



**Florida Department of Environmental Protection**

# **Revised Total Coliform Rule (RTCR)**

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August 10, 2016**





# Overview

- Key provisions
- Sampling plans
- Monitoring
- Assessments and corrective action
- Violations, public notice, consumer confidence reports (CCR)



# History of RTCR

- Six Year Review 1 – Safe Drinking Water Act requires EPA to review and revise, as appropriate, each National Primary Drinking Water Regulation no less often than every six years; In 2003, EPA reviewed and decided to revise the TCR
  - Implementation burden
  - Inadequate application of indicators of pathogenic contamination
- Agreement in Principle – In Sept 2008, Total Coliform Rule Distribution System Advisory Committee deliberations concluded with a signed Agreement in Principle (AIP) that included consensus recommendations on how to revise the TCR.



# RTCR Applicability

- Public water systems had to begin complying with RTCR on April 1, 2016.
- Subpart Y of Title 40, Code of Federal Regulations (CFR) Part 141. Majority of rule is contained in 141.851-141.861.
- Like 1989 TCR, RTCR applies to all Public Water Systems (PWSs)
  - Only microbial drinking water regulation that applies to all PWSs
    - Ground water (GW) & surface water (SW) systems
    - One of the few rules that applies to TNCWSs
    - Any size PWS population



# What Changed?

- Under RTCR, there is no longer a monthly Maximum Contaminate Level (MCL) violation for multiple total coliform detections.
  - Instead, systems that have an indication of coliform contamination in the distribution system will have to assess the problem and take corrective action that may reduce cases of illnesses and deaths due to potential fecal contamination and waterborne pathogen.



# Why Total Coliform and *E.coli*?

- RTCR uses total coliform (TC) and *E. coli* as indicators of potential risk.
  - TC are a group of closely related bacteria that, with a few exceptions, are not harmful to humans.
  - *E. coli* bacteria are a more accurate indicator of fecal contamination than TC, though not a measure of waterborne pathogen occurrence.
- Presence of TC is a good indicator of a potential pathway of microbial contamination into the distribution system.



# Key Provisions

## MCL

- Establishes an *E. coli* MCL

***E. coli* MCL Violation Occurs with Any of These Sampling Result Combinations**

| <b>ROUTINE</b> | <b>REPEAT</b>                               |
|----------------|---|
| <b>EC+</b>     | <b>TC+</b>                                  |
| <b>TC+</b>     | <b>EC+</b>                                  |
| <b>EC+</b>     | <b>Any missing repeat sample</b>            |
| <b>TC+</b>     | <b>TC+ (but no <i>E. coli</i> analyzed)</b> |



# Key Provisions

## Treatment technique triggers (assessments)

- Replaces monthly total coliform MCL with treatment technique trigger.
  - Level 1 and Level 2 assessments
  - Corrective actions
- Treatment technique triggers also invoked in situations where systems experience *E. coli* MCL or fail to conduct all repeat monitoring.





# Key Provisions

## Monitoring

- Samples collected based on a written sample siting plan.
- **Routine** sample frequency and number based on system type and population served.
- Systems not conducting **routine** monitoring monthly must collect 3 **additional routine** samples the month following 1 or more TC+ samples (this used to be 5 under TCR).
- 3 **repeat** samples required for each **routine** TC+ result.
  - Location: original site, within 5 connections upstream, within 5 connections downstream, or alternative sites
- Any sample that is TC+ must be further tested for *E. coli*



# Sampling Plans

- Systems must develop and adhere to a sample siting plan and a system-specific schedule.
- Sample siting plans are subject to state review and revision.
  - In the Central District, plans are being reviewed during the sanitary survey unless the system has requested an immediate review or proposed alternative repeat locations.



