

U.S. Environmental Protection Agency
TOTAL COLIFORM RULE / DISTRIBUTION SYSTEM (TCRDS)
FEDERAL ADVISORY COMMITTEE

AGREEMENT IN PRINCIPLE

1.0 Introduction

In the Six-Year Review determination published in July, 2003, the U.S. Environmental Protection Agency (EPA) noticed its intent to revise the Total Coliform Rule (TCR). In 2007, EPA also decided to establish a committee under the Federal Advisory Committee Act (FACA). The charge to the Total Coliform Rule/Distribution System Advisory Committee (TCRDSAC) is to develop an agreement in principle regarding recommendations to EPA on revisions to the TCR and on what information about distribution systems is needed to better understand and address possible public health impacts from potential degradation of drinking water quality in distribution systems. The major objectives of the TCRDSAC will be to provide advice on and recommendations on:

- a. Revisions to the TCR to improve implementation while maintaining or improving public health protection and distribution system water quality. The issues that the TCRDSAC may consider include but are not limited to: TCR monitoring framework, sanitary survey provisions, definition of Maximum Contaminant Level (MCL) violations and potential follow-up corrective actions, and communication of public health significance of violations.
- b. What data should be collected, research conducted, and/or risk management strategies evaluated to better inform distribution system contaminant occurrence and associated public health risks in the distribution systems. This is intended to “initiate a process for addressing cross connection control and backflow prevention requirements and consider additional distribution system requirements related to significant health risks” recommended by the Microbial Disinfection Byproducts Federal Advisory Committee. The issues that the TCRDSAC may consider include but are not limited to: (1) evaluation of available data and research on aspects of distribution systems that may create risks to public health, (2) identification of priority data gaps, and (3) identification of data collection approaches (such as a data collection rule and/or additional research).

The TCRDSAC is made up of organizational members (parties) selected by the EPA based on the diverse perspectives, expertise and experience needed to provide balanced recommendations to EPA on issues related to the TCR and the distribution system issues encompassed in the TCRDSAC charge.

This Committee met thirteen times from July 2007 through September 2008.

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2.0 General Agreements

The TCRDSAC considered both technical and policy issues in drafting the Agreement in Principle (AIP), which includes recommended revisions to the TCR and recommendations for research and information collection to better understand and address possible public health impacts from potential degradation of drinking water quality in the distribution system. The TCRDSAC recommends the following AIP, which represents the consensus of the parties based on the best information that the Committee was able to generate within the time and resources available.

1. The person signing this agreement is authorized to commit this party to its terms.
2. Each party and individual signatory that submits comments on proposed revisions to the TCR agrees to support those components of the proposal that reflect the agreements set forth below. Each party and individual signatory reserves the right to comment, as individuals or on behalf of the organization he or she represents, on any other aspect of the proposal.
3. EPA will publish a proposed rule in the Federal Register that, to the maximum extent consistent with the Agency's legal obligations, has the same substance and effect as the elements of the AIP.
4. EPA will consider all comments submitted concerning the Notice(s) of Proposed Rulemaking and in response to such comments will make such modifications in the proposed rule and preamble as EPA determines are appropriate when issuing a final rule.
5. Recognizing that under the Appointments Clause of the U.S. Constitution governmental authority may be exercised only by officers of the United States and, recognizing that it is EPA's responsibility to issue final rules, EPA intends to issue final rules that are based on the provisions of the Safe Drinking Water Act (SDWA), and comments received from the public.
6. Each party agrees not to take any action to inhibit the adoption and implementation of final rule(s) to the extent it and corresponding preamble(s) have the same substance and effect as the elements of this AIP.
7. Unless otherwise noted, the TCRDSAC recommends that the TCR provisions and current rule implementation continue unchanged.
8. The TCRDSAC recognizes that federal rulemaking procedures may be lengthy and have broad national impact. The Advisory Committee recommends that the Agency undertake technical dialogue or consultation with stakeholders to address the outreach activities described in this Agreement in Principle. The TCRDSAC believes that such engagement will allow them to be better representatives for the proposed rule when it is published. The TCRDSAC recommends that EPA hold a stakeholder meeting no less than once per year to inform EPA's effort to propose a rule that "has the same substance and effect as the elements of the Agreement in Principle."

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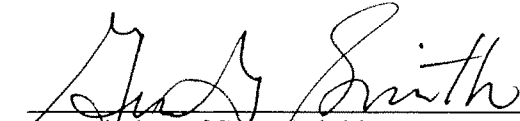
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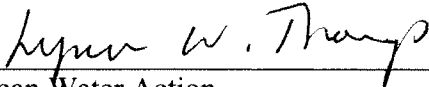
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Carrie M. Lewis, Milwaukee Water Works



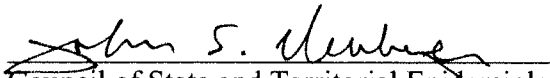
Association of Metropolitan Water Agencies
David A. Visintainer, Association of Metropolitan Water Agencies



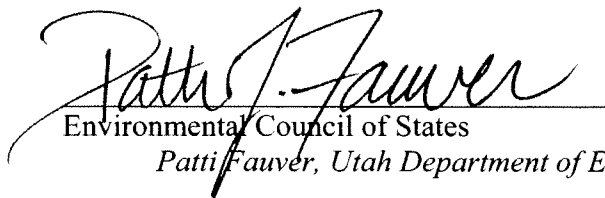
Association of State Drinking Water Administrators
Gerald Smith, Minnesota Department of Health, Section of Drinking Water Protection



Clean Water Action
Lynn Thorp, Clean Water Action/Clean Water Fund



Council of State and Territorial Epidemiologists
John S. Neuberger, The University of Kansas School of Medicine



Environmental Council of States
Patti Fauver, Utah Department of Environmental Quality



National Association of State Utility Consumer Advocates
Christine Maloni Hoover, Pennsylvania Office of Consumer Advocate

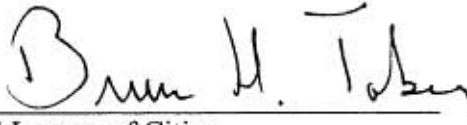
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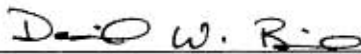
National Association of Water Companies
Mark LeChevallier, American Water



National Environmental Health Association
Bob Vincent, Florida Department of Health



National League of Cities
Bruce H. Tobey, Gloucester, Massachusetts City Council



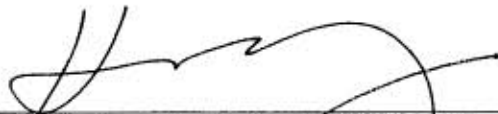
National Rural Water Association
David W. Baird, City Manager of Milford, Delaware



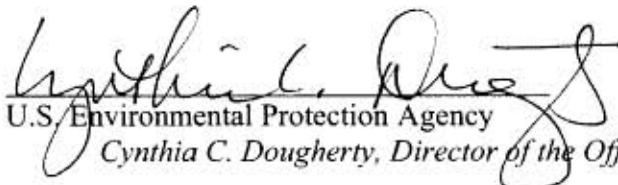
Native American Water Association
Thomas Crawford, Native American Water Association



Natural Resources Defense Council
Mae C Wu, Natural Resources Defense Council



Rural Community Assistance Partnership
Harvey A. Minnigh, RCAP Solutions



U.S. Environmental Protection Agency
Cynthia C. Dougherty, Director of the Office of Ground Water & Drinking Water

3.0 Agreement in Principle on Revisions to the Total Coliform Rule

The goal of the TCRDSAC in developing this AIP for a revised TCR (RTCR) is to achieve the objectives of the 1989 TCR more effectively and efficiently, taking into account the changes in the regulatory framework for implementing the SDWA over the past twenty years and experience with the TCR since it was promulgated in 1989. TCRDSAC drew on a variety of data sources to capture experience with the rule, on analyses conducted for TCRDSAC, and on the collective experience of the member organizations.

The TCRDSAC outlined ten criteria for the RTCR that it considered throughout its deliberations, including: 1) meeting the objectives of the current rule, 2) maintaining or enhancing public health protection, 3) reducing burden, 4) being cost effective, 5) being simpler to implement, 6) considering implications and linkages to other rules, 7) reflecting variations in system size and type, 8) recognizing the value of effective operators, 9) using the optimal indicator for each purpose or objective, and 10) being supported by scientific data. The following recommendations for the RTCR, when taken as a whole, address these criteria.

In concert with other rules promulgated by EPA under SDWA, the revised rule construct will better address the TCR objectives and enhance the multiple barrier approach to protecting public health, especially with respect to smaller groundwater systems. The RTCR paradigm is designed to trigger systems with positive total coliform (TC)/*E. coli* monitoring results to do an assessment, to identify whether a sanitary defect(s) is (are) present, and to correct such defects accordingly. This is an improvement over the current TCR framework in that it takes a more proactive approach to identifying and fixing problems that affect or may affect public health.

The follow-up actions described in the AIP also will improve the cost-effectiveness of the rule as investigations and corrective actions provide an opportunity to improve public health.

