in the assessment and corrective action phase will allow the system and the state to discuss all relevant information and appropriate timeframes to meet the rule requirements. See 40 CFR 141.859(d).

5.2. What corrective actions can PWSs take?

The type of corrective action that a system performs will depend on the cause of the contamination that it identified that resulted in a trigger for a Level 1 or Level 2 assessment.

Total coliform and *E. coli* positive samples can result from a variety of causes. Once the system has identified those causes through the assessment process, the system will need to make corrective actions to restore the integrity of the distribution system.

Discussions and informal surveys with states and systems⁹ have identified the following as some of the common causes of total coliforms and *E. coli* detections in the distribution system, a number of which are interrelated:

- Failure to disinfect (or improper disinfection) after maintenance work on the distribution system,
- Main breaks, especially in certain vulnerable locations such as under a stream or high groundwater level,
- Holes in storage tank, inadequate screening and other defects which could allow animals and/or fecal matter to enter the tank,
- Loss of system pressure (sometimes associated with main breaks or loss of power),
- Lack of regular flushing programs,
- Biofilm build-up in the distribution system, including biofilms at multiple locations or that move throughout system or those associated with seasonal changes and/or loss of disinfectant residual,
- Cross connections, especially at certain high-risk locations (e.g., hospitals, chemical plants, chemical holding/storage facilities, funeral homes, etc.),
- Inadequate disinfectant residuals,
- Contaminated sampling taps, and
- Sampling protocol errors.

The specific cause(s) of total coliforms and *E. coli* in the distribution system will likely differ from system to system. The Level 1 and Level 2 assessments are designed to help systems identify the specific causes so they can be appropriately addressed.

Table 5-1 describes some general actions that systems can take in response to the common causes of total coliform or *E. coli* positive samples that resulted in the RTCR trigger, including additional sources of information for correcting the problem. Some actions can be performed in response to multiple types of causes and multiple actions may be needed in response to a single identified cause. Most of the corrective actions listed in **Table 5-1** are described in more detail from **Section 5.2.1** through **Section 5.2.11** of this document, along with

The results of the Level 1 or Level 2 assessment may indicate that the system should employ the suggested corrective actions, measures or installation of devices (discussed in **Sections 5.2.1** to **5.2.11** of this document) to address the identified issue; or, if the PWS has them already, improve their operation and use in their system.

⁹ Informal surveys of their constituents were conducted from February to March 2010 by the American Water Works Association (AWWA), the Association of Metropolitan Water Agencies (AMWA) and the Association of State Drinking Water Agencies (ASDWA) to determine the common causes of coliform-positive results in the distribution system and the types of corrective actions taken in response to those positive results.

examples that can help mitigate or eliminate the sources of coliform contamination. **Table 5-2** summarizes these actions along with the general purpose for taking such actions.

Corrective actions should be completed in accordance with state guidance and industry best practices. States often have guidance for design, construction, operation and maintenance of water systems. Emergency response planning and implementation of cross connection control programs are also described in state guidance in some locations. An example of state guidance is the *Recommended Standards for Water Works*, also known as the *10 States Standards* (Great Lakes et al. 2007). In addition, drinking water system components installed as part of a corrective action should be in compliance with National Science Foundation (NSF)/American National Standards Institute (ANSI) Standard 61 and other applicable standards. NSF/ANSI Standard 61 addresses drinking water system components that are in contact with finished drinking water and whether contaminants leach or migrate from the product/material into the drinking water at levels that are above acceptable levels in finished waters. For smaller non-community water systems that include premise plumbing, corrective actions should also be in compliance with local plumbing codes.

In addition, **Appendix D** contains a listing of industry standards (e.g., American Water Works Association (AWWA) Standards), manuals and other reference materials that describe best practices and product specifications. Following these standards can help systems to ensure that a product (e.g., pipes, fittings, meters, etc.) or a process (e.g., main flushing, main installation, etc.) will provide satisfactory service. These standards can be valuable resources in implementing corrective actions.

Table 5-1: Common Causes of Total Coliforms and *E. coli* in the Distribution System and Possible Corrective Actions to Address Them

| Sanitary Defects¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|--|--|--|---|
| Biofilms | <ul style="list-style-type: none"> • Taste and odor complaints • Colored or turbid water that takes a long time to clear • Elevated HPC bacteria levels • Numerous isolates with similar genotypic profile | <ul style="list-style-type: none"> • Conduct unidirectional flushing to remove biofilm and sediments from distribution system. • Maintain adequate pressure in system to prevent sloughing of biofilm by installing booster pump stations, variable frequency drives (VFDs), elevated storage facilities, surge relief valves and surge tanks, and modifying high service pumps. Install automatic pressure monitoring and control. • Replace/rehabilitate pipe where biofilm sloughing is occurring. • Maintain disinfectant residuals in the distribution system. • Apply temporary disinfection, shock chlorination and/or booster disinfection in accordance with state guidelines. • Manage water age by looping dead ends; increasing volume turnover; and/or installing appropriate main sizes, automated flushing devices or mixing devices. | <ul style="list-style-type: none"> • Water Research Foundation, <i>Strategies for Managing Total Coliform and E. coli in Distribution Systems</i>, 2009. • Water Research Foundation, <i>Factors Limiting Microbial Growth in Distribution Systems: Laboratory and Pilot Scale Experiments</i>, 1996. • Water Research Foundation, <i>Assessing and Controlling Regrowth in Distribution Systems</i>, 1990. • Water Research Foundation, <i>Factors Affecting Microbial Growth in Model Distribution Systems</i>, 2000. • Camper, A. K. <i>et al.</i>, “Effect of Distribution System Materials on Bacterial Regrowth.” <i>Journal AWWA</i>, Vol. 95 Iss. 7, July 2003, Page(s) 107-121. |

¹⁰ Some of the causes of total coliforms and *E. coli* listed under this column may or may not necessarily be considered as a sanitary defect, based on what conditions the state considers as such. Whether the identified cause is considered a sanitary defect or not, the PWS should address it to prevent future occurrence of contamination.

| Sanitary Defects¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|---|---|--|---|
| Contamination of water during main installation, repair or rehabilitation | <ul style="list-style-type: none"> • Break/repair activities that could have allowed entry of contaminants or dislodged accumulated pipe debris into bulk water • Pressure loss associated with break • Low disinfectant residual • Colored or turbid water | <ul style="list-style-type: none"> • Flush system (spot or routine). • Apply temporary disinfection, shock chlorination and/or booster disinfection in accordance with state guidelines. • Review/enhance existing procedures for main installation, repair or rehabilitation procedures. • Maintain adequate pressure in the system by installing booster pump stations, VFDs, elevated storage facilities, surge relief valves and surge tanks, and modifying high service pumps. Install automatic pressure monitoring and control. | <ul style="list-style-type: none"> • AWWA C651 (Standard for Disinfecting Water Mains) |
| Cross-connections | <ul style="list-style-type: none"> • Pressure loss event within a portion of the distribution system • Total coliform-positive samples occur at high elevation and/or low pressure location(s) • Presence of a high-risk customer for backflow (e.g., industrial user) | <ul style="list-style-type: none"> • Eliminate cross-connection. • Implement cross-connection control and backflow prevention (CCCBFP) program. • Install backflow prevention assemblies and devices. • Flush system (spot or routine). • Apply temporary disinfection, shock chlorination and/or booster disinfection in accordance with state guidelines. • Maintain adequate pressure in system to prevent backflow and backsiphonage by installing booster pump stations, VFDs, elevated storage facilities, surge relief valves and surge tanks, and modifying high service pumps. Install automatic pressure monitoring and control. | <ul style="list-style-type: none"> • Cross-Connection Control Manual, EPA 816-R-03-002, EPA, February 2003 |

| Sanitary Defects ¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|---|--|--|---|
| Errors in the sampling protocol (i.e., proper sampling protocols were not followed – e.g., tap was not flushed, aerator was not removed, etc.) | <ul style="list-style-type: none"> Changes in sampler or protocol | <ul style="list-style-type: none"> Review current protocol and if inadequate, identify alternate protocol. Enhance training on site preparation, flushing protocols and sanitary sample collection and transport procedures. Sanitize sample coolers and ice packs. Ensure that samples are shipped properly and securely (e.g., bottles do not tip or become contaminated during transport). | <ul style="list-style-type: none"> Water Research Foundation, <i>Sample Collection Procedures and Locations for Bacterial Compliance Monitoring</i>, 2004 Interactive Sampling Guide for Drinking Water System Operators CD (In English: EPA 816-C-06-001; in Spanish: EPA 816-C-06-003), available at: http://www.epa.gov/ncepihom/ |
| Inadequacies of the sample site (e.g., unsanitary conditions, leaks and breaches, unprotected access, improper construction, improper location) | <ul style="list-style-type: none"> Changes in sampling site use Presence of unsanitary conditions at the sampling site | <ul style="list-style-type: none"> Develop a sample siting plan that is representative of the water quality in the distribution system. Install dedicated sampling taps. Correct leaks or other site deficiencies and breaches. Sanitize or replace sampling site. | <ul style="list-style-type: none"> Water Research Foundation, <i>Sample Collection Procedures and Locations for Bacterial Compliance Monitoring</i>, 2004 Interactive Sampling Guide for Drinking Water System Operators CD (In English: EPA 816-C-06-001; in Spanish: EPA 816-C-06-003), available at: http://www.epa.gov/ncepihom/ |