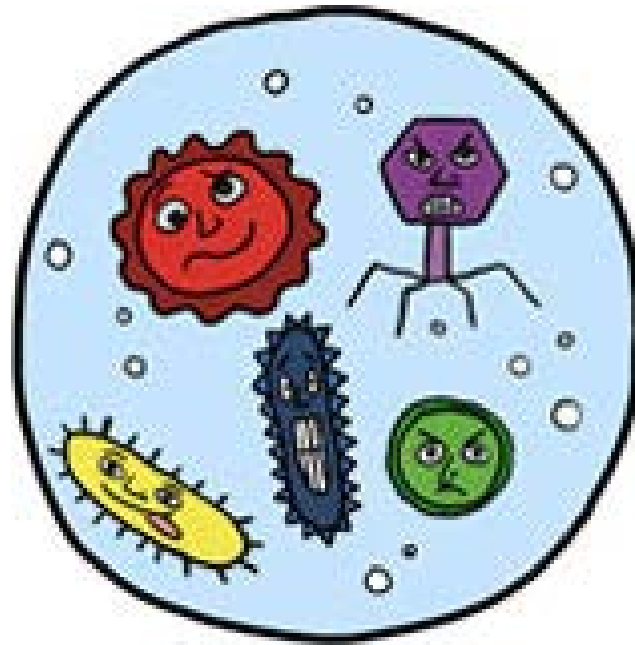
# Sample Plan Components

- Sampling locations:
  - Must be representative of the water in the distribution system.
  - Routine and \*repeat monitoring locations must be identified (may continue to use 5 up/downstream).
  - Must show all applicable ground water rule (GWR) monitoring sites.
- Sample collection schedule:
  - Samples must be collected at regular time intervals throughout the month
  - Systems serving  $\leq 4,900$  may collect all samples (5) on a single day if taken from different sites.

\*Repeat monitoring locations DO NOT need to be identified *if* the system indicates in the plan that they will be sampling from the original site and within 5 connections upstream and downstream for a total of 3 repeats.



# Questions?





# Routine Monitoring

## PWS Serving > 1,000 People

- ALL systems serving more than 1,000 people must monitor MONTHLY.
- Systems must collect samples at regular time intervals throughout the month.
  - GW systems serving 4,900 or fewer people may collect all samples on a single day if taken from different sites.



# Routine Monitoring

## PWS Serving > 1,000 People

| TOTAL COLIFORM <b>MONTHLY</b> MONITORING FREQUENCY |                     |
|--|---------------------|
| Population served                                  | Min # of Samples/Mo |
| 1,001 to 2,500                                     | 2                   |
| 2,501 to 3,300                                     | 3                   |
| 3,301 to 4,100                                     | 4                   |
| 4,101 to 4,900                                     | 5                   |
| 4,901 to 5,800                                     | 6                   |
| 5,801 to 6,700                                     | 7                   |
| ...etc...  | x                   |
| 3,960,001 or more                                  | 480                 |

Same schedule as TCR



# Routine Monitoring

## **SW & GWUDI (Subpart H) Systems Serving $\leq$ 1000 People**

- Any system that has a Surface Water (SW), Ground Water Under Direct Influence of Surface Water (GWUDI), SW or GWUDI blended source(s) are considered surface water (Subpart H) for purposes of RTCR monitoring.
- One routine sample per month.



# Routine Monitoring

## GW Systems Serving $\leq 1,000$ People

| System Type  | Increased  | Baseline    | Transition to the RTCR   |
|--------------|------------|-------------|--|
| CWS          | NA         | 1 / month   | Same frequency under the TCR   |
| NTNC and TNC | *1 / month | 1 / quarter | NTNC baseline changed from monthly to quarterly beginning April 1, 2016<br>TNC is same frequency under TCR |

\*For a system on quarterly monitoring, two RTCR monitoring violations, or one RTCR monitoring violation and one Level 1 assessment, in a rolling 12 months will increase their monitoring to monthly.