How the compliance burden is borne is important, particularly as it relates to small systems serving ≤ 1000 persons and to the primacy agencies that must implement the rule. The RTCR recommendations below take into account the capacity of small systems and primacy agencies to effectively implement the rule requirements, reflect differences in system size and type and recognize the value of effective operators in implementing the rule requirements. Specifically, the new paradigm calls for the reduction of additional routine and repeat samples for small systems, which lessens the monitoring and reporting burden on small systems and primacy agencies.

The TCRDSAC discussed and the AIP recognizes the benefits of other rules and considers the monitoring linkage between the TCR and the current Ground Water Rule (GWR). The AIP reflects variation of system size and type and recognizes the need for creative solutions for small systems. The AIP also allows for self-assessments by utilities, as appropriate.

3.1 Rule Construct

The principles and assumptions underlying these recommendations are that:

- The RTCR take a proactive approach to protect public health, maintaining a maximum contaminant level goal (MCLG) and MCL for *E. coli* and using both *E. coli* and TC monitoring to establish a framework for public water systems to assess for sanitary defects and to correct them as appropriate.
- The RTCR use microbial indicators that are appropriate for the objectives of the rule. The TCRDSAC recommends that the requirements of the RTCR continue to apply to all public water systems (PWS) and address the following objectives of the TCR: 1) evaluate the effectiveness of treatment, 2) determine the integrity of the distribution system, and 3) signal the possible presence of fecal contamination.
- In meeting these objectives, it is important that the provisions of the RTCR consider the implications and linkages to other rules promulgated by EPA under SDWA such as the GWR, Surface Water Treatment Rule (SWTR), and the Disinfectant/Disinfection Byproduct Rules (D/DBPRs).
- In crafting the definition for sanitary defect below, the TCRDSAC took into account the following assumptions:
 - o In general, utilities should correct those defects found that are related to public health.
 - o The RTCR is one of a suite of rules under the SDWA that together comprise a multiple barrier approach for protecting the distribution system from contamination.
 - o Most primacy agencies have existing authority to require utilities to correct distribution system defects that pose a risk to public health protection.
- Decision-relevant data will continue to be considered in a scientific manner as EPA proposes and finalizes the RTCR.

To accomplish the objectives above, the RTCR will use TC as an indicator to start an evaluation process that, where necessary, will require the PWS to correct sanitary defects, to be defined in the RTCR as:

“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.”

To address public health concerns, *E. coli* will remain a regulated contaminant with a zero MCLG and an MCL as defined in paragraph 3.11 of this document. Based on the availability of *E. coli* analytical techniques and an improved understanding of fecal coliforms since the TCR was promulgated in 1989, all fecal coliform provisions (including the MCLG and MCL) will be removed in the RTCR.

In addition, TC will be used as an indicator as part of a treatment technique, as allowed under Section 1412(b)(7) of the SDWA (as amended) for more

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comprehensive protection against potential fecal contamination. The RTCR should no longer include an MCLG or MCL for TC. The recommendations for the use of TC as an indicator are addressed in Section 3 of this document.

As provided for in Section 1412(b)(10) of the SDWA, PWS will be subject to the provisions of the RTCR beginning three years after its publication in the *Federal Register*.

3.2 Analytical Methods

The TCRDSAC recommends that the best available analytical methods consistent with Section 1401(1)(D) of SDWA be used to detect *E. coli* and TC indicator bacteria. EPA should consider approving methods that allow the timely (e.g. on the order of 24 hours) analytical results for *E. coli* and TC and that provide relatively concurrent analyses, without significantly sacrificing accuracy, precision and specificity.

When EPA promulgated the final TCR in the Federal Register in 1989, only four analytical methods were listed as approved methods for use in compliance sample analysis (54 FR 27565, June 29, 1989). In the 19 years since this rule was promulgated, an additional eight methods have been approved for use by the Agency. The current 12 approved analytical methods are of different technology types and have different specificities and sensitivities. There have been several reports of differences in the specificity of these methods and of differences in the abilities of the methods to detect coliforms. The TCRDSAC recommends that the Agency evaluate all currently approved coliform analytical methods to determine whether these methods continue to be appropriate for use for drinking water compliance monitoring.

The TCRDSAC recommends that EPA engage stakeholders in a technical dialogue in its review of the Alternative Test Procedure (ATP) microbial protocol for TC/*E. coli* methods for drinking water to determine if the criteria for acceptance of methods are consistent with the intent and objectives of the TCR, considering such issues as sensitivity, specificity, matrix interference, false positive and false negative results, temperature, and holding time, particularly with respect to the occurrence of TC and *E. coli* in drinking water supplies.

3.3 Transition to New Rule

The principles and assumptions underlying these recommendations are that:

- The TCRDSAC seeks to minimize disrupting effective operations of public water systems and the primacy agencies in the transition to the RTCR, e.g. by utilizing existing components of system assessment such as sanitary surveys.
- The TCRDSAC also recognizes that the transition to the RTCR will occur after the GWR is implemented. Therefore, compliance with the GWR requirements,

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including sanitary surveys and site visits, can be used to help determine the level of monitoring required for non-community water systems (NCWS) and community water systems (CWS) using groundwater serving $\leq 1,000$ persons.

The TCRDSAC recommends that the RTCR provide that all systems will continue with their current monitoring schedules until the primacy agency determines the appropriate monitoring frequency under the RTCR as provided in the applicable section for system size and type under 3.4 below.

3.4 Monitoring Frequencies (Baseline, Reduced and Criteria for Reduced Monitoring)

The principles and assumptions underlying these recommendations are that:

- System monitoring frequencies should take into account the unique characteristics of various system types and sizes.
- Small, well-operated systems may be able to reduce monitoring frequencies according to specific criteria.
- The criteria for reduced monitoring include monitoring results that reflect a clean compliance history as well as proactive practices that are designed to continue to maintain the integrity of the distribution system.
- Compliance activities for other rules (e.g. sanitary survey) are used as criteria to assess the integrity of the system and to implement the reduced monitoring provisions in a cost-effective manner.
- Groundwater systems will have completed the sanitary survey component of the GWR no later than January 2015 so sanitary survey findings can be used by primacy agencies in the determination of monitoring frequency.

3.4.a. Non Community Ground Water Public Water Systems Serving $\leq 1,000$ Persons

The principles and assumptions underlying these recommendations are:

- For transient non-community water systems (TNCWS), the TCR requirements are one of only two on-going monitoring requirements. Thus, for these systems, TCR monitoring in association with site visits and other proactive operational measures is a very important assurance of public health protection and attention to the water system.
- Well operated systems, if allowed by the primacy agency, can qualify for reduced monitoring when the primacy agency determines it to be appropriate, reducing costs and protecting public health based on criteria that ensure that barriers are in place and are effective.
- Public health protection also is enhanced by allowing primacy agencies to focus their time on those systems needing the greatest attention.

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3.4.a.1 Baseline Monitoring:

The TCRDSAC recommends that the baseline monitoring frequency for ground water NCWS serving $\leq 1,000$ persons in the RTCR be quarterly monitoring for TC and *E. coli*, except that baseline monitoring for seasonal systems serving $\leq 1,000$ persons should be monthly. For the purposes of this AIP, a seasonal system is one which operates less than four calendar quarters per year.

3.4.a.2 Transition to RTCR:

All ground water non-community water systems serving $\leq 1,000$ persons, including seasonal systems, will continue with their current TCR monitoring schedules as of the compliance effective date of the RTCR unless any of the conditions for increased monitoring in Section 3.4.a.4 are triggered on or after the compliance effective date.

After the compliance effective date of the RTCR, during each sanitary survey the primacy agency shall perform a special RTCR monitoring evaluation to review the status of the water system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. Primacy agencies will evaluate system factors such as the pertinent water quality and compliance history, the establishment and maintenance of barriers to contamination, and other appropriate protections to validate the water system's existing monitoring schedule or require increased monitoring. For seasonal systems on quarterly or annual monitoring, this evaluation shall include review of the approved sample site plan which must designate the time period(s) for monitoring based on site specific considerations (e.g. during periods of highest demand or highest vulnerability to contamination). The system must collect compliance samples during these time periods.

Systems on annual monitoring, including seasonal systems, must within one year of the compliance effective date have an initial and recurring annual site visit by the primacy agency or an annual voluntary Level 2 assessment by a party approved by the primacy agency to remain on annual monitoring.

3.4.a.3 Reduced Monitoring Requirements:

The primacy agency will have the discretion to reduce the monitoring frequency for well operated ground water NCWS from the quarterly baseline monitoring to no less than annual monitoring, if the water system can demonstrate that it meets the criteria for reduced monitoring provided in this section.

To be eligible to qualify for and remain on annual monitoring after the compliance effective date, non-community groundwater systems serving $\leq 1,000$ persons must meet each of the following criteria:

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- The most recent sanitary survey shows the system is free of sanitary defects and has a protected water source and meets approved construction standards;
- The system must have a clean (TCR) compliance history (no MCL violations, Level 1 triggers, Level 2 triggers, treatment technique violations or monitoring violations) for a minimum of 12 months;
- An annual site visit (recurring) by the primacy agency within the last 12 months and correction of all identified sanitary defects. A voluntary Level 2 assessment by a party approved by the primacy agency may be substituted for the primacy agency annual site visit; and
- The primacy agency should encourage additional enhancements to the barriers protecting the distribution system from contamination. These measures could include but are not limited to the following:
 - Cross connection control, as approved by the primacy agency;
 - An operator certified by an appropriate primacy agency certification program, which may include regular visits by a circuit rider;
 - Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the primacy agency; and
 - Maintenance of at least a 4-log inactivation of viruses each day of the month based on daily monitoring as specified in the GWR (with allowance for a 4-hour exception).
 - Other equivalent enhancements to water system barriers as approved by the primacy agency.