| Sanitary Defects¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|--|--|---|--|
| Inadequate disinfectant residual levels in the distribution system | <ul style="list-style-type: none"> • Variable raw and/or treated water quality conditions • Inadequate disinfectant at entry point • Inadequate disinfectant at booster stations • Interruptions in disinfection processes • Increases in temperature that lead to accelerated disinfectant decay | <ul style="list-style-type: none"> • Apply temporary disinfection, shock chlorination and/or booster disinfection in accordance with state guidelines. • Manage water age by looping dead ends; increasing volume turnover; and/or installing appropriate main sizes, automated flushing devices or mixing devices. • Install/upgrade on-line water quality monitoring and control. • Flush system (spot or routine). | <ul style="list-style-type: none"> • AWWA G200 (Standard for Distribution Systems Operation and Management) |
| Intrusion through pipe leaks, pipeline fracture cracks, leaking joints, submerged air-vacuum/ air-release valves and deteriorating seals | <ul style="list-style-type: none"> • Pressure loss or reduction in a portion of the distribution system • Presence of leaks, cracks and other entry points • High groundwater table and/or presence of sewers near the susceptible water main • Numerous isolates with unique genotypic profile | <ul style="list-style-type: none"> • Repair/replace leaky component. • Maintain adequate pressure in system by installing booster pump stations, VFDs, elevated storage facilities, surge relief valves and surge tanks, and modifying high service pumps. Install automatic pressure monitoring and control. | <ul style="list-style-type: none"> • Water Research Foundation, <i>Verification and Control of Pressure Transients and Intrusion in Distribution Systems</i>, 2004. |

| Sanitary Defects¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|--|---|--|---|
| Pressure loss (can result from events such as flushing, main breaks, power outages, fires or improper operations and management (operations and maintenance (O&M) practices) | <ul style="list-style-type: none"> • Recent maintenance activities, main breaks, power outages, fires • Turbidity increase or fluctuations | <ul style="list-style-type: none"> • Flush distribution system (spot or routine). • Apply temporary disinfection, shock chlorination and/or booster disinfection in accordance with state guidelines. • Improve O&M practices. • Maintain adequate pressure by installing booster pump stations, VFDs, elevated storage facilities, surge relief valves and surge tanks, and modifying high service pumps. • Install automatic pressure monitoring and control. | <ul style="list-style-type: none"> • AWWA C651 (Standard for Disinfecting Water Mains) • AWWA G200 (Standard for Distribution Systems Operation and Management) |
| Sediment build-up in storage tank or reservoir | <ul style="list-style-type: none"> • Increased disinfectant demands • Increase in turbidity, particularly in water samples collected when tank is draining • Elevated HPC in samples from tank or reservoir • Low disinfectant residual in samples from tank or reservoir | <ul style="list-style-type: none"> • Drain and flush tank or reservoir. • Shock chlorination of tank or reservoir in accordance with state guidelines. | <ul style="list-style-type: none"> • AWWA C652 (Disinfection of Water-Storage Facilities) |

| Sanitary Defects¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|---|---|--|--|
| Storage tank physical deficiencies like holes, inadequate screening, etc. (can allow entry of birds, animals, insects and other vectors that can fecally contaminate the water) | <ul style="list-style-type: none"> • Presence of physical deficiencies • Recent work on or near the tank • Recent vandalism, storm events or other events that could impact tank integrity | <ul style="list-style-type: none"> • Repair broken parts of storage tank like the vent and hatch. • Repair / install screens. • Install / improve security measures. | <ul style="list-style-type: none"> • AWWA C652 (Disinfection of Water-Storage Facilities) |
| Contamination during flushing/firefighting activities | <ul style="list-style-type: none"> • Turbidity increase or fluctuations • Color increase or fluctuations • Pressure fluctuations | <ul style="list-style-type: none"> • Ensure unidirectional flushing approach is used for flushing program and that water quality objectives (i.e., chlorine, turbidity and iron) are met prior to terminating flushing. | <ul style="list-style-type: none"> • Water Research Foundation, <i>Implementation and Optimization of Distribution Flushing Programs</i>, 1992 • Water Research Foundation, <i>Deterioration of Water Quality in Distribution Systems</i>, 1987 • Water Research Foundation, <i>Development of Distribution System Water Quality Optimization Plans</i>, 2005 |
| Treatment breakthrough | <ul style="list-style-type: none"> • Variable raw and/or treated water quality conditions • Inadequate disinfectant at entry point • Elevated HPC bacteria levels occur throughout the distribution system | <ul style="list-style-type: none"> • Increase disinfectant residual. Apply temporary disinfection, shock chlorination and/or booster disinfection in accordance with state guidelines. • Flush system (spot or routine). • Assess performance of treatment processes and remedy cause of coliform breakthrough (e.g., replace filter, decrease particle loading, etc.). | <ul style="list-style-type: none"> • Small Systems Guide to Safe Drinking Water Act Regulations, EPA Number 816-R-03-017, EPA 2003: http://www.epa.gov/nscep |

| Sanitary Defects¹⁰ / Cause(s) of TC+ and EC+ | Conditions That May Point to Cause of TC+/EC+ | Possible Corrective Action(s) | For Additional Information |
|--|--|--|--|
| Vandalism and/or unauthorized access to facilities | <ul style="list-style-type: none"> • Recent work or other events at a distribution system facility • Presence of broken or disabled security equipment | <ul style="list-style-type: none"> • Flush system (spot or routine). • Install / improve security measures (e.g., install a fence, lock buildings, install alarms and cameras) • Develop and implement an operations plan. • Develop SOPs. • Develop emergency response plan. | <ul style="list-style-type: none"> • AWWA G200 (Standard for Distribution Systems Operation and Management) • Water Research Foundation, <i>Distribution System Security Primer for Water Utilities</i>, 2005. |

Table 5-2: List of Common Corrective Actions

| Action | Purpose |
|--|---|
| Disinfection (Section 5.2.1) | Improve or maintain disinfectant residual in the distribution system. |
| Flushing (Section 5.2.2) | Keep system clean and free of sediment. Reduce disinfectant demand of pipe surfaces. Remove stagnant, untreated or contaminated water. Address water quality deterioration at dead-ends. |
| Replacement / Repair of Distribution System Components (Section 5.2.3) Valves Water mains Fittings Hydrants Meters Dedicated sample taps | Reduce potential sources / pathways of contamination from improper installation or material degradation. |
| Maintenance of Adequate Pressure (Section 5.2.4) Booster pumping stations VFDs Elevated storage facilities Surge relief valves Surge tanks | Minimize sudden changes in water velocity, which impact system pressure. Reduce risk of backflow and intrusion contamination resulting from low pressures. Reduce risk of hydraulic disturbances to pipe surface biofilm. |
| Maintenance of Appropriate Hydraulic Residence Time (Section 5.2.5) Looping dead ends Installing appropriate main sizes Automated flushing devices Storage facility modifications | Mitigate water quality problems associated with increased water age (e.g., higher DBP formation, reduced disinfectant residual, increased microbial activity, nitrification and taste-and-odor problems). |
| Maintenance of Storage Facility (Section 5.2.6) Inspecting / cleaning of tanks Lining of storage tanks Vent / hatch repair Tank repair | Remove contamination from birds and insects. Remove accumulated sediment. Protect against tank wall corrosion. Prevent entry of vectors (e.g., birds, etc.) |
| Implementation or Upgrade of a Cross Connection Control and Backflow Prevention Program (Section 5.2.7) | Prevent flow of non-potable substances into the distribution system. |
| Sampler Training (Section 5.2.8) | Reinforces proper sampling and sample handling procedures to obtain uncontaminated samples. Reduces errors in sampling results. |

| | |
|---|---|
| <p>Addition or Upgrade of On-line Monitoring and Control (Section 5.2.9) Water quality monitoring & control Pressure monitoring & control</p> | <p>Automatically control and monitor disinfectant dosages and water quality parameters (other than total coliforms). Monitor pressure levels to identify physical problems in the system (e.g., pipe breaks, leaking valves, etc.).</p> |
| <p>Addition of Security Measures (Section 5.2.10)</p> | <p>Monitor potential locations for vandalism or security breaches that could lead to water contamination. Increase public confidence in protection of their drinking water.</p> |
| <p>Development and Implementation of an Operations Plan (Section 5.2.11) SOPs Sample siting plans Routine inspections Emergency response plan Appropriately qualified operators</p> | <p>Integrate all operations and maintenance functions to meet flow, pressure and water quality goals. Establish a routine distribution system sampling plan. Implement an inspection and maintenance program to reduce sanitary defects. Define an emergency response plan for the distribution system to reduce reaction time and minimize confusion in emergencies. Ensure around-the-clock responsiveness.</p> |

5.2.1. Disinfection

Many systems use disinfection (by applying either temporary disinfection, shock chlorination or booster disinfection) as a response to positive coliform results. It is also commonly used as a precautionary measure, especially when the cause of a positive coliform sample has not been identified, to help mitigate any potential contamination that could be present in the system. If the contamination requires a long-term solution, it may take time for the system to design and perform a corrective action. In the meantime, the system cannot serve the contaminated water to its customers. The state may require the system, as part of the corrective action, to apply chlorination until the contamination is eliminated or a corrective action is put in place. When temporary chlorination is applied in response to a coliform occurrence, the system should notify its state. Chlorination should be kept in place until the state has reviewed the situation and has determined if the contamination has been addressed and the temporary disinfection can be suspended or if the disinfection needs to be continued.

