

Utility Briefing: Total Coliform Rule

Purpose

The Total Coliform Rule (TCR) was first published in June 1989 by the U.S. Environmental Protection Agency (EPA) and became effective in 1990. The purpose of the



1989 TCR was to improve public health protection by reducing fecal pathogens to minimal levels through control of total coliform bacteria, including fecal coliforms and *Escherichia coli* (*E. coli*). In 2003, the EPA completed its review of the TCR and 68 National Primary Drinking Water Regulations (NPDWRs) for chemicals and announced its intent to revise the TCR. The EPA is now proposing revisions to the 1989 TCR and anticipates greater public health protection under the proposed regulations. Revisions to the TCR are based on recommendations by a federal advisory committee and will require public water systems that are vulnerable to microbial contamination to identify and fix problems and establish criteria for systems to qualify for and stay on reduced monitoring, thereby providing incentives for improved water system operation.

Scope

As with the current TCR, the proposed Revised Total Coliform Rule (RTCR) applies to all public water systems and will impact approximately 154,000 public water systems serving approximately 307 million individuals. Regulated categories and entities include the following:

Category	Examples of Regulated Entities
Industry	Privately-owned community water system (CWSS), transient non-community water systems (TNCWSS), and non-transient non-community water system (NTNCWSS).
State, Tribal, and local governments	Publicly-owned CWSS, TNCWSS, and NTNCWSS.

Compliance

States will be responsible for managing and monitoring compliance with the RTCR. While the proposed rule provides some reduction in monitoring relative to the

current TCR, EPA maintains that overall, the proposed rule is more stringent and better protects public health. EPA proposes that the compliance date of the final RTCR be three years from the date on which the regulation is promulgated and published as a final rule in the Federal Register. EPA believes that capital improvements generally are not necessary to ensure compliance with the proposed RTCR. However, a State may allow individual systems up to two additional years to comply with the RTCR if the State determines that additional time is necessary for capital improvements.

The proposed RTCR aims to increase public health protection through the reduction of potential pathways of



E.coli

entry for fecal contamination into the distribution system. EPA considers total coliforms to be a useful indicator that a potential pathway exists through which fecal contamination can enter the distribution system. Under the current TCR, each total coliform-positive sample is assayed for either fecal coliforms or *E. coli*.

Fecal Coliform: Fecal coliform bacteria are a subgroup of total coliforms that traditionally have been associated with fecal contamination, however studies have shown that the fecal coliform assay is imprecise and captures bacteria that do not originate in the human or mammal gut (Edberg et al. 2000).

E. Coli: *E. coli* is a more restricted group of coliform bacteria that almost always originate in the human or animal gut (Edberg et al. 2000).

Studies have proven that *E. coli* is a better indicator for fecal contamination and the potential presence of associated pathogen occurrence than fecal coliforms. The proposed RTCR eliminates the associated MCLG and MCL for total coliforms.

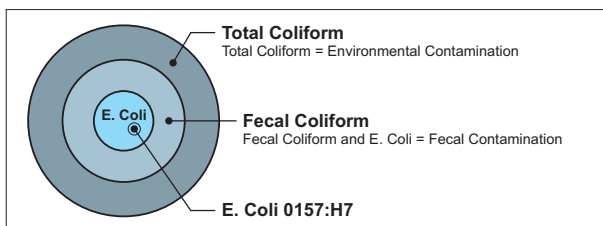
The proposed RTCR maintains and strengthens the objectives of the current TCR which are:

1. to evaluate the effectiveness of treatment
2. to determine the integrity of the distribution system
3. to signal the possible presence of fecal contamination.