3.4.a.4 Increased Monitoring Requirements:

Non-community groundwater systems serving 1,000 persons or fewer on quarterly or annual monitoring that experience any of the following events will be required to begin monthly monitoring:

1. System triggers a Level 2 assessment (or a 2nd Level 1 assessment in a rolling 12 month period)
2. System has an *E. coli* MCL violation
3. System has an RTCR treatment technique violation (either Level 1 or 2)
4. System has two routine monitoring violations in a rolling 12-month period for systems on quarterly monitoring and one routine monitoring violation for systems on annual monitoring

The system will continue monthly monitoring until the requirements in section 3.4.a.5 for returning to quarterly or annual monitoring are met.

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3.4.a.5 Requirements for Returning to Baseline Quarterly Monitoring:

To be eligible to return to quarterly monitoring, non-community groundwater systems serving $\leq 1,000$ persons must meet each of the following criteria:

- Within the last 12 months, the system shall have a completed sanitary survey or a site visit or a voluntary Level 2 assessment by a party approved by the primacy agency and the system must be free of sanitary defects, and have a protected water source; and
- The system must have a clean (TCR) compliance history (no MCL violations, Level 1 or 2 triggers, treatment technique violations or monitoring violations) for a minimum of 12 months.

3.4.a.6 Requirements for Returning to Reduced Annual Monitoring:

To be eligible to return to reduced annual monitoring, the system must meet the criteria in 3.4.a.5 plus:

- An annual site visit (recurring) by the primacy agency and correction of all identified sanitary defects. A voluntary Level 2 assessment may be substituted for the primacy agency annual site visit in any given year; and
- The system must adopt one or more additional enhancements to the water system barriers to contamination as approved by the primacy agency. These measures could include but are not limited to the following:
 - Cross connection control, as approved by the primacy agency;
 - An operator certified by an appropriate primacy agency certification program, which may include regular visits by a circuit rider;
 - Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the primacy agency; and
 - Maintenance of at least a 4-log inactivation of viruses each day of the month based on daily monitoring as specified in the GWR (with allowance for a 4-hour exception).
 - Other equivalent enhancements to water system barriers as approved by the primacy agency

3.4.b. Non-community Surface Water Systems Serving $\leq 1,000$ Persons

The TCRDSAC recommends that the monitoring requirements for surface water NCWS serving $\leq 1,000$ persons remain the same as under the current TCR.

3.4.c. Community Ground Water Systems Serving $\leq 1,000$ Persons

3.4.c.1 Baseline Monitoring:

The TCRDSAC recommends that the baseline monitoring for ground water CWS serving $\leq 1,000$ persons in the RTRC be monthly monitoring for TC and *E. coli*.

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The primacy agency may reduce the monitoring frequency for ground water CWS from the monthly baseline monitoring to quarterly reduced monitoring, if the water system can demonstrate that it meets the criteria for reduced monitoring provided in Section 3.4.c.3.

3.4.c.2 Transition to RTCR:

All community ground water systems serving $\leq 1,000$ persons will continue with their current monitoring schedules until any of the increased monitoring requirements in Section 3.4.c.4 occur.

After the compliance effective date of the RTCR, during each sanitary survey the primacy agency shall perform a special RTCR monitoring evaluation to review the status of the water system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. Primacy agencies will evaluate system factors such as the pertinent water quality and compliance history, the establishment and maintenance of barriers to contamination, and other appropriate protections to validate the water system's existing monitoring schedule or require increased monitoring.

3.4.c.3 Reduced Monitoring Requirements:

The primacy agency will have the discretion to reduce the monitoring frequency for well operated ground water CWS from the monthly baseline monitoring to no less than quarterly monitoring, if the water system can demonstrate that it meets the criteria for reduced monitoring provided in this section.

To be eligible for quarterly reduced monitoring, community ground water systems serving $\leq 1,000$ persons on monthly monitoring after the compliance effective date must be in compliance with primacy agency certified operator provisions and meet each of the following criteria:

- The most recent sanitary survey shows the system is free of sanitary defects (or has an approved plan and schedule to correct them), has a protected water source and meets approved construction standards;
- The system must have a clean (TCR) compliance history (no MCL violations, Level 1 or 2 triggers, treatment technique violations or monitoring violations) for a minimum of 12 months; and
- Meet at least one of the following criteria:
 - An annual site visit by the primacy agency or a voluntary Level 2 assessment by a party approved by the primacy agency and correction of all identified sanitary defects (or an approved plan and schedule to correct them), or
 - A cross connection control program, as approved by the primacy agency, or

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- The system must maintain continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the primacy agency, or
- The system must maintain at least a 4-log inactivation of viruses each day of the month based on daily monitoring as specified in the GWR (with allowance for a 4-hour exception); or
- Other equivalent enhancements to water systems as approved by the primacy agency.

3.4.c.4 Return to Baseline Monitoring Requirements:

When systems on quarterly monitoring experience any of the following events the system will be required to begin monthly monitoring:

- System triggers a Level 2 assessment (or a 2nd Level 1 assessment in a rolling 12 month period)
- System has an *E. coli* MCL violation
- System has an RTCR treatment technique violation (either Level 1 or 2)
- System has two routine monitoring violations in a rolling 12-month period.

The system will continue monthly monitoring until the reduced monitoring requirements in Section 3.4.c.3 are met.

3.4.d. Community Surface Water Systems Serving $\leq 1,000$ Persons

The TCRDSAC recommends that the monitoring requirements for surface water CWS serving $\leq 1,000$ persons in the RTCR remain the same as under the current TCR.

3.4.e. Public Water Systems Serving $> 1,000$ Persons

The TCRDSAC recommends that the monitoring requirements for PWS serving $\geq 1,000$ persons remain the same as under the current TCR, with the exception of the applicable revisions to the repeat and additional routine monitoring provisions.

3.4.f Seasonal Systems:

The principles and assumptions underlying this recommendation are:

- Seasonal systems represent a special case in that the shut down and start up of the water system presents opportunities for contamination to enter or spread through the distribution system.
- In addition, with the reduced operating period of the seasonal system and possible variations in daily use, it is critical that systems on a reduced monitoring schedule collect samples when there is the greatest chance that contamination can be identified.

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The TCRDSAC recommends that all seasonal systems, on and after the compliance effective date, must demonstrate completion of a primacy agency approved start up procedure. The TCRDSAC also recommends that the baseline monitoring frequency for non-community water systems which operate less than four calendar quarters per year be monthly. Seasonal systems may continue with their TCR monitoring frequency after the effective date of the RTCR as described in section 3.4.a.2.

To be eligible for reduced monitoring after the compliance effective date, seasonal systems must meet the following criteria:

- The system must demonstrate completion of a primacy agency approved start up procedure;
- The system must have an approved sample site plan which designates the time period for monitoring based on site specific considerations (e.g. during periods of highest demand or highest vulnerability to contamination). The system must collect compliance samples during this time period; and
- To be eligible for reduced quarterly monitoring, the system must also meet the first two reduced monitoring criteria under 3.4.a.5.
- To be eligible for reduced annual monitoring, the system must also meet all the reduced monitoring criteria under 3.4.a.3/a.6.

3.5 Repeat Monitoring

The principles and assumptions underlying this recommendation are:

- System size, system complexity, and primacy agency burden should be taken into account in developing appropriate repeat monitoring strategies.
- For smaller systems serving $\leq 1,000$ persons, repeat sampling locations are specified in a sampling plan (Section 3.7) because the complexity of the systems is low and this requirement would place the least burden on small systems and primacy agencies, while allowing accommodation for access problems under the current TCR.
- For larger systems, the TCRDSAC believes that allowing flexibility in the selection of monitoring locations can provide a public health benefit through specific targeting for each incident to facilitate the identification of the source and extent of any problem. The sampling plan for systems electing this option should therefore contain standard operating procedures specifying how samples will be targeted.

All systems will be required to take 3 repeat samples for any routine TC-positive, regardless of the system type and size. Currently, the TCR requires all systems serving $\leq 1,000$ persons to collect at least 4 repeat samples. The TCRDSAC believes that 3 repeat samples would be sufficient. Systems serving fewer than $\leq 1,000$ persons using ground water sources would still need to take an additional sample of each source at the same time as the 3 repeat samples to comply with the GWR, with

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possible flexibility allowed under the second bullet in section 3.7 below regarding sample site plans.

One of the repeat samples must be taken at the same site as the initial TC-positive, as is specified in the current TCR. However, the TCRDSAC believes that in place of the current requirement that an additional 2 repeat samples be taken within 5 service connections up and down stream of the initial TC-positive site, the RTCR should provide for a more flexible and more protective response.