Temporary disinfection can be conducted at the point of entry to the distribution system or can be installed at a location in the distribution system to target a specific area. Depending on the extent of the problem revealed by the Level 1 or Level 2 assessment, system-wide or targeted disinfection (such as shock chlorination) may be an appropriate corrective action.

For non-disinfecting systems or those using free chlorine, temporary/additional disinfectant in the form of sodium hypochlorite (bleach) is often used because it is easier to install and operate than gaseous chlorination or other disinfection methods, particularly on a temporary basis. It is a low cost option that can provide some protection to a portion of a distribution system or across an entire pipe network. However, care should be used in the storage of hypochlorite as age and temperature have been shown to be associated with the conversion of hypochlorite to perchlorate (Stanford et al. 2009).

For non-disinfecting systems, before beginning disinfection, it is also important to know if there are water quality issues such as the presence of iron and manganese in the water that may react with the chlorine. If chlorination is going to be a long-term solution, the source water should be evaluated for DBP precursors and naturally occurring ammonia.

It is important to note that temporary disinfection is better suited to deal with a single event and is not intended to deal with a chronic problem like source water contamination. Systems using chloramine as a secondary disinfectant should carefully balance chlorine addition with ammonia to maintain the desired chlorine to ammonia ratio for optimal chloramine formation.

Booster disinfection facilities located throughout a distribution system can provide additional chemical treatment in the system. Booster disinfection can improve or maintain disinfectant residual levels in a distribution system. Prior to discharge into the distribution system, potable water from a treatment facility must have a certain disinfectant residual level to minimize microbial growth. These levels are defined by state and EPA regulations. Organics and reduced metals in the water also consume disinfectant residuals; therefore, it is vital to maintain an appropriate disinfectant residual level in the system in order to avoid increased levels of total coliforms in the system.

See **Chapter 6** of this document for a discussion of simultaneous compliance issues systems should consider when using disinfection as a corrective action.

5.2.2. Flushing

A water main flushing program helps to keep a system clean and free of sediment, can reduce the disinfectant demand of pipe surfaces and removes stagnant water and untreated or contaminated water that may have entered the system (Kirmeyer and Friedman 2000). Flushing can also be used to address water quality deterioration at dead-ends. The volume of water flushed is related to the length of flushing time and flow rate from the hydrant. Systems should flush until a disinfectant residual can be measured or some other water quality target is reached (other than just until the water appears clear). Systems could perform scheduled system-wide flushing

and/or periodic unscheduled (or “spot”) flushing which can be used to address isolated water quality problems, including total coliform-positive samples. However, spot flushing should not be used as the only solution to positive coliform results or low residual events. Flushing should be used until the source of the problem and a more permanent fix have been identified.

Upon obtaining a positive coliform sample, a common response is to flush the area near the sample site to draw in fresh water and remove any contaminated water that may be present. This unscheduled spot flushing is different from a routine flushing program in that the flushing only occurs when triggered by a water quality measurement, customer complaint or similar event.

Minimum elements of a flushing scheduled/routine program are outlined in the AWWA G200 Standard (AWWA 2004) and involve: (1) a preventive approach to address local problems or customer concerns and routine flushing to avoid water quality problems; (2) use of an appropriate flushing velocity to address water quality concerns; and (3) written procedures for all elements of the flushing program including water quality monitoring, regulatory requirements and specific flushing procedures.

5.2.3. Replacement / Repair of distribution system components

Distribution system components and appurtenances such as pipes, valves, fittings, hydrants, meters and sample taps are integral parts of the water system. These components are also potential sources of contamination if improper installation or material degradation allows leaks or other entry points for contamination into a distribution system. **Inspection of distribution system components may indicate that they should be replaced or repaired as part of proper maintenance or detection during an assessment, whether or not it is identified as the cause of the leak or as a possible entry point for contamination (sanitary defect)** (see Sections 5.2.3.1 to 5.2.3.6 of this document). Some components throughout the distribution system are located below grade, making a leak difficult to locate. However, a number of technologies have been developed to locate leaks below grade. **Systems should complete any repairs or replacements with proper attention to prevent contamination of the distribution system.** See the AWWA standards listed in Appendix D of this document for more information on installation, repair and replacement of distribution system components.

5.2.3.1. Water mains

The condition of distribution system piping can be vital to the quality of water being conveyed to a community. Contaminants may enter through holes, breaks, cracks or joints in the piping. The condition of a pipe can vary based on type, age and location of the pipe. Depending

on the condition of the pipe, the water main can be replaced or repaired to stop infiltration into the system.

5.2.3.2. Valves

Valves are located throughout a distribution system to isolate portions of the system as needed. Leaks at the connection points between the valve and the adjacent pipe, as well as a valve seat or valve body, can create a pathway for contamination.

5.2.3.3. Fittings

There are many types of fittings located throughout a distribution system. The most common type of distribution system fitting is a cross. A cross has four connections, which make it more susceptible to leaks. Leaks can occur because of a crack on the fitting or through the gasket between the fitting and another appurtenance, e.g., a valve, cap or pipe.

5.2.3.4. Hydrants

Hydrants are located throughout a distribution system to provide potable water at required fire flow pressures for emergency situations. Hydrant connections are tapped off the distribution system; therefore, these connections can be possible locations for coliform contamination to enter a distribution system. Replacing a damaged or faulty fire hydrant can help eliminate sources of contamination into the distribution system as it eliminates a pathway for contamination. Systems should attempt to control usage of the hydrants as much as possible to eliminate unauthorized use and install backflow prevention devices where possible.

5.2.3.5. Meters

Meters are located at entry points to commercial, residential and industrial facilities to measure the amount of water that is consumed at a particular location. Sizes for each of the meters will likely vary based on the type and usage requirements of a facility. Contamination may enter through the connection points of the meter and the distribution system. Replacing a broken or faulty meter can help prevent contamination of the distribution system through leaks, as it eliminates a pathway for contamination.

5.2.3.6. Dedicated sample taps

Typical sample locations often include both customer taps and dedicated sampling stations. A dedicated sampling station is a device that is plumbed directly into a distribution

system line to provide “improved access to the distribution system water and provide reproducible samples that are representative of water quality at the customer’s meter” (Kirmeyer and Friedman 2000). Installing dedicated sample taps can therefore minimize the occurrence of contamination that can result from improper sampling practices and minimize concerns about water quality in customer plumbing.

Dedicated sampling stations should be of metal construction, have unthreaded nozzles or a design approved by the state and be located so as to be representative of the water in the distribution system. If they are to be used for coliform sampling under the RTCR, they should be installed in locations in accordance with the system sample siting plan. They are typically covered to protect them from birds, insects, dirt and other sources of outside contamination. Freezing of dedicated sampling taps has occurred in northern climates and that possibility should be considered when deciding whether and how to install such taps and which types to install. Some manufacturers have dedicated sampling taps that resist freezing.

Additional guidance on selection of an appropriate sample tap, including factors such as type of tap and sink, can be found in Narasimhan et al. 2004.

5.2.4. Maintenance of adequate pressure

Pressure losses can occur in the distribution system as a result of events such as flushing, main breaks, power outages, service line breaks and fires. Pressure transients (also called pressure surges or water hammer) can occur when an abrupt change in water velocity occurs due to a sudden valve closure, pump shutdown or startup or loss of power. The resulting pressure wave, with alternating low and high pressures, travels back and forth through the distribution system until the pressure is stabilized. Low pressure conditions in the distribution system can allow a flow reversal or backflow of non-potable water to enter the system from a cross connection or other source such as intrusion. Pressure transients can also create hydraulic disturbances that allow biofilm material on pipe surfaces to enter the bulk water. Systems should check with their states regarding distribution system pressure requirements. Industry guidelines suggest that system pressure should be maintained within the range of 35 to 100 psi at all points in the distribution system (AWWA 1996). The AWWA G200 standard indicates that the minimum residual pressure at the service connection under all operating conditions should be greater than 20 psi (AWWA 2004). Many states also have guidelines regarding distribution system operating pressure. Written SOPs for pump, hydrant and valve operation under routine and emergency conditions can help minimize sudden changes in water velocity that impact system pressure.

Other actions that can help to maintain an adequate pressure in the distribution system include building new booster pump stations and elevated storage facilities, modifying existing

high services pumps and installing variable frequency drives (VFDs), surge relief valves and surge tanks (see the following discussion, **Sections 5.2.4.1 to 5.2.4.5** of this document).

5.2.4.1. Booster pumping stations

Booster pumping stations are used in the distribution systems to move water from lower pressure zones to higher pressure zones and to maintain pressure at desirable levels. As the water system grows and changes, existing booster pump stations may no longer be able to maintain the desired pressure across the distribution system. In such cases, the system may be required to construct a new booster station. The construction of a completely new booster pump station is not always required to maintain an appropriate pressure in a water system. There may be situations where a modification or replacement of an existing pump is sufficient.

