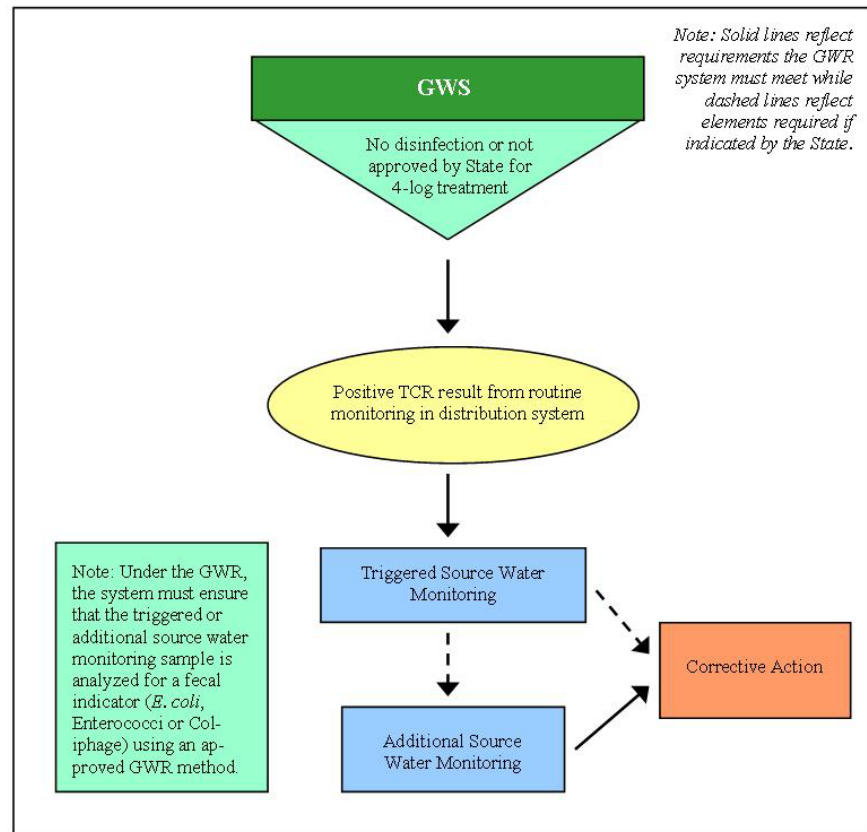


*Disclaimer: This article is not a rule and is not legally enforceable. As indicated by the use of non-mandatory language such as “may” and “should,” it does not impose any legally binding requirements. This article describes requirements under existing laws and regulations, and does not replace any existing established laws or regulations.*

## Mapping Ground Water Rule Requirements: Triggered and Additional Source Water Monitoring

*This is the second article in a series of five developed by US Environmental Protection Agency (EPA), Office of Ground Water and Drinking Water (OGWDW) that summarize key components of the Ground Water Rule (GWR). As with all drinking water rules, please check with your Primacy Agency for specific state-related requirements.*

The GWR has four basic requirements: **Source Water Monitoring**, Compliance Monitoring, Sanitary Surveys, and Corrective Action. The previous article introduced some of the key elements of the rule and provided a glimpse into future articles detailing components of the GWR. This article discusses in further detail the source water monitoring component. As seen in Figure 1, triggered and additional source water monitoring applies to those ground water systems (GWSs) that do not reliably provide 4-log treatment of viruses, which includes inactivation/removal or a state-approved combination of these technologies before or at the first customer. These systems may have to conduct *source water monitoring* (Figure 1) to comply with the GWR in the event of a total coliform-positive (TC+) sample collected in their distribution system. Source water monitoring is comprised of triggered and/or additional monitoring (discussed in this article) and assessment monitoring (discussed in the next article).