# Additional Routine Monitoring

| TCR  | RTCR   |
|--|--|
| <p>PWS taking &lt; 5 routine samples per month (PWS serving <math>\leq 4,100</math>)</p> <ul style="list-style-type: none"><li>• Must take at least 5 routine samples in the month after a TC+ sample.</li></ul> | <p>No longer a requirement for systems that monitor at least monthly.</p> <p>PWSs taking samples less frequently than once per month (i.e., quarterly or annually)</p> <ul style="list-style-type: none"><li>• Must take at least 3 routine samples in a month after a TC+ sample.</li></ul> |



# Repeat Monitoring

## Number of samples

| TCR   | RTCR  |
|---|---|
| PWS serving $\leq 1,000$ : 4 repeat samples for every TC+ routine sample. | <ul style="list-style-type: none"><li>• All PWSs must take 3 repeat samples for every TC+ routine sample regardless of whether PWS has already triggered an assessment.</li><li>• Also must take additional repeats for TC+ repeat samples until TT trigger (including EC MCL) reached and system notifies the state.</li></ul> |
| PWS serving $> 1,000$ : 3 repeat samples for every TC+ routine sample.    |   |



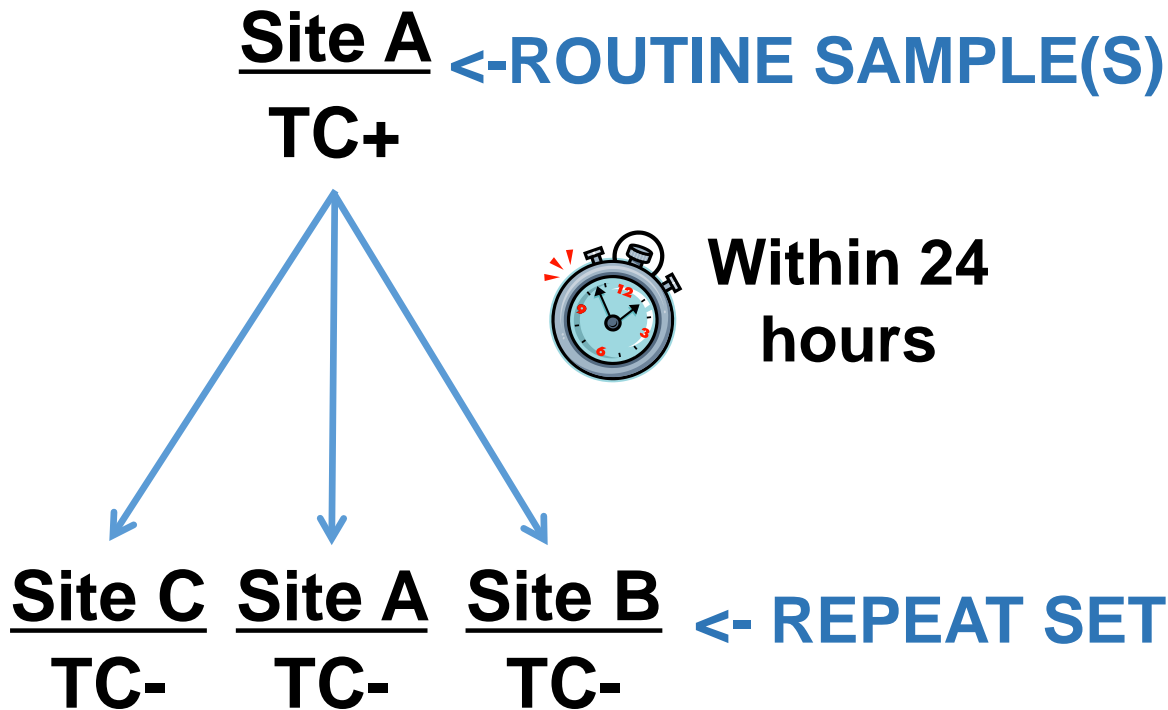
# Repeat Monitoring

## Locations

| TCR  | RTC  |
|--|--|
| <p>Repeat samples must be collected from the original TC+ site, at least one at a tap within 5 service connections upstream, and at least one at a tap within 5 service connections downstream</p> | <p>PWS can collect repeat samples using the same procedure as in the TCR, or</p> <p>PWS can specify in their sample siting plan either fixed alternative locations or criteria for selecting sites on a situational basis via a standard operating procedure</p> |



# Follow-up Monitoring for TC+ Routine Sample(s)



- For every routine sample that is TC+:
  - Collect 3 repeat samples
- All TC+ samples must be tested for *E. coli*

Systems must collect a set of repeat samples for EACH routine TC+ sample, even if a TT exceedance has occurred