1. Systems serving fewer than $\leq 1,000$ persons should specify in their sampling plan where the two additional samples will be taken to address access issues.
2. Larger, more complex systems may elect to specify criteria for selecting repeat sampling sites on a situational basis in its standard operating procedures (SOP). This SOP should be designed to focus the repeat samples at locations that will best verify and determine the extent of potential contamination of the distribution system area based on specific situations.

After a trigger is reached, additional rounds of repeat sampling are not required.

3.6 Additional Routine Monitoring

Additional routine monitoring must be conducted following a single TC-positive sample (with or without a Level 1 trigger event) by all systems collecting samples on a quarterly or annual frequency. The additional routine monitoring will consist of three samples per month for one month following the TC-positive sample.

Additional routine samples will be treated as compliance samples.

3.7. Sample Siting Plans

The principles and assumptions underlying this recommendation are:

- Sample siting plans under the TCR should be representative of the water quality in the distribution system.
- Systems should have the flexibility to propose repeat monitoring locations that may be representative of a pathway for contamination of the distribution system (e.g., storage tank) as opposed to the current requirement of 5 connections upstream and downstream. Ground water systems should also have the flexibility to propose repeat sampling locations that differentiate potential source water and distribution system contamination (e.g. by sampling at entry points to distribution systems (EPDS))
- The revised rule construct is intended to be an incentive for PWS to conduct more monitoring than is required by the RTCR, to investigate potential problems in the distribution system, and use monitoring as a tool to assist in uncovering problems where they exist. Nothing shall preclude a PWS from taking more than the

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minimum number of required routine samples and including them in calculating compliance with RTCR, if the samples are taken in accordance with the approved sample siting plan.

Thus, the TCRDSAC recommends that:

- a. Sample siting plans under the RTCR should be crafted to be representative of the water quality in the distribution system. The system is responsible for developing a sample siting plan, which is subject to primacy agency review and revision consistent with current practice. The primacy agency will develop and implement a process that ensures the adequacy of the sample siting plan, including a periodic review.
- b. Samples taken for TCR compliance (routine, repeat and additional routine) may take place from a customer's premise, dedicated sampling station, or other designated compliance sampling location.
- c. Primacy agencies may review and revise sampling at the EPDS if the system has demonstrated to the primacy agency's satisfaction that the sample siting plan remains representative of the water quality in the distribution system. In the event of a TC-positive sample result, monitoring at the EPDS (especially for undisinfected ground water systems) can be an effective way to differentiate between potential source water and distribution system problems.
- d. Routine and repeat sample sites and any sampling points necessary to meet the requirements of the GWR should be reflected in the sampling plan.

Samples collected outside of the routine/repeat framework (e.g., special purpose samples taken for assessment or investigative purposes, demonstrating pipes are ready to return to service, customer service samples, quality control samples, etc.) are not to be counted for reporting or compliance purposes (i.e., compliance with *E. coli* MCL) or for exceeding RTCR triggers.

3.8 Assessment

The TCRDSAC recommends that the RTCR include the following assessment process. The TRCDSAC built the assessment component of the revised rule recommendations upon the following principles:

1. The purpose of assessments is to proactively enhance public health protection by identifying the presence of "sanitary defects" and defects in distribution system coliform monitoring practices.
2. The purpose of PWS having responsibility for an assessment is to strengthen their capacity to ensure that barriers are in place and are effective.

There are two levels of assessment and specific triggers associated with each level.

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The TCRDSAC agrees that the underlying principles, specific rule requirements, and referenced attachments should be used to set practical expectations for the level of resources committed to undertaking both Level 1 and 2 assessments as well as resulting corrective action requirements.

3.8.a Purpose

The purpose of Level 1 and 2 assessments is to identify the presence of “sanitary defects” and defects in distribution system coliform monitoring practices.

The TCRDSAC recommends the definition for “sanitary defects” included in section 3.1 above. Specific examples of sanitary defects are included in Attachment Y.

“Sanitary defect” is a term specific to the TCR assessment and correction provisions. Sanitary defects are not intended to be linked directly to “significant deficiencies” under the SWTR and GWR, although some problems could meet either definition. Nothing in these recommendations is intended to limit the existing authorities of primacy agencies under other regulations.

Minimum elements of both Level 1 and 2 assessments should include review and identification of:

1. Inadequacies in sample sites, sampling protocol, and sample processing,
2. Atypical events that may affect distributed water quality or indicate that distributed water quality was impaired
3. Changes in distribution system maintenance and operation that may effect distributed water quality including water storage
4. Source and treatment considerations that bear on distributed water quality, where appropriate (e.g. small groundwater systems)
5. Existing water quality monitoring data

The RTCR should provide for:

1. The primacy agency tailoring specific assessment elements to the size and type of the system
2. The PWS tailoring their assessment activities based on the characteristics of the distribution system.

Working with stakeholders, EPA should develop guidance that reflects the above elements and principles and include example forms and instructions for assessments at various system sizes and types.

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3.8.b. Level 1 Assessments

3.8.b.1 Level 1 Assessment Triggers

A Level 1 assessment is triggered if sampling results in one of the following triggers:

1. For systems taking 40 or more samples per month, the PWS exceeds 5.0% TC-positive samples for the month or;
2. For systems taking fewer than 40 samples per month, the PWS has two or more TC positive samples in the same month; or
3. Failure to take every required repeat samples after a single TC-positive sample.

3.8.b.2 Level 1 Assessment Timeframe

The PWS will complete a Level 1 assessment as soon as practicable after notification of their monitoring results. The PWS will provide the primacy agency a complete Level 1 assessment form within 30 days after notification of exceeding the trigger.

3.8.b.3 Description of a Level 1 Assessment

The self assessment will consist of a simple examination of the system and relevant operational practices. The RTCR should reflect the substance and effect of the example Level 1 assessment form provided in Appendix X. Appendix X is intended as a concept to describe practical expectations for the level of resources committed to undertaking a Level 1 assessment. The Level 1 assessment will be completed by the PWS and reviewed by the primacy agency. If the primacy agency determines the assessment insufficient, it will consult with the PWS.

The assessment form will identify sanitary defects detected, corrective actions completed, and a timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified. Upon completion and submission of the assessment form by the PWS, the primacy agency will determine if the system has identified a likely cause for the Level 1 trigger and establish that the system has corrected the problem.

3.8.c Level 2 Assessments

3.8.c.1 Level 2 Assessment Triggers

A Level 2 assessment is triggered if sampling results in one of the following triggers:

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1. An *E. coli* MCL violation,
2. An *E. coli* monitoring violation (defined as failing within the required time period to collect repeat samples following an *E. coli*- positive sample), or
3. A second Level 1 trigger, within a rolling 12 month period, unless the primacy agency has determined a likely reason that the initial Level 1 samples were TC-positive and establishes that the system has corrected the problem.
4. For systems with approved reduced annual monitoring, a Level 1 trigger in two consecutive years.

3.8.c.2 Level 2 Assessment Timeframe

The public water system will complete a Level 2 assessment as soon as practicable after notification of their monitoring results. The PWS will submit the Level 2 assessment form to the primacy agency within 30 calendar days after the notification of exceeding the trigger. The assessment form will describe sanitary defects detected, corrective actions completed, and a timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified.

3.8.c.3 Description of a Level 2 Assessment

Level 2 assessments shall be conducted by the public water system, where the system has staff or management with the certification or qualifications specified below, unless otherwise directed or approved by the primacy agency:

1. A certified operator with a minimum of two (2) years of experience as a certified operator in systems requiring similar or more extensive certification requirements or
2. Individuals with equivalent training or experience as approved by the primacy agency.

A Level 2 assessment is a more detailed examination of the system, its monitoring and operational practices than the Level 1 assessment form. The RTCR should reflect the substance and effect of the example Level 2 assessment form provided in Appendix X. Appendix X is intended as a concept to describe practical expectations for the level of resources committed to undertaking a Level 2 assessment. The level of effort and resources required to implement the assessment will be commensurate with more comprehensive investigation and review of available information, and engaging additional parties and expertise relative to the Level 1 assessment.

The primacy agency will review the completed Level 2 assessment form. If the primacy agency determines that the Level 2 assessment form is insufficient, it will

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consult with the PWS and, if necessary, provide assistance or require appropriate action.

3.9 Corrective Action

PWS shall be responsible for correcting sanitary defects found through either Level 1 or 2 assessments as defined above and described through the examples in Appendix Y.

At any time during the assessment or corrective action phase, the water system and primacy agency may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the primacy agency on all relevant information that may impact on a directed requirement, including the method of accomplishment, an appropriate timeframe, and other relevant information.

Source(s) of *E. coli* MCL violations that are detected by an assessment are public health hazards and must be corrected as soon as practicable, before the assessment form referenced in section 3.8 is due to the primacy agency.

For corrections not completed by the time of submission of the assessment form, the system and primacy agency shall agree on a schedule to complete the remaining corrective action(s). The system shall notify the primacy agency when it has completed each corrective action.

3.10 Documentation (Recordkeeping)

The assessment form or other available summary documentation of the sanitary defects and corrective actions taken will be maintained on file for primacy agency review. This record will be maintained by the systems for a period no shorter than the sanitary survey cycle applicable to the PWS.