The proposed revision better addresses these objectives by requiring systems that may be vulnerable to fecal contamination (as indicated by their monitoring results) to do an assessment identify whether any sanitary defect(s) is (are) present, and correct the defects. Eight key provisions proposed by the RTCR are described below:

1. MCLG and MCL for *E. coli*, and coliform treatment technique

The proposed RTCR establishes a maximum contaminant level goal (MCLG) of zero and maximum contaminant level (MCL) for *E. coli* and establishes a coliform treatment technique for protection against potential fecal contamination. Total coliform and *E. coli* monitoring results are used to start an evaluation process that, where necessary, will require the PWS to conduct follow-up corrective action. The proposed MCL for *E. coli* is based on the monitoring results for total coliforms and *E. coli*. A system is in compliance with the *E. coli* MCL unless any of the following conditions occur:



- A system has an *E. coli* positive repeat sample following a total coliform-positive routine sample; or
- A routine sample is *E. coli*-positive and one of its associated repeat samples is total coliform positive; or
- A system fails to test for *E. coli* when any repeat sample tests positive for total coliforms; or
- A system fails to take all required repeat samples following a routine sample that is positive for *E. coli*.

In the proposed RTCR, non-acute MCL violation for total coliforms under the current TCR is replaced by a coliform treatment technique involving monitoring for total coliforms. Under the proposed treatment technique framework, the presence of total coliforms

is used as an indicator of a potential pathway of contamination into the distribution system.

2. Monitoring

Monitoring requirements for the proposed RTCR are similar to the existing TCR in the following areas:

- Public Water Supply will continue to monitor for total Coliforms and *E. coli* according to a sample siting plan and schedule specific to the system.
- Sample siting plans must continue to be representative of water throughout the distribution system.
- Allowance for reduced monitoring for some small groundwater systems.

One major change in monitoring requirements in the proposed RTCR is the requirement for small groundwater systems that are on or wish to conduct reduced monitoring to meet certain eligibility criteria.

For small groundwater systems, the proposed RTCR requires increased monitoring for high-risk systems and specifies conditions under which systems will no longer be eligible for reduced monitoring. The proposed RTCR



also requires systems on a quarterly or annual monitoring frequency (applicable only to groundwater systems serving 1,000 or fewer people) to conduct additional routine monitoring the month following one or more total coliform-positive samples. The proposed rule will require systems to collect at least three routine samples (as opposed to five samples specified in the current TCR) during the next month, unless the State waives the additional routine monitoring.

The current TCR requires all systems serving 1,000 or fewer people to collect at least four repeat samples while PWSs serving 1,000 people or greater to collect three repeat samples. The proposed rule requires three repeat samples after a routine total coliform-positive sample, regardless of the system type and size.

3. Repeat samples

Under the proposed RTCR, systems have the flexibility to propose repeat sample locations that best verify and determine the extent of potential contamination of the distribution system rather than having to sample within five connections upstream and down-

stream of the total coliform-positive sample location. In lieu of proposing new repeat sample locations, the systems may stay with the default used under the current TCR of five connections upstream and downstream of the total coliform-positive sample location.

4. Treatment technique requirements

The RTCR replaces the non-acute MCL violation for total coliforms under the current TCR with a coliform treatment technique. The proposed treatment technique uses the presence of total coliforms as an indicator of a potential pathway of contamination into the distribution system.

The proposed revision specifies two levels of treatment technique triggers, Level 1 and Level 2, and their corresponding levels of response. A system is considered to have exceeded the trigger immediately once any of the following conditions have been met:

Level 1 Treatment Technique Triggers

- For systems taking 40 or more samples per month, the PWS exceeds 5.0 percent total coliform-positive samples for the month
- For systems taking fewer than 40 samples per month, the PWS has two or more total coliform-positive samples in the same month
- The PWS fails to take every required repeat sample after any single routine total coliform positive sample

Level 2 Treatment Technique Triggers

- The PWS has an *E. coli* MCL violation
- The PWS has a second Level 1 treatment technique trigger within a rolling 12-month period.
- For PWSs with approved reduced annual monitoring, a Level 1 treatment technique trigger in two consecutive years.

At a minimum, both Level 1 and 2 assessments must include review and identification of the following elements:

- Inadequacies in sample sites, sampling protocol, and sample processing
- Atypical events that may affect distributed water quality or indicate that distributed water quality was impaired
- Changes in distribution system maintenance and operation that may affect distributed water quality, including water storage

- Source and treatment considerations that bear on distributed water quality,
- Existing water quality monitoring data.