# Follow-up Monitoring for TC+ Repeat Sample(s)

## Site A TC+



|               |               |               |
|---------------|---------------|---------------|
| <u>Site C</u> | <u>Site A</u> | <u>Site B</u> |
| TC+           | TC-           | TC+           |

  
**Within 24 hours**  
 ←-Repeat Set 1

|               |               |               |
|---------------|---------------|---------------|
| <u>Site C</u> | <u>Site A</u> | <u>Site B</u> |
| TC-           | TC+           | TC+           |

←-Repeat Set 2

|               |               |               |
|---------------|---------------|---------------|
| <u>Site C</u> | <u>Site A</u> | <u>Site B</u> |
| TC-           | TC-           | TC-           |

←-Repeat Set 3

In this example, there are a total of 9 repeat samples at 3 sites.

- For each routine TC+ sample, when there are multiple TC+ repeat samples in a set:
  - Collect one set of 3 repeat samples until either:
    - TC are not detected in one complete set of repeats

OR

  - System determines that a TT trigger has been exceeded and notifies the state



# Repeat Monitoring Timing

- System has 24 hours after learning about TC+ routine sample to take repeat samples.
- Must collect all repeats on same day.
  - Three repeat samples are needed for each TC+ routine sample.
- State may allow systems with single service connection to:
  - Collect over a 3-day period.
  - Collect a larger volume container(s) of any size as long as the total volume collected is at least 300mL.



# Monitoring - E.coli MCL

- Remember: RTCR establishes an E.coli MCL as any of the following scenarios

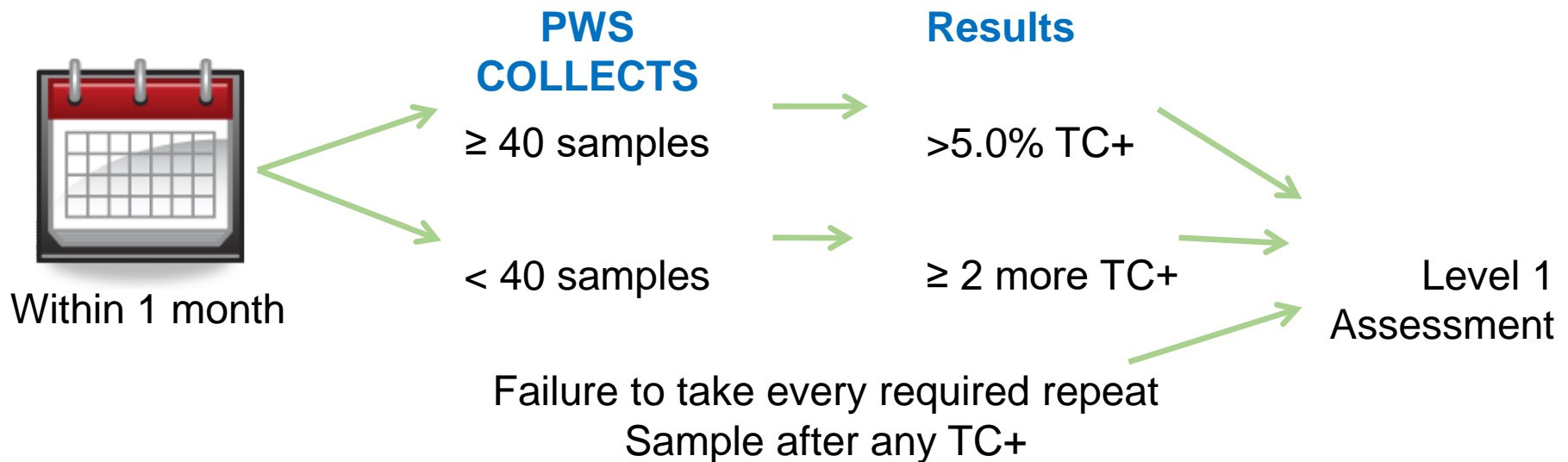
***E. coli* MCL violation occurs with any of these sampling result combinations**

| <b>Routine</b> | <b>Repeat</b>                               |
|----------------|---|
| <b>EC+</b>     | <b>TC+</b>                                  |
| <b>TC+</b>     | <b>EC+</b>                                  |
| <b>EC+</b>     | <b>Any missing repeat sample</b>            |
| <b>TC+</b>     | <b>TC+ (but no <i>E. coli</i> analyzed)</b> |



# Monitoring

- Results of all ROUTINE and REPEAT sampling included in determination of whether an Assessment is triggered.