3.11 Violations and Public Notification Requirements

The principles and assumptions underlying this recommendation are:

- Violations should be subject to appropriate public notification.
- The severity of the violation, as it potentially impacts public health, should be considered in determining the timing and nature of public notification.
- Two TC-positive samples (or greater than 5.0 percent as appropriate) in the RTRC is considered a trigger mechanism for prescribed follow-up action rather than an MCL violation as long as the appropriate action is taken. This is consistent with the concept that TC is an indicator of the integrity of the distribution system. In addition, total coliform will be used as an indicator as part of a treatment technique, as allowed under Section 1412(b)(7) of the SDWA (as amended) for

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more comprehensive protection against potential treatment failures and sanitary defects.

- A violation of the *E. coli* MCL occurs when both a routine and an associated repeat TC sample are TC-positive and either one is also *E. coli*-positive, as currently provided for in the TCR. As such, it has associated public notification and triggers a Level 2 assessment and corrective action.
- Failure to take repeat samples following a TC-positive or *E. coli*-positive sample also should be taken seriously. Failure to take repeat samples after a positive *E. coli* sample should constitute an *E. coli* MCL violation with appropriate public notification and trigger a Level 2 assessment and corrective action. Failure to take repeat samples following a TC-positive sample should trigger a Level 1 assessment and corrective action.
- Performing the triggered assessment and corrective action is an important aspect of compliance and, therefore, a system neglecting to perform the prescribed assessment or corrective action is in violation of the RTCR treatment technique.

3.11.a Violations

E. coli MCL Violation

A violation of the *E. coli* MCL occurs when both a routine and an associated repeat TC samples are TC-positive and either one is also *E. coli*-positive. This was referred to as an acute MCL violation in the TCR.

A violation of the *E. coli* MCL also occurs when a system fails to take required repeat samples following a routine sample that is positive for both TC and *E. coli*.

Both types of *E. coli* MCL violation require Tier 1 public notification in accordance with the EPA public notification rules. In addition, PWS are required to notify the primacy agency after learning of an *E. coli*-positive sample consistent with the provisions in the TCR.

Treatment Technique Violation

A treatment technique violation occurs when, after a system exceeds an action trigger specified in paragraph 3.8, it then fails to conduct the required assessment or corrective actions specified in paragraphs 3.8 and 3.9. There is no violation associated solely with a system exceeding one or more action triggers. Treatment Technique Violations require a Tier 2 public notification.

Routine Monitoring Violation and Reporting Violation

A routine monitoring violation occurs when a system fails to take every required routine or additional routine samples in a compliance period. A Reporting Violation occurs when a system properly conducts monitoring or assessment but fails to submit a monitoring report or assessment form by the required deadline. Both require a Tier 3 public notification. Consistent with existing provisions, a CWS may notify consumers using the annual Consumer Confidence Report.

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3.11.b Public Notification

Consistent with existing provisions, the RTCR will have three tiers for public notification as provided for in 40 CFR 141.201(b). The TCRDSAC recommends that EPA propose and request public comment on a revision to public notification and Consumer Confidence Report language consistent with existing provisions in subpart Q and O to 40 CFR 141 that reflect the use of TC as an indicator and the provisions for a treatment technique. Consistent with recommendations in Section 2.0, the TCRDSAC recommends that the opportunities for public comment include a stakeholder meeting.

Table: Example Violations for the RTCR

RTCR Violation Definition	Consequences under the RTCR
<p><i>E. coli</i> MCL violation</p> <p>1) Compliance sample and its associated repeat sample are: <i>Compliance</i> _____ <i>Repeat</i> _____ EC+ _____ EC+, or _____ EC+ _____ TC+, or _____ TC+ _____ EC+.</p> <p>2) PWS fails to take every required repeat sample following a routine EC+ sample.</p>	<ul style="list-style-type: none"> • Tier 1 Public Notice (PN) required within 24 hours (141.202(b)(1)) • Initiate consultation with the primacy agency no later than 24 hours after learning of the violation, to determine additional PN requirements, if any. (141.202(b)(2)) • Level 2 assessment/corrective action • No less than monthly monitoring
<p>TT violation</p> <p>1) Failure to perform a Level 1 or 2 assessment if triggered</p> <p>2) Failure to correct all sanitary defects identified in an assessment.</p> <p>3) Failure to correct sanitary defects according to agreed upon schedule.</p>	<ul style="list-style-type: none"> • Tier 2 PN required, no later than 30 days after the system becomes aware of the violation (141.203(b)(1)) • Repeat PN every three months as long as the violation or situation persists, unless the primacy agency determines that appropriate circumstances warrant a different frequency. (141.203(b)(2)) • No less than monthly monitoring
<p>Routine Monitoring Violation PWS does not take every required routine sample, or every required</p>	<ul style="list-style-type: none"> • Tier 3 PN required, no later than one year after learning of the violation. If posted, it must remain as long as the violation persists,

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RTCR Violation Definition	Consequences under the RTCR
additional routine sample, in a compliance period.	but in no case less than 7 days. CWS can provide the PN in the annual consumer confidence report. (141.203(b)(1) and (2)) <ul style="list-style-type: none"> • No less than monthly monitoring if PWS has monitoring violations in 2 of 4 quarters (for systems on quarterly monitoring) or misses its required annual sample (for systems on annual monitoring).
Reporting violation PWS fails to submit a monitoring report or assessment form, or fails to submit a report by the required date	<ul style="list-style-type: none"> • Tier 3 PN required, not later than one year after learning of the violation. If posted, it must remain as long as the violation persists, but in no case less than 7 days. CWS can provide the PN in the annual consumer confidence report. (141.203(b)(1) and (2))

3.12 Operator Training and Certification

The TCRDSAC encourages each State or primacy agency to develop training and testing specific to the RTCR requirements as part of its operator certification program.

3.13 Linkage to Other Rules

The TCRDSAC recognizes that existing regulatory provisions link monitoring requirements in different rules to either TCR monitoring requirements (e.g., residual disinfectant monitoring conducted at the same time and location as TCR samples are taken, as provided for in the SWTR and Stage 1 DBPR) or TCR monitoring results (e.g., source water fecal indicator samples are required under specified circumstances following a TC-positive sample, under the GWR). In addition, there is at least one case where results of monitoring in another rule trigger a requirement to collect a TC sample and use the results in determining compliance (i.e., a high turbidity measurement under the SWTR in an unfiltered subpart H system triggers a TCR requirement to collect an additional TC sample).

To address these issues, the TCRDSAC recommends that EPA identify existing linkages between the TCR and other rules and propose regulatory provisions in the RTCR that are as protective as existing provisions and consistent with meeting the objectives of the affected rules. These regulatory provisions will consist of at least new cross-references with the RTCR. The TCRDSAC also recommends that EPA

conduct the stakeholder consultation described in Section 2.8 and request public comment on the scope and adequacy of these provisions.

3.14 Reporting to Primacy Agency and Recordkeeping

Reporting requirements associated with specific provisions of the RTCR are indicated in the description of each individual activity. Current TCR provisions for the retention of sample results and records of decisions related to monitoring schedules would be maintained.

3.15 Primacy Provisions

The principles and assumptions underlying these recommendations are:

- Flexibility is provided in the RTCR for primacy agencies to allow them to implement the requirements of the rule in a manner that maximizes the efficiency of the rule for the primacy agencies and water systems while maintaining the effectiveness of the rule in protecting public health. In their application to EPA for approval to implement the federal requirements, the primacy application will indicate what baseline and reduced monitoring provisions of the RTCR the primacy agency will adopt and will describe how they will implement the RTCR in these areas so that EPA can be assured that implementation plans meet the minimum requirements of the rule.
- Adaptation of current policies and procedures will be needed to address the new regulatory construct. For example, state policies on invalidation of TC and *E. coli* positives will need to be modified and clarified.
- The RTCR should be written to assure that where EPA acts as the State (as defined in 40 CFR 141.2), the Agency can fully implement all aspects of the rule.

The primacy agency's application for primacy for the RTCR will include:

1. Sample Siting Plans - primacy agencies will describe how they review and revise sample siting plans in accordance with 40 CFR 141.21(a) and the RTCR.
2. Reduced Monitoring Criteria – The primacy application will indicate whether the primacy agency will adopt the reduced monitoring provisions of the RTCR. If the primacy agency adopts the reduced monitoring provisions, they will describe the specific types or categories of water systems that will be covered by reduced monitoring and whether the primacy agency will use all or a reduced set of the optional criteria. For each of the reduced monitoring criteria, both mandatory and optional, the primacy agency will describe how the criteria will be evaluated to determine when systems qualify.
3. Assessments and Corrective Actions – primacy agencies will describe their

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process for implementing the new assessment and corrective action phase of the rule. This would include examples of sanitary defects, examples of assessment forms or formats, provisions for identifying acceptable parties to perform Level 2 assessments, and methods that systems may use to consult with the primacy agency on appropriate corrective actions.