EPA expects that States will tailor specific assessment elements to the size and type of the system and that each public water system in turn will tailor its assessment activities based on the characteristics of its distribution system. Both Level 1 and Level 2 assessments must be submitted to the State for review within 30 days after determination that the PWS has exceeded the trigger. The State will determine if the assessment is sufficient. The completed assessment form must include assessments conducted, all sanitary defects identified, corrective actions completed, and a timetable for any corrective actions not already completed.

Level 1 Assessment

Level 1 self-assessment requires a basic examination of the source water, treatment, distribution system and relevant operational practices.

Level 2 Assessment

A Level 2 assessment is a more comprehensive examination of the system, its monitoring and operational practices than the Level 1 assessment. Level 2 assessments must be conducted by a third party approved by the State.

5. Violations

The proposed RTCR establishes an *E. coli* MCL violation, a treatment technique violation, a monitoring violation, and a reporting violation. Public notification is required for each type of violation and the form of notification is dependent on the degree of potential public health concern. The proposed RTCR also modifies the public notification and Consumer Confidence Report language.



6. Providing notification and information to the public

Public notification requirements in the existing TCR have been modified in the proposed RTCR and are summarized in **Table 1**.

	Existing TCR	Proposed RTCR
Tier 1	Required for acute MCL violation which is based on the presence of fecal coliforms or <i>E. coli</i> , or the system's failure to test for fecal coliforms or <i>E. coli</i> following a total coliform-positive repeat sample.	Required for an <i>E. coli</i> MCL violation. Notice required within 24 hours of violation.
Tier 2	Required for nonacute MCL violation, which is based on total coliform presence.	Required for a treatment technique violation for failure to conduct assessments or corrective actions. Notice required within 30 days of violation.
Tier 3	Required when the system has a monitoring or reporting violation.	Required for a monitoring violation or a reporting violation. Notice required within 1 year of violation.
Consumer Confidence Report (CCR)	Requires the inclusion of total numbers of positive samples, or highest monthly percentage of positive samples for total coliforms as well as total number of positive samples for fecal coliforms.	Replaces positive sample requirements with requirement to include the number of Level 1 and Level 2 assessments required and completed, the corrective actions required and completed, and the total number of positive samples for <i>E. coli</i> .

TABLE 1

7. Reporting and recordkeeping requirements for systems

In addition to the existing general reporting requirements in 40 CFR 141.31, the proposed RTCR requires a PWS to:

- notify the State no later than the end of the next business day after it learns of an *E. coli* positive sample.
- report to the State an *E. coli* MCL violation no later than the end of the next business day after learning of the violation, and notify the public.
- report to the State a treatment technique violation no later than the end of the next business day after it learns of the violation, and notify the public.
- report to the State monitoring violations within ten days after the system discovers the violation, and notify the public.
- notify the State when each scheduled corrective action is completed for corrections not completed by the time of the submission of the assessment form.
- systems triggered into conducting an assessment are required to submit the completed assessment

form within 30 days after determination that the coliform treatment technique trigger has been exceeded.

EPA is proposing to maintain the current TCR requirements regarding retention of sample results and records of decisions related to monitoring schedules. Systems are required to maintain on file for State review the assessment form or other available summary documentation of the sanitary defects and corrective actions taken and are to maintain documents for at least 5 years after completion of the assessment or corrective action.

8. Analytical methods

In the twenty years since the current TCR was promulgated, many analytical methods of have been developed and approved for use in measuring coliforms and *E. coli*. Concerns were expressed by the TCR advisory committee that the current approved methods may not be equivalent to each other and the EPA notes that there have been additional concerns with some of the methods currently approved. EPA believes that additional information may be needed regarding the performance of the currently approved methods in order to justify their continued approval. Among other options, EPA is considering a complete, side-by-side method evaluation study, whereby all the methods are compared to each other under identical conditions, according to the same protocol.

Transition to the RTCR

The proposed RTCR allows all systems to transition to the new rule at their current TCR monitoring frequency, including systems on reduced monitoring under the current TCR. States will then evaluate the monitoring frequency during each sanitary survey conducted after the compliance effective date of the RTCR. This process reduces State burden by not requiring the State to determine appropriate monitoring frequency at the same time as when the State is trying to adopt primacy, develop policies, and train their own staff and the PWSs in the State. The estimated net incremental cost of the proposed RTCR is \$14 million annually; 97% of which is incurred by public water systems with the remaining 3% incurred by state and primacy agencies. The proposed timeline for implementation of the RTCR is presented in **Figure 1**.