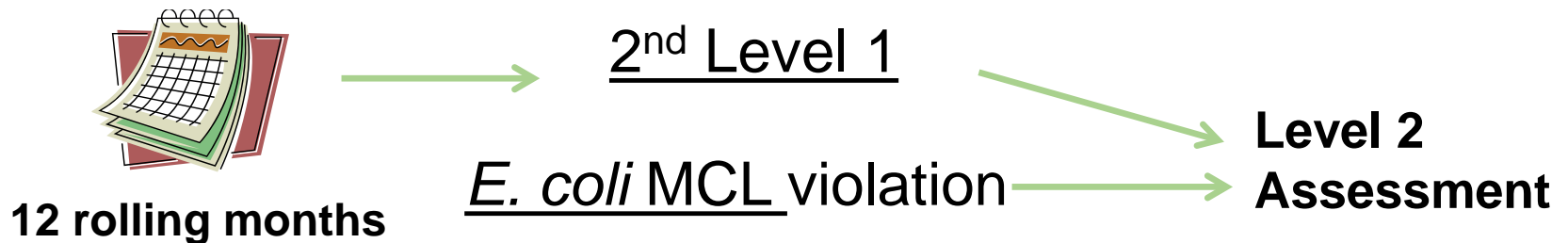






# Monitoring

- Results of all ROUTINE and REPEAT sampling included in determination of whether an assessment is triggered.





# Analytical Methods

- Under the TCR:
  - PWSs must conduct total coliform, fecal coliform and *E. coli* analysis in accordance with the methods listed in Title 40 CFR (Code of Federal Regulations) 141.21(f).
- Under RTCR:
  - Fecal coliform analytical methods no longer allowed.
  - Methods table in RTCR reflect approval of a modified Colitag method for simultaneous detection of *E. coli* and other total coliforms.
  - Changes were made to total coliform and *E. coli* methods. These changes are consistent with the laboratory certification manual. The changes include:
    - Change in holding time definition: Time from sample collection to initiation of test medium incubation may not exceed 30 hours.
    - Requiring de-chlorination agent. If residual chlorine present, sodium thiosulfate must be added to neutralize the chlorine
    - Requiring autoclaving of Membrane Filtration (MF) funnel.



# Example

Let's try an example:

- South Town PWS – Profile
  - CWS
  - Ground water only; 2 wells
  - Disinfects (<4 log)
  - Serves 1100 persons
  - Monitors monthly for Total Coliform
  - 2 samples/month required



# South Town PWS – Case Scenario

April 2016

Routine Sample Results:

Site A: TC+/EC+

Site B: TC+/EC-

How many repeat samples are required?

- 6 total – 3 repeats for each

How many routine samples will be required next month?

- 2 – system samples monthly, continue routine sampling



# South Town PWS – Case Scenario

April 2016

Routine Sample Results:

Site A: TC+/EC+

Site B: TC+/EC-

What if one of those repeat samples associated with Site A is TC+...

Has an MCL violation occurred?

- Yes

Has an assessment been triggered?

- Yes – Level 1 *and* a Level 2



# Purpose of Assessments

- All systems required to conduct assessment when monitoring results show that the system may be vulnerable to contamination.
- An assessment is an evaluation to identify sanitary defects and TT triggers.
- More proactive approach to public health protection compared to TCR
  - Conditions that defined a non-acute MCL violation under TCR are now used to trigger an assessment



# Level 1 Assessment Triggers

- Must consider all compliance samples (the total number of routine and repeat samples) to determine Level 1 assessment trigger.
  - >5% TC+ in monthly sampling.
  - 2 or more TC+ results for systems taking < 40 samples/month.
  - Failure to take every repeat sample after any TC+.