5.2.4.2. Variable frequency drive (VFD)

A VFD, also called a variable speed drive, allows a booster pump to supply the required amount of flow based on system demand with a pressure set point to maintain constant system discharge pressure, controlled to within a few psi of an operator-adjustable system pressure set point. VFDs work with a system pressure transmitter to control the system pressure set point.

5.2.4.3. Elevated storage facilities

Elevated storage is provided within the distribution system to supply peak demand rates and equalize system pressures. In certain systems, elevated storage is more effective and economical than ground storage because by nature of its elevated location, pumping requirements may be reduced, and the storage can serve as a source of emergency supply since system pressure requirements can still be met temporarily when pumps are out of service. Elevated storage tanks are often cited in areas having the lowest system pressures during intervals of high water use. These areas are often those of greatest water demand or those farthest from pump stations. Elevated tanks are generally located at some distance from the pump station serving a distribution pressure level, but ideally are not placed outside of boundaries of the service area unless the facility can be located on a nearby hill. Elevated tanks are built on the highest available ground so as to minimize the required construction cost and the height requirements.

5.2.4.4. Surge relief valves

Surge relief valves provide pressure management by ejecting water out of a side orifice to prevent excessive high-pressure surges and can also be triggered to open on a downsurge in

pressure in anticipation of an upsurge to follow. Systems should always use surge relief valves with caution for they can make low-pressure conditions in a line worse than they would be without the valve.

5.2.4.5. Surge tanks

The four common types of surge tanks include pneumatic or closed tanks, open standpipes (or air chambers), one-way surge tanks (allows water to flow only from the tank into the pipeline) and two-way surge tanks (allows flow to and from the tank). If water is stored in these tanks for long periods of time, the water may lose its disinfectant residual and microbial growth and other water quality problems may result. Proper operations and maintenance of surge tanks is required to prevent poor quality or contaminated water from entering the distribution system.

Hydropneumatic tank systems are a popular way to provide pressure control and stabilization in smaller water distribution systems; however, they are not typically used in larger systems. A hydropneumatic tank system allows for fluctuations in water distribution system pressure and a potential cushion against water hammer. The system also minimizes booster pump on-off cycles so that a recommended frequency of 10-15 cycles per hour can be maintained.

The pressure tank uses a compressed air head-space to maintain system pressure. As water system demand increases, water in the pressure tank discharges into the system and reduces the pressure tank's water level, which expands the air cushion above the water and decreases the tank air pressure. When the air reaches a determined set point, the air compressor comes on to recharge the air space and cycles off when the high pressure set point is met. If the water demand continues to increase, the booster pumps will cycle on at the low water level and replenish the water level in the pressure tank. The pressure tank should be sized correctly, because its size determines the frequency of pump cycling.

5.2.5. Maintenance of appropriate water age, hydraulic residence time and mixing

Water quality problems associated with increased water age include reduced disinfectant residual, increased microbial activity, nitrification and/or taste and odor problems. As water travels through the distribution system, chlorine continues to react with natural organic matter (NOM) to form DBPs. Thus, increased water age can also lead to higher DBP concentrations. PWSs should develop an overall strategy to manage the water age in their distribution systems, while considering the need to have adequate storage for emergencies. Establishing a water age goal is system-specific depending on system design and operation, water demands and water quality (e.g., DBP formation potential). In the US, the average distribution system retention time is 1.3 days and the average maximum retention time is 3.0 days based on a survey of 800

medium and large water utilities (AWWA and AwwaRF 1992). Water age can be controlled through a variety of techniques including management of finished water storage facilities, looping of dead-ends and re-routing of water by changing valve settings (see the following discussion, **Sections 5.2.5.1 to 5.2.5.4** of this document). Additional guidance is provided in the AwwaRF report, *Managing Distribution System Retention Time to Improve Water Quality* (Brandt et al. 2004).

5.2.5.1. Looping dead-ends

Dead-end pipes often result in stagnant water conditions where water age increases, which can cause water quality problems. One of the solutions to address the stagnant water issue is looping of dead-ends. However, PWSs should carefully evaluate looping on a case-by-case basis as it may not actually reduce the long detention times present in those areas.

5.2.5.2. Installing appropriate main sizes

Most distribution systems have been designed to meet a minimum hydraulic capacity. Additional capacity is generally included at the design stage to accommodate for future growth or to allow more flexibility in the configuration of a distribution system network. A PWS may also have a policy to limit the number of different pipe diameters within the system in order to simplify construction and maintenance. Consequently, network pipes tend to be larger than is necessary to meet the daily demand from the network leading to increased retention time. Hence, there can be an option to replace mains with smaller diameter pipes but still maintain the required hydraulic capacity.

5.2.5.3. Installing automated flushing devices

Automated flushing devices are used to purge accumulated sediments at low spots and dead-ends of pipelines at regular intervals and to drain pipelines for repairs, maintenance and inspection. These devices are best suited to rural networks in which security of the units and disposal of the water flushed is less problematic. An additional drawback of installing these devices is the volume and value of the wasted water may be unacceptable. However, in networks with long pipe runs terminating in dead-ends, there may be few viable alternatives to flushing for controlling retention time.

5.2.5.4. Storage facility modifications

Most storage facilities have been designed focusing more on quantity, cost, service life, appearance and shape than on maintaining water quality. Water quality in storage facilities is affected by the mixing patterns that occur primarily during the filling cycle, the long-term residence time and the interaction between these two phenomena. Old water in stagnant zones can often have very high DBPs and low to no disinfectant residual. This water can be released into the system during periods of high demand. Increasing volume turnover reduces the average hydraulic residence time (HRT) in finished water storage facilities, thereby reducing DBP formation, loss of disinfectant and microbial growth. Kirmeyer and Friedman (2000) recommend complete turnover every three to five days but suggest that water systems establish their own turnover goal based on system-specific needs and goals. Improving mixing in finished water storage facilities can help eliminate stagnant zones. Mixing can be improved by increasing inlet momentum, changing the inlet configuration, increasing the fill time and by installing mixing devices within the storage facility (see the following discussion, **Sections 5.2.5.4.1 to 5.2.5.4.3** of this document).

It may be necessary to reduce the water volume in a storage tank or increase demand on the tank to achieve increased volume turnover. Decommissioning storage facilities may be an appropriate strategy to reduce water age if existing facilities are oversized and not needed for emergency conditions, fire protection or for maintaining system pressure. A professional engineer should review system needs, system design and operation to determine if the existing storage capacity and tank operation are appropriate.

5.2.5.4.1. Inlet / outlet configuration

Inlet and outlet configuration are critical in the development of proper mixing in a finished water storage facility. The inlet structure should be located and sized to disperse the jet into the storage facility as well as to maintain a jet sufficient for mixing. In particular, the location and orientation of the inlet pipe relative to the tank walls can have a significant impact on mixing characteristics. The physical modifications to the inlet pipe for improving mixing within the tanks include:

- Changing the orientation of the inlet pipe; and/or
- Decreasing the inlet diameter to increase the jetting action.

The outflow configuration does not significantly influence mixing, but operation of the inlet and outflow is important because flow entering the tank and leaving the tank at the same time can negatively impact mixing and should be avoided. Furthermore, when the inlet/outlet is a common pipe, the ability to reduce the inlet diameter to achieve a higher inflow velocity and

better jetting action will be constrained by the need to maintain an outflow capacity adequate to satisfy system operational and fire flow requirements. For this reason, it is recommended that PWSs eliminate common inlet/outlet pipes.

5.2.5.4.2. Installation of mixing devices

Mixing the storage facility contents to reduce stagnant zones can also be accomplished by installing mixing devices. Special precautions are recommended with mechanical mixing devices because of potential contamination to finished water by the mixer mechanism lubrication system. Multiple mixing devices may be needed so PWSs should consider the increased maintenance requirements inside the storage facility.

5.2.5.4.3. Increasing volume turnover

As mentioned earlier in this section, increasing the volume turnover reduces the average HRT in the storage tank. PWSs can accomplish turnover by making operational modifications to the storage tank such as increasing the water level fluctuation or drawdown between fill and draw cycles. The water level should be lowered in one continuous operation and not in small incremental drops throughout the day. This will help to mitigate microbial growth in the tank by decreasing the HRT or increasing the volume turnover by increasing the flow rate.

Operational modifications may be limited by the following considerations:

- Control of flow rates during tank filling may be needed to minimize the potential for low pressure in the distribution system; and
- Changes in operating protocol for booster stations and other tanks to achieve turnover while maintaining adequate pressure system-wide.

5.2.6. Maintenance of storage facility

Finished water storage tanks are an important component of a PWS's distribution system. Tanks are usually designed for three purposes: reduce pressure fluctuations in the distribution system, equalize water demands and provide water reserves for emergencies such as fires and power outages.

The two main categories of water storage tanks include ground storage tanks and elevated storage tanks (see previous discussion on elevated storage tanks in **Section 5.2.4.3** of this document). Ground storage tanks can be below grade, partially below grade or at ground level in a distribution system and are usually constructed of a variety of materials, including steel,

concrete and fiberglass reinforced plastic. Elevated storage tanks are typically constructed of steel.