4. Invalidation of routine and repeat samples collected under the TCR – primacy agencies will describe their criteria and process for invalidating total TC and *E. coli*-positive samples under the RTCR. This would include criteria to determine if a sample was improperly processed by the laboratory, reflects a domestic or other non-distribution system plumbing problem or reflects circumstances or condition which does not reflect water quality in the distribution system.
5. The TCRDSAC has recommended changes in the RTCR to be more protective of public health and encourages primacy agencies to adopt all of the final rule's requirements. State rules must be at least as stringent as these requirements in order for the states to be granted primacy under Section 1413(a) of the Safe Drinking Water Act. (*"For purposes of this subchapter, a State has primary enforcement responsibility for public water systems during any period for which the Administrator determines (pursuant to regulations prescribed under subsection (b) of this section) that such State -- (1) has adopted drinking water regulations that are no less stringent than the national primary drinking water regulations promulgated by the Administrator under subsections (a) and (b) of section [1412] of this title..."*) However, nothing in the RTCR will preclude a primacy agency from exercising its authority under the Safe Drinking Water Act to adopt or enforce additional or more stringent state requirements, as provided under Section 1414(e) of the Act. (*"Nothing in this title shall diminish any authority of a State or political subdivision to adopt or enforce any law or regulation respecting drinking water regulations or public water systems, but no such law or regulation shall relieve any person of any requirement otherwise applicable under this title."*)

3.16 Optimizing Distribution System Integrity

The TCRDSAC encourages the development of national and regional distribution system optimization partnerships that focus on protecting the integrity of drinking water quality once it is delivered to the distribution system. The purpose of the partnerships should be to inform and inspire proactive systems to implement best management practices that emphasize protection of public health. These partnerships, comprised, for example, of representatives from utilities, communities, academia, and regulatory organizations could develop continuous improvement programs that encompass water distribution optimization principles and practices for system design, operations, and maintenance. These partnerships should foster continuous review of distribution system issues and should define excellence in distribution system operation in terms of processes, systems, procedures, as well as measures. The

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optimization partnerships should encourage voluntary program participation of all drinking water utilities regardless of system size.

The Advisory Committee recommends that the optimization partnerships develop language that recognizes best management practices and other measures for enhancing the integrity of distribution systems, or provide enhanced protection for the water in the distribution system and public health. These practices include:

1. Disinfectant residuals sufficient to afford protection in the distribution system.
2. Approved cross connection control and backflow prevention programs, and
3. Other practices that contribute to a multiple-barrier approach, such as frequent regular inspection of system components.

3.17 Other

3.17.a Cross Connection Control Practices

The TCRDSAC recommends that EPA and primacy agencies reference and compile existing requirements, guidance, and other information on cross connection control practices from EPA, states, AWWA and other relevant parties with the aim of having a single, complete resource library available to the public.

3.17.b Performance Measures

The TCRSDAC recognizes the challenges inherent in measuring rule effectiveness and believes the RTCR provides a fresh opportunity for consideration of metrics. The TCRDSAC recommends that EPA develop performance measures for the RTCR in parallel with the rule development. The measures should be aimed at evaluating the rule's long-term effectiveness. The data for the measures should be based on improved collection and categorization of compliance data from both state and national perspectives, per the examples given in Section 3.17e.

The TCRDSAC recommends that EPA conduct a review of the effectiveness of the RTCR using a stakeholder process. This review can be conducted in accordance with the Agency's existing 6 year review process.

3.17.c Sanitary Surveyors

The TCRDSAC recommends that EPA, in cooperation with primacy agencies, develop minimum qualifications and a standardized training program for sanitary surveyors, and evaluate the need for certification.

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3.17.d Release of RTCR Guidance and Training Materials

The Advisory Committee also recommends that EPA develop guidance documents as expeditiously as possible, with the highest priority documents developed first. EPA will develop a plan which includes a list of the guidance manuals and schedule. The TCRDSAC recommends that EPA discuss the development plan with interested stakeholders.

3.17.e SDWIS Modifications

The Advisory Committee recommends within 18 months of final rule promulgation EPA release an upgrade to SDWIS State and SDWIS Fed to accommodate monitoring data, tracking, compliance determinations and reporting of all rule related requirements, as appropriate. This SDWIS upgrade release will occur in concert and consistent with the Trading Partner Agreement with states through ASDWA for the provision of contaminant monitoring and related metadata to EPA. This new upgrade shall have improved collection and categorization of compliance data from both state and national perspectives (e.g., different data elements for *E. coli* violations and Treatment Technique violations as shown in the violations table in section 3.11). The TCRDSAC recommends that EPA evaluate the benefits and feasibility of collecting data from Level 1 and Level 2 assessments as part of the SDWIS Fed upgrade to inform RTCR rule effectiveness. The TCRDSAC recommends that EPA engage stakeholders as part of the information requirements planning process.

4.0 Agreement in Principle on Research and Information Collection

The TCRDSAC recognizes that a number of issues have the potential to affect the distribution system water quality. Having reviewed a wide range of issues for the RTCR, the TCRDSAC found that additional research and information collection is needed to inform potential additional national risk management actions (e.g., regulations, guidance). Information gaps vary depending on the distribution system issue but broadly include:

- the linkage between the potential distribution system problem and public health consequences,
- the extent of the potential distribution system problem, and
- the specific management tools that are appropriate for sufficiently managing the potential risk from the specific distribution system problem.

The amount of additional information for EPA and other water organizations to move forward to identify national risk management actions relative to these gaps varies by topic in terms of effort and timeline. Consequently, the TCRDSAC offers recommendations to both organize and focus a coordinated research and information collection program so that timely progress on these topics can be achieved.

4.1 Research and Information Collection Partnership

4.1.a Purpose and Governance. The TCRDSAC recommends that a Research and Information Collection Partnership (RICP) be formed to inform and support the drinking water community in developing future national risk management decisions pertaining to drinking water distribution systems. The RICP will enable EPA, water utilities, and other parties to collaborate on defining, prioritizing, coordinating, and communicating critical decision-relevant research and information needs. The RICP will provide a formal process for systematic planning, implementation, analysis, and communication of distribution system research and information collection.

1. The RICP shall be comprised of organizational members who are signatory to the Memorandum of Understanding (MOU) or Cooperative Research and Development Agreement (CRADA) described below. The TCRDSAC recommends that the members of the RICP initially at least include, at a minimum, EPA, AwwaRF, and representatives of other funding entities (the number proportional to the level of funding). The RICP will be directed by a Steering Committee (SC) comprised of three members from EPA, three members from water utilities, plus three members, one each representing public health (e.g. CDC), environmental advocate, and state regulator perspectives. The Committee recommends that one or more members of the SC bring a small system perspective.
2. The RICP SC will have the goal of an initial meeting within 6 months after signing of the AIP and will meet at least once per year over the duration of the research and information collection agenda.
3. At their first meeting, the RICP SC members will develop a formal charter that includes a transparent process for defining responsibilities, holding meetings, reporting, and making decisions; and a systematic approach for managing data and information generated from partnership activities and other ongoing relevant research and information collection.

4.1.b Operations. The TCRDSAC recommends that the RICP formalize the roles and responsibilities of its members through the following steps:

1. The RICP parties will develop and sign a MOU/CRADA that specifies the formal commitments and defines roles and responsibilities.
2. As part of the annual budget process, the parties will meet to discuss their research and information priorities and coordinate research and information collection projects.

4.1.c Research and Information Collection Priorities.

The RICP will establish a science-driven, mutually-agreed-upon, strategically-focused, decision-relevant research and information collection agenda that encompasses short, medium, and long term research and information needs that support EPA's 3rd six-year review which will address existing regulations with

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distribution system components (i.e., the review that follows after the RTCR is promulgated). This research and information collection agenda will build upon EPA's and AwwaRF's ongoing distribution system research. The TCRDSAC recommends that the research and information collection priorities described in Section 4.2 be the starting point for developing the research and information collection agenda. The first draft of this research and information collection agenda will be completed within a year of signature of this AIP.

The RICP will identify high priority research and information collection needs for particular topics, through an iterative process that includes development of an analytical framework. High priority needs are intended to encompass that research and information needed to determine whether an issue is of sufficient concern that further action is needed, although not whether there should be federal action. The RICP should also develop a mechanism to regularly review and evaluate ongoing research on monitoring methods, sampling methodologies, relationships between indicators and pathogens, microbial risk assessment, and other topics determined to be relevant. The RICP should draw on this to refine and optimize the research and information collection agenda, consulting with stakeholders.

4.1.d Findings.

When the results of the priority research and information collection become available, or at a point prior to that if EPA determines that action of some type may be warranted, members of the RICP will consult with one another and with a representative group of stakeholders through a consultative mechanism such as the National Drinking Water Advisory Council, one of its subgroups, an independently chartered committee under the Federal Advisory Committee Act, or through another type of consultation commensurate with the action being considered. This consultation will pertain to the action being considered.

4.1.e Information Collection.

The TCRDSAC recommends that the RICP explore several mechanisms for collecting and analyzing data including: surveys implemented through research projects, by interested organizations (e.g., AWWA, AMWA, NRWA, AwwaRF, and others), or by EPA (e.g., UCMR, Community Water Supply Survey, and others). If EPA decides to implement an information collection process through a regulatory process other than through the UCMR, EPA should consult with stakeholders in advance.

4.1.f Outreach.