# Level 2 Assessment Triggers

- Considering all compliance samples (routine and repeat) a system:
  - Has a second Level 1 trigger within a rolling 12-month period.
    - Unless state has determined a likely reason that the samples that caused the first Level 1 TT trigger were total coliform-positive and has established that the system has corrected the problem.
  - An *E. coli* violation
  - On approved annual monitoring exceeds a Level 1 trigger in two consecutive years.





# Elements of Assessments

- At a minimum, assessment must include review and identification of the following elements:
  - Atypical events that may affect distributed water quality.
  - Distribution or storage maintenance and operation changes that may affect water quality.
  - Source and treatment considerations affecting water quality.
  - Existing water quality monitoring data.
  - Inadequacies in sample sites, sampling protocol, and sample processing.



# Level of Effort – Level 1 vs. Level 2

- Level 1:
  - Primarily completed using existing data.
  - May include limited inspections or interviews.
  - Intended to be a self-assessment by PWS.
- Level 2:
  - More comprehensive review of existing data.
  - May include field investigations, additional sampling, and inspections.
  - Conducted by professional engineer, FRWA Circuit Rider, licensed operator meeting minimum operator requirements for the system [Rule 62-699, Florida Administrative Code]



# Sanitary Defect

*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*





# Sanitary Defects





# Sanitary Defects





# Common Causes of Contamination and Corrective Actions

| Common Cause   | Common Corrective Action(s)   |
|--|---|
| <b>Failure to disinfect (or improper disinfection) after maintenance work in the distribution system</b> | <ul style="list-style-type: none"><li>• <b>Disinfection</b></li></ul>   |
| <b>Main breaks</b>   | <ul style="list-style-type: none"><li>• <b>Disinfection</b></li><li>• <b>Replacement/repair of distribution system components</b></li></ul>   |
| <b>Holes in storage tank, inadequate screening, etc.</b>   | <ul style="list-style-type: none"><li>• <b>Maintenance of storage facility</b></li><li>• <b>Addition of security measures</b></li><li>• <b>Development &amp; implementation of an operations plan</b></li></ul> |
| <b>Cracks in well seal, casing, etc.</b>   | <ul style="list-style-type: none"><li>• <b>Replacement/repair of well components</b></li></ul>  |



# Common Causes of Contamination and Corrective Actions

| Common Cause   | Common Corrective Action(s)   |
|--|---|
| <b>Loss of system pressure</b>                         | <ul style="list-style-type: none"><li>• Maintenance of adequate pressure</li><li>• Valve maintenance</li><li>• Addition or upgrade of on-line monitoring &amp; control</li></ul>                                      |
| <b>Biofilm accumulation in the distribution system</b> | <ul style="list-style-type: none"><li>• Flushing</li><li>• Maintenance of adequate pressure</li></ul>   |
| <b>Cross connections</b>                               | <ul style="list-style-type: none"><li>• Maintenance of adequate pressure</li><li>• Installation of backflow prevention assembly/device</li><li>• Implementation/upgrade of cross connection control program</li></ul> |



# Common Causes of Contamination and Corrective Actions

| Common Cause                            | Common Corrective Action(s)  |
|---|--|
| <b>Inadequate disinfectant residual</b> | <ul style="list-style-type: none"><li>• <b>Disinfection</b></li><li>• <b>Flushing</b></li><li>• <b>Maintaining appropriate hydraulic residence time</b></li><li>• <b>Addition or upgrade of on-line monitoring and control</b></li></ul> |
| <b>Contaminated sampling taps</b>       | <ul style="list-style-type: none"><li>• <b>Replacement/repair of distribution system components</b></li><li>• <b>Sampler training</b></li></ul>  |
| <b>Sampling protocol errors</b>         | <ul style="list-style-type: none"><li>• <b>Sampler training</b></li><li>• <b>Development and implementation of an operations plan</b></li></ul>  |





# Assessment Form Components

- Must include:
  - Sanitary defect(s) identified.
    - Assessment form may note that no sanitary defects were identified, if applicable.
  - Corrective actions taken.
  - Proposed timetable for corrective actions not yet completed.
- Level 2 assessment elements contain the same elements as the Level 1, but each element is investigated in greater detail.