Contamination from birds and insects can be a source of microbial contamination in the distribution system. Maintenance on a storage tank can significantly reduce the possibility of contamination or recontamination. Some actions PWSs can take include inspecting and cleaning, lining the interior of the tank, repairing vents and/or hatches and repairing the tank itself (see the following discussion, **Sections 5.2.6.1 to 5.2.6.4** of this document).

5.2.6.1. Inspection / cleaning of tanks

Tank inspections can provide useful information on the physical condition of the exterior and interior of the tank and on identifying potential sources of microbial contamination. Inspections can also identify the accumulation of sediment within storage tanks due to particle settling in the tank or the dissolving of cementitious materials of a concrete tank from soft, low alkalinity, low pH waters. There are several water quality issues associated with sediment buildup in a storage tank, including increased disinfection demand, microbial growth, DBP formation and increased turbidity.

5.2.6.2. Lining of storage tanks

Lining the interior of a water storage tank is another action that PWSs can take to reduce the potential for coliform contamination and recontamination of the distribution system. Corrosion and corrosion product buildup from excessive interior corrosion can also result in water quality issues such as increased disinfection demand, microbial growth and increased turbidity.

5.2.6.3. Vent / hatch repair

One of the most common sources of contamination in a water storage tank is the improper design and maintenance of vents and roof hatches. These accessories can provide entry points for debris as well as microbial contamination from birds and insects. Aging water storage tanks with damaged tank covers can also be a source of microbial contamination. To prevent contamination and recontamination of the water supply, damaged vents, hatch roofs and tank covers should be repaired or replaced immediately.

5.2.6.4. Tank repair

Aging water storage tanks can provide entry points for debris as well as microbial contamination from birds and insects and should be replaced or repaired immediately to prevent contamination and recontamination of the water supply.

5.2.7. Implementation or upgrade of a Cross-connection Control and Backflow Prevention Program

Implementing or upgrading a Cross-connection Control and Backflow Prevention (CCCBFP) Program, including the installation of backflow prevention assemblies and devices, can prevent the flow of non-potable substances into the distribution system. When implementing the CCCBFP Program, PWSs should adhere to applicable state and/or local criteria, codes and/or regulations. Some codes or regulations may include documenting installation procedures and the periodic testing of backflow prevention assemblies. CCCBFP can prevent the introduction of non-potable substances into the public water supply due to backsiphonage or backpressure.

Backflow prevention equipment installation and maintenance is generally the consumer's responsibility. However, depending on how a PWS implements the CCCBFP, the customer and the PWS can share costs for the equipment and equipment installation, inspection, testing and maintenance. The PWS, on the other hand, is primarily responsible for the administration of CCCBFP and the inspection, review and approval of all backflow prevention assemblies and devices.

5.2.8. Sampler training

Implementation of a sampler training program provides guidelines for procedures that samplers must follow to collect valid, uncontaminated samples for analysis of total coliforms in the distribution system. Training sessions for operators reinforce proper sampling and sample handling procedures to obtain uncontaminated samples.

5.2.9. Addition or upgrade of on-line monitoring and control

Currently, monitoring of total coliforms is performed through grab samples at the treatment plant and throughout the distribution system. These grab samples are then analyzed in a laboratory to determine whether total coliforms are present or not in the grab sample. To ensure sufficient treatment has been provided, grab sample results, disinfectant dosages and certain water quality parameters, such as disinfectant residual levels, can be correlated. Since automatic monitoring is not available for total coliforms, PWSs can instead automatically control and

monitor for disinfectant dosages and water quality parameters (see the following discussion, **Sections 5.2.9.1 to 5.2.9.2** of this document).

5.2.9.1. Water quality monitoring and control

A PWS's ability to monitor disinfectant residuals in the distribution system can allow it to determine if there is an area of possible contamination or an area that requires additional treatment. Low levels of disinfectant residuals in the system can be caused by an increase of organics in a system, which consume disinfectant residuals, or insufficient disinfectant dosages at the treatment facility. Maintenance of sufficient disinfectant residual levels in a distribution system is important in maintaining minimal levels of total coliforms in the system.

PWSs can monitor disinfectant residual using routine grab samples, with adjustment of dosages based on results. Controlling and monitoring disinfectant dosages and water quality parameters can also be performed through the use of a SCADA system at the treatment facility. Disinfectant dosing equipment can be monitored and analyzers can be placed in the treatment process to monitor water quality parameters. Monitoring water quality parameters via SCADA in a distribution system is possible; however, it can be costly. Determining the number and location of the analyzers is challenging and highly dependent upon the system size. Typically, analyzer equipment will draw samples from an above grade pipe or a sample tap to an analyzer that is placed in a building. Sample locations will require analyzer equipment, a building, electric power and, in the case of some systems, integration to the PWS's existing SCADA system. Method requirements for on-line amperometric chlorine monitors are more time intensive and difficult than grab sampling.

5.2.9.2. Pressure monitoring and control

In addition to water quality monitoring, PWSs can monitor pressure levels throughout the distribution system. Installing online pressure monitoring and control will help minimize future incidents of pressure loss that can allow entry of contaminants into the distribution system. It can also help a PWS determine if there are any physical problems in the system, e.g., a crack in a pipe, a leaking valve, etc., that cause changes to the water quality of the system. Pressure readings can also be used to help locate areas of deficiency in a distribution system. Similar to the water quality monitoring, determining the number of pressure monitors and their locations is dependent upon the system size. Pressure monitoring locations will likely require the same equipment as water quality sampling locations.

On-line distribution system monitoring through the SCADA system can alert operators if there are possible issues with the distribution system; however, monitoring the water quality or

pressure will not identify the source of the contamination nor will it necessarily identify the location of the contamination.

5.2.10. Addition of security measures

PWSs may need to install security measures in circumstances where the assessment or onsite inspection reveals vandalism or security breaches that could lead to water contamination. Measures that PWSs may take to correct security breaches include installing a fence or locking buildings to restrict access to the system. Other possible security measures include employing a full time, on-site security staff and using alarms and cameras to detect security breaches.

PWSs should prioritize their security measures and concentrate on the most vulnerable parts of their system, such as unstaffed facilities (e.g., finished water storage tanks). An important implementation issue is determining the extent to which the water system needs to be secured. This would depend on how widely spread the system/facility is, the number and complexity of the treatment trains, the extent of the watershed, the distance of the treatment plant from the influent wells, accessibility of the distribution system, etc.

Installing security measures can increase the public's confidence in the protection of their drinking water and indeed can provide substantial protection against vandalism that might result in contamination of the water. However, security measures are not always foolproof or absolute in combating vandalism or security breaches.

5.2.11. Development and implementation of an operations plan

PWSs may need to develop an operations plan or improve their existing one when the assessment identifies gaps in the way the system is operated that could have led to or contributed to the sanitary defect identified. For example, a broken valve might have been prevented if routine inspections were part of the operations plan. An operations plan can integrate all operations and maintenance functions to meet the goals of flow, pressure and water quality. The AWWA G200-04 standard describes the critical requirements for the effective operation and management of drinking water distribution systems. According to this standard, a water system should develop SOPs, comprehensive monitoring plans, routine inspections and emergency response plans.

5.2.11.1. Standard operating procedures

SOPs should be developed for each operation and maintenance function that affects the system's water quality (e.g., flushing programs, storage facility inspections). The water quality goals for both the distribution system and the particular function should be specified in the SOPs.

SOPs should be developed from information gathered from the various departments and crews involved in a given function. The SOPs should be written in terms that everybody will understand and they should include all activities needed to conduct the procedures and describe the labor, equipment and materials needed to complete the activity.

5.2.11.2. Sample siting plans

PWSs should establish a routine distribution system sampling plan that is representative of the entire distribution system (under the RTCR, PWSs are required to have a sample siting plan in place). At a minimum, the sample sites should include sites required for regulatory compliance monitoring (as those required by the RTCR and the GWR). Additional sites should be sampled as necessary to provide a complete picture of the water quality in the system. All samples should be collected in accordance with the latest edition of *Standard Methods for the Examination of Water and Wastewater* (as of the writing of this document, the latest version is that of APHA et al. 2005).

5.2.11.3. Routine inspections

Routine inspections of various distribution system components such as finished water storage facilities, water mains, pump stations, chemical storage facilities, valves and fire hydrants are critical to ensure high-quality water. PWSs should implement inspection and maintenance programs of these components as part of the SOPs.

5.2.11.4. Emergency response plan

A written emergency response plan for the distribution system allows operating personnel to respond efficiently, effectively and rapidly to an emergency situation. Water quality system safety and reliability are improved if a PWS has an emergency response plan.

5.2.11.5. Appropriately qualified operators

EPA established an operator certification program with minimum professional standards for the operation and maintenance of water systems. The EPA program issued guidelines that specify standards for certification and recertification of operators. States implement the minimum standards of the certification program guidelines. While the specific requirements vary from state to state, the goal of the program is to ensure that skilled professionals are overseeing the treatment and distribution of safe drinking water and compliance with the Safe Drinking Water Act (SDWA). More information on the operator certification program can be found at: <http://water.epa.gov/infrastructure/drinkingwater/pws/dwoperatorcert/index.cfm>.

Providing training sessions for operators reinforces proper operation and maintenance of water facilities and systems. These sessions can also help educate PWS staff on emerging treatment technologies, regulatory requirements and other advances in the drinking water industry.