## Figure 1. Triggered Source Water Monitoring Requirements

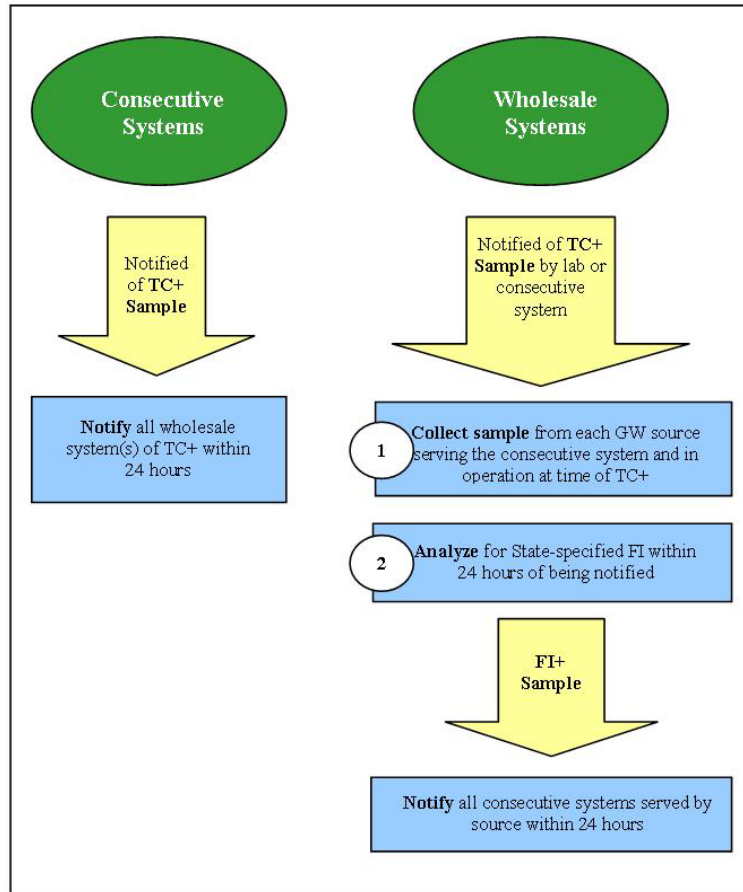
### Triggered Source Water Monitoring

GWSs that do not provide at least 4-log treatment of viruses and are notified of a routine TC+ sample collected under the Total Coliform Rule (TCR) must conduct triggered source water monitoring. Triggered source water monitoring includes the collection and analysis of samples for fecal indicators and helps determine if fecal contamination is present in the ground water source.

Within 24 hours of being notified of a routine TC+ sample, the GWS must collect one ground water sample for each TC+ from each source in use when the routine TC+ sample was collected. The sample must be collected prior to treatment or at a state-approved location. Some GWSs might have to install a tap prior to treatment in order to collect this sample if one is not already in place. Both triggered and additional source water monitoring sample volumes must be at least 100mL. For systems that serve less than 1,000 people, the GWR allows the system, with state approval, to use the triggered source water sample to meet both TCR and GWR requirements as long as the state has approved the use of *E.coli* as a fecal indicator for source water monitoring under both TCR and GWR.

The GWR allows for representative sampling for those GWSs that have multiple sources. Instead of collecting a triggered source water sample per source in use at the time the routine TC+ was collected, the state may allow a GWS with multiple sources to sample from a groundwater source that is representative of the aquifer and of the monitoring sites in the system's state-approved TCR sample plan. The representative sample locations must be approved by the state. When conducting representative monitoring, systems must still collect the sample within 24 hours of being notified of the routine TC+ sample and analyze the sample using an approved method (see Table 1). Representative sampling may be beneficial for some systems since it reduces the monitoring cost burden. The Rule authorizes the state to require a triggered source water monitoring plan if the GWS will be conducting representative monitoring.

The GWR has specific requirements for triggered source water monitoring conducted by wholesale and consecutive systems as shown in Figure 2.



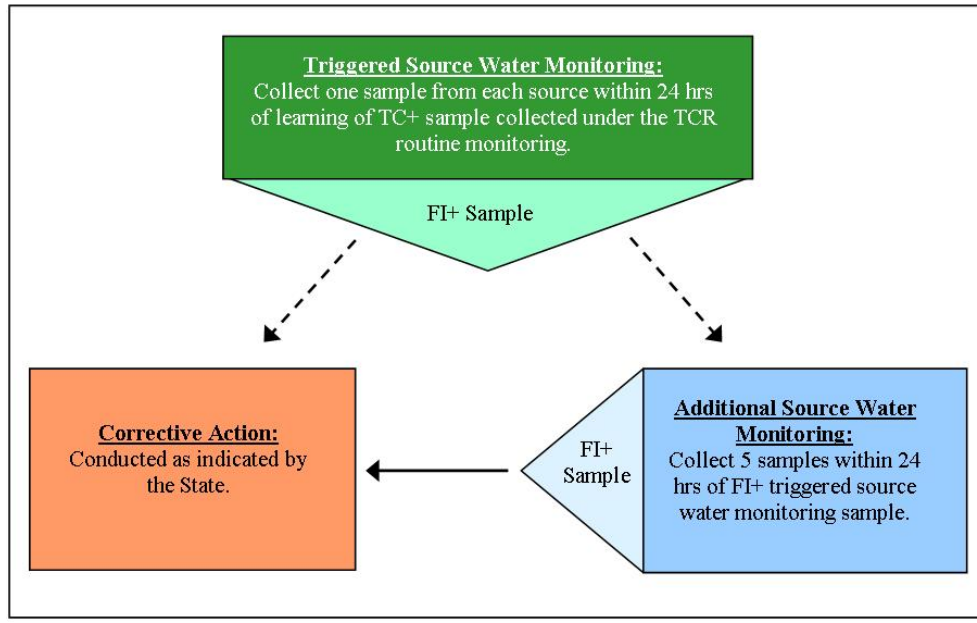
**Figure 2. GWR Triggered Source Water Monitoring Requirements for Consecutive and Wholesale Systems**

In the event that a wholesale system that does not provide 4-log treatment of viruses at all of its groundwater sources is notified by a consecutive system of a routine TC+ sample collected under TCR, the wholesale system must sample each groundwater source in operation at the time the TC+ was collected and analyze those sources for the state-specified fecal indicator within 24 hours of being notified of the TC+ sample. If this subsequent sample is fecal indicator-positive (FI+), the wholesale system must notify all consecutive systems served by the FI+ source and take the state-approved corrective action. In turn, both the wholesale and the consecutive systems that delivered finished water from the FI+ ground water source must notify their consumers under the Tier 1 Public Notification (PN) requirements and via Special Notice in the Consumer Confidence Report, both of which are described in more detail in the fifth article of this series.