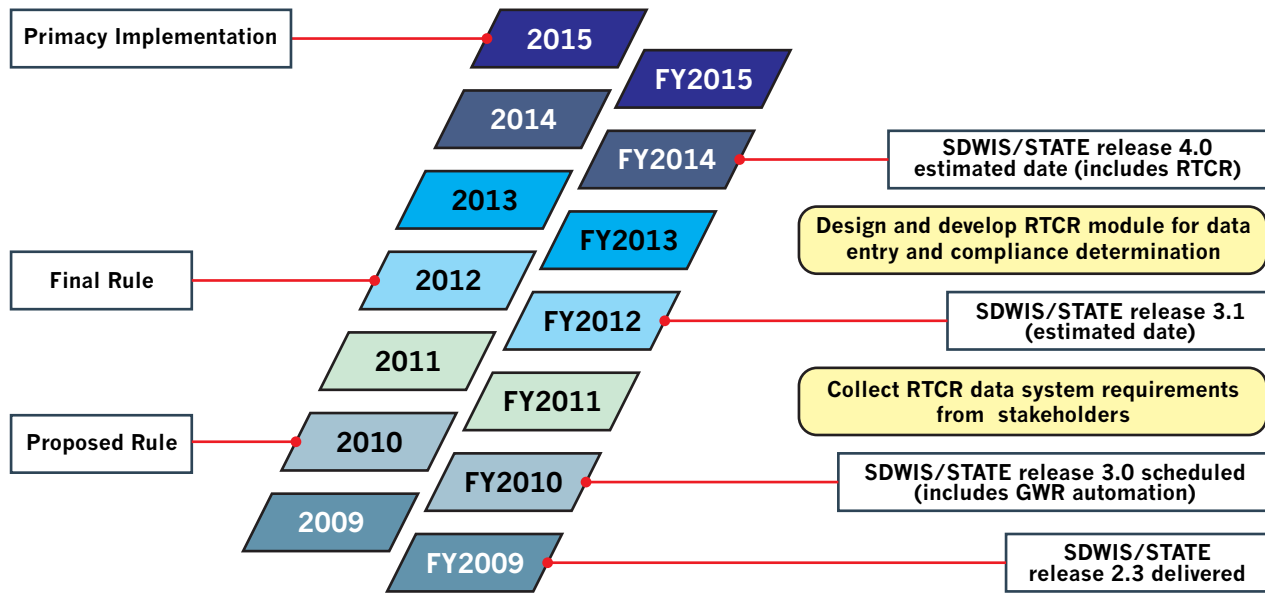


FIGURE 1

Proposed Definitions of the RTCR

Clean compliance history. A record of no maximum contaminant level (MCL) violations under 40 CFR 141.63; no monitoring violations under 40 CFR 141.21 or subpart Y; and no coliform treatment technique trigger exceedances or coliform treatment technique violations under subpart Y.

Sanitary defect. 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 (USEPA 2008c). Sanitary defect is a term specific to the proposed RTCR assessment and corrective action provisions. An example of a sanitary defect is disinfection issues such as inability to maintain required residual throughout the distribution system.

Seasonal systems. EPA is proposing to define a seasonal system as a non-community water system that is operated in three or fewer calendar quarters per calendar year.

Seasonal systems represent a special case in that the shut down and start-up of the water system present opportunities for contamination to enter or spread through the distribution system. For

example, loss of pressure after a system's shut down can lead to intrusion of contaminants. Microbial growth prior to start-up can result in biofilm formation, which can lead to the accumulation of con-



taminants. The advisory committee recommended that seasonal systems be identified and be subject to additional regulatory requirements because the shutdown and startup of the system presents opportunities for contaminants to enter or spread through the distribution system. These results are possible in any system that shuts down and does not maintain adequate pressure throughout the distribution system.