5.3 What are some of the best practices PWSs can take?

Best practices are actions that PWSs should and/or might choose to take following a Level 1 or Level 2 trigger regardless of whether they have identified a sanitary defect or a likely cause of the total coliform or *E. coli* occurrence (e.g., a single *E. coli*-positive sample). They can range from temporary measures to long term measures.

In the survey conducted by AWWA, Association of Metropolitan Water Agencies (AMWA) and Association of State Drinking Water Agencies (ASDWA) (see footnote 9), most respondents indicated that follow-up actions are taken following a positive coliform result even when the underlying cause is unidentified. Systems take these actions to ensure public health protection and generally do not involve major construction or capital improvement. Examples of common actions that were reported are flushing, increasing disinfectant residual, collecting additional investigative samples, examining whether samples were collected from appropriate sample sites and re-training staff/sampler on proper sampling procedures. Based on the results of the survey, the list below includes these actions and a few other ones as examples of best practices that PWSs may take following an assessment trigger or a positive coliform result, regardless of whether the cause or the sanitary defect is identified. Some of them have already been discussed in **Section 5.2** of this document. These actions are not mutually exclusive and PWSs may choose to implement a combination of them, if appropriate. PWSs should also consider implications for long-term sustainability and public health protection when deciding which of these actions to implement.

The RTCR also identifies a list of “best technologies, treatment techniques, or other means” (also known as best available technologies (BATs)) to help PWSs comply with the rule (see §141.63(e) of the RTCR). They include appropriate well placement and construction, maintenance of a disinfectant residual throughout the distribution system, proper maintenance of the distribution system, filtration and disinfection of surface water, implementation of a cross-connection control program and implementation of a wellhead protection program. PWSs may choose to take advantage of these BATs when they trigger an assessment in order to avoid future triggers and/or violations, even if they are unable to find a likely cause/sanitary defect. Some of these BATs are also discussed in the list below.

- **Apply disinfection** – A discussion of disinfection practices is in **Section 5.2.1** of this document. Additional information on emergency disinfection practices can be found at <http://www.epa.gov/drink/emereprep/emergencydisinfection.cfm>
- **Change or update distribution system maintenance operations** – A well-maintained and operated distribution system is an important barrier in protecting water quality. Even if water from an extremely clean source is adequately treated, breakdowns in the distribution system can lead to waterborne illnesses. In particular, the contamination of treated water can result from main breaks, inadequate water pressure that allows intrusion or backflow of contaminants, deficiencies in storage tanks and inadequate separation of water supply lines and sewers.
Proper maintenance of the distribution system includes appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, cross-connection control and continual maintenance of positive water pressure in all parts of the distribution system. Even if a Level 1 or Level 2 assessment does not reveal an underlying cause for the positive coliform samples, a PWS may choose to change or update their distribution system maintenance operations as a follow-up action. Many of these actions are described in **Section 5.2.3** of this document.
- **Perform unscheduled or spot flushing** – A discussion of unscheduled or spot flushing is in **Section 5.2.2** of this document.
- **Implement sampler training** – A discussion of sampler training is in **Section 5.2.8** of this document.
- **Review sample siting plan** – The sample siting plan should ensure that the quality of the water is representative of the distribution system. PWSs might consider reviewing and revising the sample siting plan as a universal follow-up action, regardless of whether an underlying cause for the positive coliform samples can be identified.
- **Select appropriate sample sites** – Part of a successful sampling plan is the selection of clean, appropriate sample taps and sites from which to collect representative samples. In addition to reviewing the sample siting plan, PWSs may wish to consider the use of dedicated sample taps, which is discussed in **Section 5.2.3.6** of this document.
- **Collect additional follow-up samples** – Collecting follow-up total coliform samples after conducting a corrective action is a good practice to help determine the effectiveness of the corrective action. This action could also enhance public health protection by determining if there are still any sanitary defects that may not have been identified initially. Note, however, that additional follow-up total coliform sampling in itself, without any other corrective action, is not sufficient to address identified sanitary defects.
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Appendix C

PN/CCR Templates

Appendix C
DRAFT Tier 1 Public Notice Template for *E. Coli* MCL Violation

DRINKING WATER WARNING

***E. COLI* MAXIMUM CONTAMINANT LEVEL VIOLATION**

BOIL YOUR WATER BEFORE USING.
HIERVAN EL AGUA ANTES DE USARLA.

**ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE
ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.**

___[Insert system name]___ water is contaminated with *E. coli* bacteria.

E. coli bacteria were found in the water supply on ___[Insert date]___. These bacteria can make you sick, and are a particular concern for people with weakened immune systems.

What should I do?

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a boil, let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation **until further notice**. Boiling kills bacteria and other organisms in the water.

E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly and people with severely compromised immune systems.

The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care providers.

What happened? What is being done?

Bacterial contamination can occur when increased run-off enters the drinking water source. It can also happen due to a break in the distribution system (pipes) or a failure in the water treatment process.

[Describe corrective actions taken]

We will inform you when tests show no bacteria and you no longer need to boil your water. We anticipate resolving the problem by ___[Insert date when you expect to return to compliance]__.

For more information, please contact: ___[Enter name of contact]___
at ___[Enter telephone number and area code]___

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by ___[Insert name of water system]___.

PWS ID#: ___[Enter PWS ID#]___

Date distributed: ___[Insert date distributed]___

Appendix C
DRAFT Tier 2 Public Notice Template for Failure to Complete a Level 1 Assessment

FAILURE TO COMPLETE A LEVEL 1 ASSESSMENT

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.

_____ [Insert system name] _____ recently violated a drinking water requirement. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we did (are doing) to correct this situation.

Coliforms are bacteria that are naturally present in the environment and that are used as an indicator that a potential pathway exists through which contamination (including potentially harmful, waterborne pathogens) may enter the distribution system. [Insert reason that assessment was triggered; include applicable sample dates and results]. As a result, we were required to conduct a Level 1 assessment of our system within 30 days. A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system. *We failed to conduct the required Level 1 assessment within 30 days, and have therefore, violated a drinking water requirement.*

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours.

Failure to conduct an assessment to identify the sanitary defect that triggered the assessment has the potential to prolong the risk of fecal contamination of our distribution system water. While we have not detected any evidence of fecal contamination in our distribution system, we are committed to correcting the deficiency to eliminate the potential threat of contamination. *Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.*

These symptoms, however, are not caused only by organisms in drinking water, but also by other factors. If you experience any of these symptoms and they persist, you may want to seek medical advice.

What is being done?

[Describe corrective actions taken]

We anticipate resolving the problem within _____ [Insert date] _____ (or the problem was resolved on _____ [Insert date] _____).

For more information, please contact: _____ [Enter name of contact] _____
at _____ [Enter telephone number and area code] _____

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by _____ [Insert name of water system] _____.

PWS ID #: _____ [Enter PWS ID#] _____

Date distributed: _____ [Insert date distributed] _____

Appendix C

DRAFT Tier 2 Public Notice Template for Failure to Complete a Level 2 Assessment (related to *E. coli*)

FAILURE TO COMPLETE A LEVEL 2 ASSESSMENT

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.

_____ [Insert system name] _____ recently violated a drinking water requirement. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we did (are doing) to correct this situation.

Our water system detected *E. coli* bacteria in the distribution system. *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. [Insert reason that assessment was triggered; include applicable sample dates and results]. As a result, we were required to conduct a detailed Level 2 assessment of our system within 30 days. A Level 2 assessment is a detailed study of the water system treatment and distribution to identify potential problems and determine (if possible) why *E. coli* bacteria have been found in our water system. *We failed to conduct the required Level 2 assessment* within 30 days, and have therefore violated a drinking water requirement.

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours.

Failure to conduct a timely assessment to identify the sanitary defect that triggered the assessment has the potential to prolong the risk of fecal contamination of our distribution system water. While we have not detected any evidence of fecal contamination in our distribution system, we are committed to correcting the deficiency to eliminate the potential threat of contamination. *Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.*

These symptoms, however, are not caused only by organisms in drinking water, but also by other factors. If you experience any of these symptoms and they persist, you may want to seek medical advice.

What is being done?

[Describe corrective actions taken]

We anticipate resolving the problem within _____ [Insert date] _____ (or the problem was resolved on _____ [Insert date] _____).

For more information, please contact: _____ [Enter name of contact] _____
at _____ [Enter telephone number and area code] _____

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by _____ [Insert name of water system] _____.

PWS ID #: _____ [Enter PWS ID#] _____

Date distributed: _____ [Insert date distributed] _____

Appendix C
DRAFT Tier 2 Public Notice Template for Failure to Perform Corrective Action (related to total coliform)

FAILURE TO PERFORM CORRECTIVE ACTION

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.

_____ [Insert system name] _____ recently violated a drinking water requirement. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we did (are doing) to correct this situation.

Coliforms are bacteria that are naturally present in the environment and that are used as an indicator that a potential pathway exists through which contamination (including potentially harmful, waterborne pathogens) may enter the distribution system. We found coliforms, indicating the need to look for potential problems in water treatment or distribution. As a result, we were required to conduct an assessment of our system within 30 days. An assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system. [Insert the required assessment and the cause of the sanitary defect.] We failed to correct the sanitary defect within the required timeframe, and have therefore violated a drinking water requirement.