<b>Consecutive System:</b>
A public water system that receives some or all of its finished water from one or more wholesale systems
<b>Wholesale System:</b>
Public water systems that treat source water, as necessary to produce finished water, and then deliver some or all of that finished water to another public water system.

**Additional Source Water Monitoring**

If a triggered source water monitoring sample is FI+, the system must conduct additional source water monitoring unless the state requires corrective action. Figure 3 below provides a graphical representation of these requirements. If the state invalidates a FI+ sample, the system must collect a new sample for the same fecal indicator. To comply with the additional source water monitoring requirement, the system must collect five additional source water samples within 24 hours of learning of the FI+ triggered source water sample, unless the state requires corrective action or if the sample is invalidated by the state. The samples must be collected from the same ground water source that the original triggered source water monitoring sample was collected that had a FI+ source water sample. The GWS should ask the state for the frequency at which it must collect the additional source water monitoring samples during the 24 hour period as well. If one of the additional source water samples is FI+, the GWS is required to conduct corrective action as discussed in the Rule. Corrective action is discussed in the fourth article of this series.



**Figure 3. GWR Requirements for FI+ Triggered Source Water Monitoring Sample**

**Methods**

Samples must be analyzed using methods approved under the GWR. The table below identifies the approved methods.

**Table 1: GWR Approved Methods**

Fecal Indicator	Methodology	Method Name
<i>E. coli</i>	Colilert	9223 B
	Colisure	9223 B
	Membrane Filter Method with MI Agar	EPA Method 1604

	m-ColiBlue24 Test	1
	E*Colite Test	2
	EC-MUG	9221 F
	NA-MUG	9222 G
Enterococci	Multiple Tube Technique	9230 B
	Membrane Filter Technique	9230 C
	Membrane Filter Technique	EPA Method 1600
	Enterolert	3
Coliphage	Two-step Enrichment Presence-Absence Procedure	EPA Method 1601
	Single Agar Layer Procedure	EPA Method 1602

Analyses must be conducted in accordance with the documents listed below. The Director of the Federal Register approves the incorporation by reference of the documents listed in footnotes 2–11 in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Copies may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

<sup>1</sup>A description of the m-ColiBlue24 Test, “Total Coliforms and *E. coli* Membrane Filtration Method with m-ColiBlue24®Broth,” Method No. 10029 Revision 2, August 17, 1999, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010 or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

<sup>2</sup>A description of the E\*Colite Test, “Charm E\*Colite Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Drinking Water, January 9, 1998, is available from Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843–1032 or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

<sup>3</sup>Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. Preparation and use of the medium is set forth in the article “Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters,” by Budnick, G.E., Howard, R.T., and Mayo, D.R., 1996, Applied and Environmental Microbiology, 62:3881–3884.

### **Frequently Asked Questions about Triggered Source Water Monitoring**

**Question #1:** If a GWS analyzed a triggered source water monitoring sample for *E.coli*, is it required to analyze the additional source water monitoring sample for *E.coli* as well?

**Answer #1:** No. The federal rule does not state that the additional source water monitoring sample be analyzed for the same fecal indicator used for triggered source water monitoring. This would be a state-specific requirement. Please check with your state to ensure you analyze the sample for the correct fecal indicator.

**Question #2:** If any of the GWS's repeat TCR samples are TC+, does the GWS have to take more triggered source water monitoring samples?

**Answer #2:** No. The GWS is only required to conduct triggered source water monitoring in response to a TCR routine sample result that is TC+. However, the state may require the GWS to conduct assessment monitoring if it believes that the source might be vulnerable to contamination.

**Question #3:** Is a FI+ triggered source water sample a treatment technique violation?

**Answer #3:** No. A FI+ triggered source water sample requires either corrective action or additional monitoring as determined by the state. It also requires Tier 1 PN, Special Notice in the Consumer Confidence Report, and notification to any consecutive system that could have received water from the FI+ source. Under the GWR,

the system will only receive a treatment technique violation if it fails to meet the corrective action requirement, provide treatment or maintain microbial treatment.

### **Training Opportunities**

Currently EPA Headquarters has not scheduled any additional workshops or webcast trainings on the GWR; however there still may be trainings sponsored by your state, EPA Region, or technical assistance providers. Contact your EPA Region or state for more information on workshops or trainings that may be held near you. For more information on the GWR, please visit the GWR homepage at: [www.epa.gov/safewater/disinfection/gwr](http://www.epa.gov/safewater/disinfection/gwr). The next article will cover GWR requirements for compliance and assessment source water monitoring.