The TCRDSAC recommends that EPA hold stakeholder meetings at least within every two years to discuss progress of the research and information collection agenda, to review ongoing projects, and to evaluate the data resulting from these projects. Feedback from the stakeholder meetings will be used to inform potential new research and information collection focus and direction and assess the need for adjustments to the research and information collection agenda. The TCRDSAC encourages the RICP to disseminate broadly the results of the research and information collection efforts.

4.2 Recommended Priorities for Research and Information Collection

4.2.a Issues

Based on currently available information, the TCRDSAC recommends the following seven issues as being the most relevant to protecting public health and maintaining the integrity of drinking water distribution systems for future consideration by the RICP in developing its research and information collection agenda:

- Cross connections and backflow of contaminated water;
- Contamination due to storage facility design, operation, or maintenance;
- Contamination due to main installation, repair or rehabilitation practices;
- Contaminant intrusion due to pressure conditions and physical gaps in distribution system infrastructure;
- ¹ Significance and control of biofilm and microbial growth;
- Nitrification issues that lead to public health effects; and
- Accumulation and release of contaminants from distribution system scales and sediments.

4.2.b Conceptual Framework for Knowledge Gaps

For each of the seven issues areas, the TCRDSAC identified priorities based on whether the research or information collection effort would address the following three major public health concerns: Exposure and vulnerability of the public; health effects and risks to the public; and the effectiveness of mitigation measures. (See specifics below.)

- Exposure and vulnerability of the public
 - Identify situations that may result in contamination of public health significance.
 - Characterize the contamination or conditions of public health significance that are introduced during those situations.
 - Assess the exposure to contaminants (considers occurrence, pathway and host susceptibility).
- Health effects and risks to the public:
 - Measure health consequences from exposure to the contaminants.
 - Monitor for situations which pose a public health concern.
 - Measure and track the national significance of the described situations
- Effectiveness of mitigation measures:
 - Characterize preventative measures or steps to minimize or prevent exposure.
 - Identify and implement remediation steps when contamination occurs.
 - Quantify the national significance of additional mitigation measures.

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4.2.c Approach to Identifying Research and Information Collection Needs

The scope and extent of research and information collection needs identified by the TCRDSAC are consistent with and expand upon previous expert advice provided to EPA. The TCRDSAC believes that one of its key recommendations is the prioritization and organization of these generally agreed upon research and data collection efforts and the recommendation for coordinated research and data collection among the research and information collection partners.

The TCRDSAC specifically recommends that, as research and information collection efforts begin in each of the seven issue areas, the RICP first develop an analytical framework for the issue. Analytical frameworks will be developed to evaluate key input factors that must be in place to inform the regulatory process, to illustrate how the key factors and influencing variables interact, and to help assess the significance of critical data and information gaps. The TCRDSAC envisions that developing analytical frameworks first will provide a foundation for understanding interdependencies and potentially filling multiple knowledge gaps simultaneously. These frameworks should include consideration of important issues such as public health assessment and fate and transport of contaminants, as follows:

- **Public Health Assessment:** to evaluate the state of knowledge of public health data relevant to the seven issues; assess the needs for additional public health data and the means to collect that data; or determine the impact of not having that data in either a qualitative or quantitative format; and
- **Fate & Transport of Contaminants:** to better understand the chemical, physical and microbial changes to contaminants in the distribution system, and the mechanisms whereby contaminants travel and are retained within the distribution system; and to determine most appropriate monitoring approach(es) to capture contamination events.

Development of the analytical frameworks will also facilitate a transparent dialogue among researchers, research funding organizations, utilities, EPA, and other interested stakeholders by considering cross-cutting priorities and organizing and prioritizing research and information collection toward answering key questions. The frameworks will also help the RICP to identify cohesive approaches to manage the overall cost of the research and information collection effort and to identify solutions that cost effectively address challenging information gaps with appropriate levels of confidence.

Based on current knowledge, the TCRDSAC recommends an initial grouping of the seven issue areas into two tiers of priority, and that this grouping be used to prioritize analytical framework development. While urging that the RICP retain the overall characterization of the ranking structure, the TCRDSAC also recognizes that new knowledge emerges over time and, thus, recommends that the RICP have the flexibility to move specific issues to a different ranking based on new information and/or the completion of an analytical framework for the issue. The TCRDSAC

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Agreement in Principle*

expects that there may be a range of research and information collection priorities within and across the seven analytical frameworks.

- Tier One: The following issues have been associated with documented public health outcomes. Some information is available to characterize the extent of these issues, although more national characterization of the occurrence and relationship between these issues is needed. Some best practices information also is available.
 - Cross connection and Backflow
 - Storage Facilities
 - Main Construction and Repair
 - Pressure and Intrusion

- Tier Two: For the following issues, some evidence exists that they do occur in public drinking water systems and adverse public health impacts are suspected to be associated with these topics, although available information is more anecdotal in nature and additional research and information collection is necessary to better define public health risks. Little occurrence information is available to document or characterize these issues.
 - Biofilm
 - Nitrification
 - Contaminant Accumulation

APPENDIX X

**CONCEPT EXAMPLE
LEVEL 1 ASSESSMENT FORM**

System Name:	Source Water:	PWSID #
System Type:	System Size:	
Operator in Responsible Charge (ORC):	Phone:	PWS Address:
City, State:		
County:		
Person that collected TC samples if different than ORC:	Phone:	
Address, City, State, Zip:		
Date Assessment Completed:		

Questions	Review	Applicable	Issue Identified	Issue Description	Corrective Action Taken (Including Date)
M A N A G E M E N T	1. Have any of the following occurred at relevant facilities prior to the collection of TC samples?	<input type="checkbox"/>	Y N	Y N	
	(Any interruptions in the treatment process; any reported loss of pressure events (5 psi); operation and maintenance activities that could have introduced total coliform; reported vandalism and/or unauthorized access to facilities; visible indicators of unsanitary conditions reported; Has there been a fire fighting event, flushing operation, sheared hydrant, etc.)				
	2. Have there been any recent changes?	<input type="checkbox"/>	Y N	Y N	
	(Sources introduced, treatment or operational changes, potential sources of contamination)				
3. Evaluate sample site.	<input type="checkbox"/>		Y N		
(Condition or location of tap, regular use of connection)					
4. Sample protocol followed. And reviewed	<input type="checkbox"/>		Y N		
(Flush tap, remove aerator, no swivel, fresh sample bottles, sample storage acceptable)					

Questions	Review	Applicable	Issue Identified	Issue Description	Corrective Action Taken (Including Date)
5. Distribution System.	<input type="checkbox"/>	Y N	Y N		
(System pressure, cross connection, pump station, air relief valves, fire hydrants or blow off, breaks, repairs)					
6. Storage Tank.	<input type="checkbox"/>	Y N	Y N		
(Screens, security, access opening, condition of tank, vent, drain overflow, pressure tank, O&M)					
7. Treatment Process. (If applicable)	<input type="checkbox"/>	Y N	Y N		
(Interruptions, POE/POU, softeners, O&M)					
8. Source - Well	<input type="checkbox"/>	Y N	Y N		
(Sanitary seal, vent screened, air gap, cross connection, security, pump to waste line)					
9. Source - Spring	<input type="checkbox"/>	Y N	Y N		
(Condition of spring development, condition of spring box, security)					
10. Source - Surface Water Supply		Y N	Y N		
(Heavy Rainfall, rapid snowmelt, flooding, changes in availability, power outages)					

Print name of person completing form: _____ Date: _____

Signature: _____

Reserved for State

- 1 Assessment has been successfully completed.
- 2 Likely reason of total coliform positives occurred is established and the system
- 3 Was a Reset Requested and/or Granted - Rationale
- 4 Name of State Reviewer:

Note: Form to be completed based on data and documents available to the PWS operator in charge, maintained on file and returned to the Primacy Agency within XX days.

TCR Triggered Assessment Form - Level 2

CONCEPT EXAMPLE

LEVEL 2 ASSESSMENT FORM

System Name:	System Type:	PWSID#
System Source:	System Size:	
Operator in Responsible Charge (ORC):	Phone:	PWS Address:
County:		
City, State:		
Person(s) that collected TC samples if different than ORC:	Phone:	
Address, City, State, Zip:		
Date Assessment Completed:		

Questions	Review	Issue Identified	Applicable	Issue Description	Corrective Action Taken (Date)
1. Have any of the following occurred prior to collection of TC samples at a relevant facility?	<input type="checkbox"/>	Y N	Y N		
a. Were there any operation and maintenance activities that could have introduced total coliforms?	<input type="checkbox"/>	Y N			
b. Have there been any interruptions in the treatment process?	<input type="checkbox"/>	Y N			
c. Has the system lost pressure to less than 5 psi?	<input type="checkbox"/>	Y N			
d. have there been any vandalism and/or unauthorized access to facilities?	<input type="checkbox"/>	Y N			
e. Are there any visible indicators of unsanitary conditions observed?	<input type="checkbox"/>	Y N			
f. Have there been any analytical results or any additional samples collected, including source samples which were positive (not for compliance)?	<input type="checkbox"/>	Y N			
g. have there been any community illness suspected of being waterborne (e.g., Does the community public health official indicate that an outbreak has occurred.)	<input type="checkbox"/>	Y N			
h. Did the water system receive any TCR monitoring violations in the past 12 months? If yes, when.	<input type="checkbox"/>	Y N			
i. What was the most recent date on which satisfactory total coliform samples were taken?	<input type="checkbox"/>	Y N			
j. have there been a fire fighting event, flushing operation, sheared hydrant, etc.		Y N			
Other comments on records and maintenance?					