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours.

Failure to correct the identified defect that was found during the assessment has the potential to cause distribution system contamination. *Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.*

These symptoms, however, are not caused only by organisms in drinking water, but also by other factors. If you experience any of these symptoms and they persist, you may want to seek medical advice.

What is being done?

Since being informed of the failure, we have begun to correct the sanitary defect identified during the assessment.
_____ The sanitary defect was determined to be [describe the cause of the sanitary defect.] We are now [describe the corrective action you are currently taking.] _____

We anticipate resolving the problem within _____ [Insert date] _____ (or the problem was resolved on _____ [Insert date] _____).

For more information, please contact: _____ [Enter name of contact] _____
at _____ [Enter telephone number and area code] _____

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by _____ [Insert name of water system] _____.

PWS ID #: _____ [Enter PWS ID#] _____

Date distributed: _____ [Insert date distributed] _____

DRAFT RTCR Annual CCR Language

This document contains examples of how community water systems can document RTCR Tier 1, Tier 2, and Tier 3 violations in their annual consumer confidence report (CCR.)

Note that the RTCR requires that Community Water Systems document any Tier 1 or Tier 2 violations from the last 12 months in the yearly CCR report.

The electronic version of this document has hyperlinks from the table of contents.

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*Different CCR language is required for a Tier 2 Failure to Perform a Level 2 assessment triggered by a second Level 1 assessment. See the updated version of this document on the Pa. DEP RTCR web page in May 2015 for this information.

** Different CCR language is required for a Tier 2 Failure to Perform Corrective Actions that are related to *E. coli*. See the updated version of this document on the Pa. DEP RTCR web page in May 2015 for this information.

Microbial Table Explanation

For each Tier 1 and Tier 2 violation the CCR documentation is to consist of 2 pieces: a "microbial table" and a "situation description." This section explains the microbial table and the usage of the MCL (Maximum Contaminant Level) and TT (Treatment Technique) terminology.

This explanation information does not have to be included in the CCR report, it is only included in this document so that when you see the microbial tables for Examples #1-#4, the various columns make more sense.

Column Explanation:

Table #1: A facility that had an E. coli MCL violation:

| Contaminant | MCL/TT | MCLG | Value | Date | Violation | Typical Sources |
|----------------|--------|------|-----------------------------|---------------|-----------|------------------------------|
| <i>E. coli</i> | MCL | 0 | Positive (<i>E. coli</i>) | April 5, 2017 | Yes* | Human and animal fecal waste |

* The CWS detected *E. coli* in the distribution system; the sample was collected in response to a TC + routine sample collected on April 2nd, 2017.

The "**Contaminant**" column describes the microbial contaminant that was present.

The "**MCL/TT**" column states whether an *E. coli* Maximum Contaminant Level (MCL) was exceeded or whether the system incurred a "Treatment Technique (TT)" violation by having certain RTCR Tier 2 circumstances. A list of *E. coli* MCL Tier 1 Violations and Treatment Technique Tier 2 violations occurs on page 2.

The RTCR "Maximum Contaminant Level Goal (**MCLG**)" column is 0 for *E. coli* and Total Coliforms.

Indicate a positive result in the "**Value**" column.

The "**Date**" column should indicate the date that the CWS received the sample result from the laboratory that resulted in a violation.

The "**Violation**" column indicates that an RTCR Tier 1 or Tier 2 PN violation occurred.

The "**Typical Sources**" column will indicate that the typical sources of *E. coli* bacteria are human and animal fecal waste. For total coliforms, this column will indicate total coliforms are naturally present in the environment.

Table #2: A facility that had a Treatment Technique Violation:

Table #2 is for a facility that had a Treatment Technique violation for failing to submit their Level 1 assessment within 30 days of a violation.

| Contaminant | MCL/TT | MCLG | Value | Date | Violation | Typical Sources |
|-------------------------|--------|------|----------|---------------|-----------|--------------------------------------|
| Total Coliform Bacteria | TT | 0 | Positive | June 17, 2017 | Yes* | Naturally present in the environment |

* The CWS triggered a Level 1 assessment on June 17th, 2017 and failed to complete the required assessment on time

The difference between RTCR MCL Violations and Treatment Technique (TT) Violations is described below. All MCL Violations are Tier 1 PN and all TT Violations are Tier 2 PN.

MCL Violations: Community Water Systems incur an *E. coli* "MCL violation" under the following circumstances:

- A Total Coliform Positive (TC+) routine sample result followed by an ***E. coli+*** check sample result.
- An ***E. coli +*** routine sample result followed by a TC+ check sample result.
- An ***E. coli +*** routine sample result and PWS fails to take all required check samples.
- A TC+ check sample result, and PWS fails to test for ***E. coli***.

Under the RTCR, *E. Coli* MCL Violations always require Tier 1 PN.

TT Violations: Community Water Systems incur a coliform "Treatment Technique" (TT) violation under the following circumstances:

- The system fails to submit a Level 1 assessment within 30 days of the trigger date
- The system fails to submit a Level 2 assessment within 30 days of the trigger date
- The system fails to correct any sanitary defect found through either a Level 1 or Level 2 assessment within 30 days or in accordance with a schedule acceptable to the state.

Under the RTCR, Treatment Technique Violations always require Tier 2 PN.

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| CCR Example #1: Tier 1 <i>E. coli</i> MCL Violation |
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| Contaminant | MCL/TT | MCLG | Value | Date | Violation | Typical Sources |
|----------------|--------|------|-----------------------------|---------------|-----------|------------------------------|
| <i>E. coli</i> | MCL | 0 | Positive (<i>E. coli</i>) | April 5, 2017 | Yes* | Human and animal fecal waste |

* The Jeffstown CWS detected *E. coli* in the distribution system; the sample was collected in response to a TC + routine sample collected on April 2nd, 2017. More information about this situation is provided in the Situation section below.

Situation

- On April 3rd, 2017, we found out one of our routine samples for April was TC +, but *E. coli* absent.
- On April 4th, we collected a set of 3 check samples and had them analyzed.
- On April 5th, we learned that one of these check samples was *E. coli* +.
- In response, we sent notices to all of our affected customers within 24 hours of learning of this *E. coli* + sample.
- *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly and people with severely compromised immune systems.
- We were required to complete a Level 2 assessment because we found *E. coli* in our water system. A Level 2 assessment is a detailed study of the water system treatment and distribution to identify potential problems and determine (if possible) why *E. coli* bacteria have been found in our water system.
- In addition, we were required to take a corrective action to address the sanitary defect that was found during the assessment and we completed this action. The Jeffstown CWS determined the sanitary defect to be an inadequate disinfectant residual following a line break repair. We implemented required corrective action established by the Pa. DEP to address the defect. We developed a plan with the Pa. DEP and increased the disinfectant residual in the distribution system. This change was implemented by April 10, 2017.

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| CCR Example #2: Tier 2 Failure to Complete a Level 1 Assessment |
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| Contaminant | MCL/TT | MCLG | Value | Date | Violation | Typical Sources |
|-------------------------|--------|------|----------|---------------|-----------|--------------------------------------|
| Total Coliform Bacteria | TT | 0 | Positive | June 17, 2017 | Yes* | Naturally present in the environment |

* The Deerland Ridge CWS triggered a Level 1 assessment on June 17th, 2017 and failed to submit the required assessment within 30 days of the trigger date. More information about this situation is provided in the Situation section below.

Situation

- During the past year, we were required to conduct a Level 1 assessment. We did not complete the required Level 1 assessment on time.
- On June 17, 2017, one of the routine samples was total coliform-positive (TC+). As required by the Revised Total Coliform Rule, we collected check samples from the distribution system and had them analyzed. One of these check samples also tested positive for total coliform bacteria.
- *Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.*
- We were required to conduct one Level 1 assessment, which was not completed on time.
- We sent notices to all of our customers within 30 days of learning of the failure to complete the required Level 1 assessment on time.
- The Level 1 assessment was completed on August 5, 2017, and identified the cause of the sanitary defect to be damage to the storage tank. We implemented the corrective action plan established by the PA DEP, repaired the damage to the storage tank and disinfected the tank on August 31, 2017.

**CCR Example #3: Tier 2 Failure to Complete a Level 2 Assessment
(related to *E. coli**)**

| Contaminant | MCL/TT | MCLG | Value | Date | Violation | Typical Sources |
|----------------|--------|------|-----------------------------|----------------|-----------|------------------------------|
| <i>E. coli</i> | MCL | 0 | Positive (<i>E. coli</i>) | April 4, 2017 | Yes | Human and animal fecal waste |
| <i>E. coli</i> | TT | 0 | Positive (<i>E. coli</i>) | April 5, 2017* | Yes | Human and animal fecal waste |

* The Lloydston Authority CWS triggered a Level 2 assessment on April 5th, 2017 and failed to submit the Level 2 assessment within 30 days of the trigger date. More information about this situation is provided in the Situation section below.