# Submission and Review



→ **Submit completed Level 1 or 2 assessment form to state**

**Within 30 days of learning that trigger has been exceeded**

- **State will review assessment to determine if:**
  - **System identified likely cause of Level 1 or Level 2 trigger**
  - **System corrected the problem or has an acceptable schedule for correction**



# Timing of Corrective Action

- System must complete corrective action:
    - By the time assessment form is submitted, which is within 30 days of the trigger.
  - OR
  - Within state-approved timeframe.
- 
- System must notify the state when each scheduled corrective action is completed.
  - Either system or state can at any time request a consultation with the other party to discuss the corrective action.



# Who Conducts Assessments?

- Level 1
  - Intended to be self-assessments
  - Conducted by system staff
- Level 2
  - More in-depth look at the system
  - Conducted by Professional Engineer, FRWA Circuit Rider, licensed operator meeting minimum operator requirements for the system [Rule 62-699, F.A.C.]

**Note:** *If the system operator conducts a Level 1 Assessment and the system triggers a Level 2 Assessment, the same person that completed the Level 1 cannot complete the Level 2*



# Questions?

We're in the home stretch!





# Violations

## E.Coli MCL violation

PWS is in violation of the *E. coli* MCL when any of these conditions occur:

***E. coli* MCL Violation occurs with any of these sampling result combinations**

| Routine    | Repeat                                      |
|------------|---|
| <b>EC+</b> | <b>TC+</b>                                  |
| <b>TC+</b> | <b>EC+</b>                                  |
| <b>EC+</b> | <b>Any missing repeat sample</b>            |
| <b>TC+</b> | <b>TC+ (but no <i>E. coli</i> analyzed)</b> |



# Treatment Technique Violations

- PWS is in violation of the RTCR TT when any of the following occur:
  - Failure to conduct a Level 1 or Level 2 assessment within 30 days of learning of the trigger.
  - Failure to correct all sanitary defects from a Level 1 or Level 2 assessment within 30 days of learning of the trigger or in accordance with schedule approved by the state.
  - Failure of a seasonal system to complete state-approved start-up procedure prior to serving water to public.



# Monitoring Failures

| Violation consists of failure to:                                     | Monitoring Violation | <i>E. coli</i> MCL Violation | Triggers Level 1 or Level 2 Assessment |
|---|----------------------|------------------------------|--|
| Take routine sample   | Yes                  |                              |  |
| Take/analyze for <i>E. coli</i> following a TC+ <u>routine</u> sample | Yes                  |                              |  |
| Take repeat samples following a TC+ routine sample                    |                      |                              | Triggers Level 1 assessment*           |
| Take repeat sample following a EC+ routine sample                     |                      | Yes                          |  |
| Take/analyze for <i>E. coli</i> following a TC+ <u>repeat</u> sample  |                      | Yes                          |  |

**\* A Level 2 assessment is triggered if a second Level 1 assessment was triggered within a rolling 12-month period.**





# Reporting Violations

- PWS is in violation of reporting requirements when any of the following occurs:
  - Failure to submit monitoring report.
  - Failure to submit a completed Level 1 or Level 2 assessment form within 30 days of learning of the trigger.
  - Failure to notify the state by the end of the day/next business day following an *E. coli*-positive sample or *E. coli* MCL violation.



# Public Notification

| Violation                     | Tier of Public Notification |
|-------------------------------|-----------------------------|
| <i>E. coli</i> MCL Violation  | Tier 1                      |
| Treatment Technique Violation | Tier 2                      |
| Monitoring Violation          | *Tier 3                     |
| Reporting Violation           | *Tier 3                     |

\*Requires a Tier 2 delivery (delivered within 3 months of discovery)



# Consumer Confidence Reports

- CWS must report
  - Starting April 1, 2016
    - *E. coli*: number of positive results
    - Level 1 or Level 2 assessment language
      - Number required assessments and number completed.
      - Number of required corrective actions and number completed.
      - Number assessments missed and corrective actions not completed.



# Questions?





# Contacts

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