TCR Triggered Assessment Form - Level 2

2. Have there been any recent treatment or operational changes?	<input type="checkbox"/>	Y N	Y N		
a. Have any inactive sources recently been introduced into the system (e.g., auxiliary systems)?	<input type="checkbox"/>	Y N			
b. Have there been any new sources introduced into the system?	<input type="checkbox"/>	Y N			
c. Is there evidence of any potential sources of contamination (main breaks, low pressure, high turbidity, loss of disinfection, etc.)?	<input type="checkbox"/>	Y N			
3. Evaluate sample site.	<input type="checkbox"/>	Y N	Y N		
a. What is the condition of the tap?					
b. What is the location of the tap?					
c. What is the regular use of the connection?					
d. (If applicable) have there been any plumbing changes or construction? If yes, when and what was the repair or change?	<input type="checkbox"/>	Y N			
e. (If applicable) have there been any plumbing breaks or failure? If yes, when?	<input type="checkbox"/>	Y N			
f. (If applicable) List any identified cross connections after the service connection or in premise plumbing.					
g. (If applicable) Were all of the backflow prevention devices present, operational and maintained?	<input type="checkbox"/>	Y N			
h. (if applicable) Were there any low pressure events or changes in water pressure after the service connection or in the premise plumbing? If yes, when?	<input type="checkbox"/>	Y N			
i. Is there any treatment devices after the service connection or in premise?	<input type="checkbox"/> Point of Entry (POE) Point of Use <input type="checkbox"/> OU)				
Other comments on sample site?					
4. Sample protocol followed and reviewed		Y N			
(Flush tap, remove aerator, no swivel, fresh sample bottles, sample storage acceptable)					
5. Distribution System.	<input type="checkbox"/>	Y N	Y N		
a. System pressure: Is there evidence that the system experienced low or negative pressure? If yes, when?	<input type="checkbox"/>	Y N			
b. List any identified cross connections.					
c. Pump station (if applicable): Are there any sanitary defects in the pump station? Are pump(s) operable?	<input type="checkbox"/>	Y N			

TCR Triggered Assessment Form - Level 2

d. Last pump maintenance/service date.	Date:			What was done?
e. Air relief valves: Is the valve vault subject to flooding or does the vent terminate below grade?	<input type="checkbox"/>	Y N		
f. Fire hydrant/blow off: Are any located in an area with a high water table or pits?	<input type="checkbox"/>	Y N		
g. Is the distribution system secured to prevent unauthorized access?	<input type="checkbox"/>	Y N		
h. Are the backflow prevention devices at high risk sites present, operational and maintained?	<input type="checkbox"/>	Y N		
i. Have there been any water main repairs or additions? If yes when, and what was the repair or addition?	<input type="checkbox"/>	Y N		
j. Have there been any water main breaks? If yes, when?	<input type="checkbox"/>	Y N		
k. Was there any scheduled flushing of the distribution system? If yes, when?	<input type="checkbox"/>	Y N		
l. Is there any evidence of intentional contamination in the distribution system?	<input type="checkbox"/>	Y N		
Other comments on the distribution information.				
6. Storage Facilities	<input type="checkbox"/>	Y N	Y N	
a. Are the overflow and vents properly screened?	<input type="checkbox"/>	Y N		
b. Is the facility secured to prevent unauthorized access?	<input type="checkbox"/>	Y N		
c. Does the Access opening have the proper gasket and seal tightly?	<input type="checkbox"/>	Y N		
d. Could the physical condition of tank be a source of contamination?	<input type="checkbox"/>	Y N		
e. Is the Vent turned down and maintain an approved air gap at the termination point?	<input type="checkbox"/>	Y N		
f. Does the Drain/overflow line terminate a minimum of 12" air gap?	<input type="checkbox"/>	Y N		
g. If present, Is the Pressure tank maintaining an appropriate minimum pressure?	<input type="checkbox"/>	Y N		
h. Is proper O&M being performed?	<input type="checkbox"/>	Y N		

TCR Triggered Assessment Form - Level 2

i. Was there any observed physical deterioration of the tank?	<input type="checkbox"/>	Y N		
j. Were there any observed leaks?	<input type="checkbox"/>	Y N		
k. Is there any evidence of intentional contamination at the storage tank?	<input type="checkbox"/>	Y N		
l. have there been any facility maintenance? (i.e. painting/coating) If yes, when?	<input type="checkbox"/>	Y N		
m. Is facility maintenance occurring per appropriate schedule?				
n. Does the tank "float" on the distribution system or are there separate inlet and outlet lines?	<input type="checkbox"/>	Y N		
o. (If applicable) What is the measured chlorine residual (total/free) of the water exiting the storage tank today?	Residual:			
p. Are there any unsealed openings in the storage facility such as access doors, vents or joints?	<input type="checkbox"/>	Y N		
Other comments on the storage system				
7. Treatment Process. (If applicable)	<input type="checkbox"/>	Y N	Y N	
a. Treatment devices operational and maintained?	<input type="checkbox"/>	Y N		
b. Is there any recent installation or repair of treatment equipment?				
c. Were there any recent changes in the treatment process? If yes, when, what was the change?	<input type="checkbox"/>	Y N		
d. Were there any interruptions of treatment (lapses in chemical feed, turbidity excursions, disinfection)? If yes which part, when and for how long?	<input type="checkbox"/>	Y N		
e. What is the free chlorine residual measured immediately downstream from the point of application?	Residual:			
f. Did a review of the filter turbidity profiles reveal any anomalies?		Y N		
g. Were there any failures to meet the CxT calculations?		Y N		
h. Were the flow rates above the rated capacity?		Y N		
i. Were there any anomalies on the settled water turbidities?		Y N		
j. Other comments on the treatment system.				
8. Source - Well		Y N	Y N	

TCR Triggered Assessment Form - Level 2

	a. Is the sanitary seal intact?		Y N			
	b. Is the vent screened?		Y N			
	c. Does the vent and pump to waste terminate in an approved air gap?		Y N			
	d. Are there any unprotected cross connections at the wellhead?		Y N			
	e. How is the well used?	Primary	Backup	Emergency	Not a PWS	Not Drinking Water
	f. How far does the casing extend above grade?	Height: _____		Comments:		
	g. Is the well cap vented?		Y N			
	h. Is there evidence of standing water near the wellhead?		Y N			
	i. Is the wellhead secured to prevent unauthorized access?		Y N			
	a. have there been any sewer spills, source water spills or other disturbances?		Y N			
	d. Other comments on the well system. (Are there aspects of well construction and operation that would bear on observed positives.)					
9.	Source - Spring		Y N	Y N		
	a. What is the condition of the spring development?					
	b. What is the condition of the spring box?					
	c. Is the spring secured to prevent unauthorized access?		Y N			
	d. Other comments on the spring system.					
11	Source - Surface Water Supply			Y N		
	a. have there been any sewer spills, source water spills or other disturbances?		Y N			
	b. have there been any Algal blooms?		Y N			
	c. Has source water turnover occurred?		Y N			
	d. Other source water comments					
11	Environmental Events			Y N		

TCR Triggered Assessment Form - Level 2

a. Has there been heavy rainfall?		Y N		
b. Has there been any rapid snow melt or flooding?		Y N		
c. Have there been changes in available source water (e.g., significant drop in water table, well levels, reservoir capacity, etc.)				
d. have there been any Interruptions to electrical power?		Y N		
e. have there been any extremes in heat or cold?		Y N		

Print name of person completing form: _____

Date: _____

Signature: _____

Reserved for State

1 Assessment has been successfully completed.

Name of State Reviewer:

APPENDIX Y

EXAMPLES OF SANITARY DEFECTS AND DEFECTS IN DISTRIBUTION SYSTEM COLIFORM MONITORING PRACTICES

Example Monitoring Conditions of Concern:

Sampling and Sample Site Issues

- Poor sample collection practices or technique
- Sample site not representative
- Bad sample tap
- Bad sample site – influence of premise plumbing, etc.

Inappropriate laboratory practices

- Poor sample handling practices
- Laboratory errors in sample processing

Example sanitary defects:

Cross Connection and Backflow Issues

- Required cross connection control devices not in place or not operating properly
- Unprotected cross connection found

Operator Issues

- Failure to follow SOPs that protect distribution system integrity and sanitary condition
- Inadequate disinfection during and after repair/replacement activities

Distribution System Issues

- Inadequate inspection and maintenance of distribution system
- Loss of distribution system integrity (i.e., Main breaks)
- Failure to maintain adequate pressure
- Improper flushing operations
- Improper construction of new, replaced, or renovated lines.

Storage Issues

- Overflow, vents, hatches and other penetrations not configured, screened, or sealed properly
- Inadequate inspection and maintenance of storage facilities
- Inadequate disinfection during and after repair/replacement activities

Disinfection Issues

- Inability to maintain required residual throughout the distribution system