Situation

- During the past year we were required to conduct a Level 2 assessment. The Lloydston Authority failed to submit the Level 2 assessment within 30 days of the trigger date.
- The Level 2 assessment was completed on May 23rd, 2017. This assessment determined the cause of the sanitary defect to be that our 500,000 gallon storage tank water quality was degrading because of excess water residence time due to inadequate tank turnover. As a result, the Pa. DEP had us adjust operational storage tank water levels to turn-over more water during fill/draw cycles. This corrective action was implemented on May 26th, 2017.
- The bullets below detail the events and concerns leading up to the Level 2 assessment requirement circumstances:
 - On April 3rd, 2017, we found out one of our routine samples for April was TC +, but *E. coli* absent.
 - On April 4th, we collected a set of 3 check samples and had them analyzed.
 - On April 5th, we learned that one of these check samples was *E. coli* +.
 - *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly and people with severely compromised immune systems.
 - In response, we sent notices to all of our affected customers within 24 hours of learning of this *E. coli* + sample.
 - We were required to complete a Level 2 assessment because we found *E. coli* in our water system. A Level 2 assessment is a detailed study of the water system treatment and distribution to identify potential problems and determine (if possible) why *E. coli* bacteria have been found in our water system. This assessment was submitted/completed after the required 30-day time period.

- In response, we sent notices to all of our affected customers within 30 days of learning of the failure to submit the Level 2 within 30 days of the trigger date.
- After being informed of the failure to submit the Level 2 assessment within 30 days of the trigger date, the Lloydston Authority completed the Level 2 assessment.

*Different CCR language is required for a Tier 2 Failure to Perform a Level 2 assessment triggered by a second Level 1 assessment. See the updated version of this document on the Pa. DEP RTCR web page in May 2015 for this information.

**CCR Example #4: Tier 2 Failure to Perform Corrective Action
(related to total coliform**)**

| Contaminant | MCL/TT | MCLG | Value | Date | Violation | Typical Sources |
|-------------------------|--------|------|----------|-----------------|-----------|--------------------------------------|
| Total Coliform Bacteria | TT | 0 | Positive | August 20, 2017 | Yes* | Naturally present in the environment |

* The Billsburg Borough CWS triggered a Level 1 assessment on August 20th, 2017. The Borough submitted the required assessment within the required 30 days of the trigger date, by September 20th, 2017. However, the Borough failed to correct the sanitary defect identified during the assessment within the required timeframe established by the Pa. DEP. More information about this situation is provided below in the Situation section below.

Situation

- During the past year we were required to conduct one Level 1 assessment which was completed and submitted in August of 2017. In addition we were required to take a corrective action which we did not complete on time.
- On August 18th, 2017, Billsburg Borough found out one of our routine samples for August was total coliform positive (TC +), but *E. coli* absent. As required by the Revised Total Coliform Rule, we collected check samples from the distribution system and had them analyzed. One of these check samples was also TC +, but *E. coli* absent.
- *Coliforms are bacteria that are naturally present in the environment and that are used as an indicator that a potential pathway exists through which contamination (including potentially harmful, waterborne pathogens) may enter the distribution system. We found coliforms, which indicated the need to perform a Level 1 assessment on the water system. A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in the water system.*
- This Level 1 assessment was submitted to the Pa. DEP by September 20th, 2017, within 30 days of the trigger date as required. During the assessment, the sanitary defect was determined to be a need to adjust the flushing frequency in a distant portion of the distribution system to pull fresh water and improve water quality. However, the Billsburg Borough distribution staff did not receive the message, so they did not adjust the flushing protocol by October 4th, 2017, the timeframe established by the Pa. DEP.
- We sent notices to all of our affected customers within 30 days of learning of the failure to correct the sanitary defect within the timeframe established by the state.

- After being informed of the failure to correct the sanitary defect within the required timeframe established by the Pa. DEP, Billsburg Borough was able to adjust their flushing protocol by October 18th, 2017.

** Different CCR language is required for a Tier 2 Failure to Perform Corrective Actions related to *E. coli*. See the updated version of this document on the Pa. DEP RTCR web page in May 2015 for this information.

**CCR Example #5: Tier 3 Failure to take all Routine Total Coliform Samples
in the Required Compliance Period**

Violation

Our water system failed to collect three of the required 15 drinking water total coliform samples between December 1 and December 31, 2016. None of the 12 samples we did collect were positive for total coliform or *E. coli* bacteria. We were informed of this monitoring violation on January 11, 2017. During the January 1 through January 31, 2017 compliance period we took all 15 of the required routine coliform samples.

Failure to conduct routine coliform monitoring within the required compliance period is a monitoring violation.

Appendix C

RTCR Summary Table for PN & CCR

| Situation | PN Tier | Assessment Trigger | Document in CCR (CWS systems only) |
|--|----------------|---------------------------|--|
| TC+ routine followed by an <i>E. coli</i> + check | Tier 1 | Level 2 | Yes |
| <i>E. coli</i> + routine followed by a TC+ | Tier 1 | Level 2 | Yes |
| <i>E. coli</i> + routine and PWS fails to take all required check samples | Tier 1 | Level 2 | Yes |
| TC+ check sample result, and PWS fails to test for <i>E. coli</i> | Tier 1 | Level 2 | Yes |
| Failure to perform a Level 2 assessment or corrective actions | Tier 2 | N/A | Yes |
| Failure to perform a Level 1 assessment or corrective actions | Tier 2 | N/A | Yes |
| Seasonal system failure to follow state-approved start-up procedures prior to serving water to the public | Tier 2 | N/A | N/A |
| TC+ routine (<i>E. coli</i> absent) followed by a TC+ check (<i>E. coli</i> absent); PWS collects less than 40 samples/month | N/A | Level 1 | Yes |
| Greater than 5.0 percent TC+ routine (<i>E. coli</i> absent) and/or TC+ check (<i>E. coli</i> absent) check samples in a month; PWS collects at least 40 samples/month | N/A | Level 1 | Yes |
| Failure to take a required routine sample | Tier 3 | N/A | Yes, the CCR can be used if the timing is appropriate |
| Failure to analyze for <i>E. coli</i> following a routine TC+ sample | Tier 3* | N/A | Yes, the CCR can be used if the timing is appropriate |

* Assumed to be *E. Coli* + and used in MCL determination, which could lead to Tier 1

Continued next page

| Situation | PN Tier | Assessment Trigger | CWS systems document in CCR |
|--|---------|--|---|
| Failure to submit a completed Level 1 assessment form after PWS conducts the assessment within 30 days of a Level 1 trigger | Tier 3 | N/A (since Level 1 has been completed) | Yes, the CCR can be used if the timing is appropriate |
| Failure to submit a completed Level 2 assessment form after PWS conducts the assessment within 30 days of a Level 2 trigger | Tier 3 | N/A (since Level 2 has been completed) | Yes, the CCR can be used if the timing is appropriate |
| Failure to notify the state of an <i>E. coli+</i> sample result (when all check samples are negative) in a timely manner | Tier 3 | N/A | Yes, the CCR can be used if the timing is appropriate |
| For seasonal systems, failure to submit certification of completion of state-approved start-up procedure | Tier 3 | N/A | N/A |
| Failure to maintain assessment forms for at least 5 years | Tier 3 | N/A | Yes, the CCR can be used if the timing is appropriate |
| Failure to maintain corrective action documentation for at least 5 years | Tier 3 | N/A | Yes, the CCR can be used if the timing is appropriate |
| Failure to maintain a record of any check sample taken that meets state criteria for an extension of the 24-hour period for collecting check samples | Tier 3 | N/A | Yes, the CCR can be used if the timing is appropriate |

Appendix C: Responding to Total Coliform Positive Sample Results

Background:

This appendix is a quick review of how a PWS responds to total coliform positive (TC+) samples under the RTCR.

Under the TCR, the response to a TC+ check sample was a Tier 2.

Under the RTCR, the response to a TC+ check sample (that is *E. coli* absent) is that a Level 1 assessment is triggered.

| TC + Response Review |
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- Based on their sample siting plan, all PWSs collect their monthly routine samples (at regular intervals throughout the month) and have them analyzed for total coliforms.
- Any TC+ routine sample must be analyzed for *E. coli*. (Note: if the TC + routine sample is *E. coli* +, that does not automatically trigger an assessment or Tier, but is used for determining possible further action in conjunction with the check sample results. The state must be notified of any *E. coli* + routine sample result.)
- For any TC + routine sample:
 - 3 check samples must be taken (one at the original location, one upstream, and one downstream.)
 - All 3 check samples must be analyzed for total coliform.
 - Any TC+ check sample must be analyzed for *E. coli*.
 - Any TC+ check sample that is also *E. coli* + is an ***E. Coli* MCL violation**.
 - Any TC+ check sample that is *E. coli* absent is still a coliform TT violation which triggers a Level 1 assessment (for a PWS collecting fewer than 40 routine and repeat samples per month.)

Level 1 assessment triggers:

- A PWS collecting fewer than 40 routine and repeat samples per month that has two or more routine and/or repeat samples per month that are TC+ .
- A PWS collecting at least 40 routine and repeat samples per month has greater than 5.0 percent of the routine and/or repeat samples in a month that are TC+.
- A PWS fails to take every required repeat sample after any single TC+ sample.

Level 2 assessment triggers:

- A TC+ routine sample followed by an *E. coli* + check sample
- An *E. coli* + routine sample followed by a TC+ check sample
- Failure to collect all required check samples within the required time frame following an *E. coli* + routine sample
- Failure to test for *E. coli* following a TC + check sample
- A second Level 1 assessment within a rolling 12 month period