



Consecutive System Guide for the Ground Water Rule

Purpose

The purpose of this guidance manual is solely to provide technical information for water systems and states to assist them in complying with Ground Water Rule (GWR). The statutory provisions and EPA regulations described in this document contain legally binding requirements. This guidance is not a substitute for applicable legal requirements, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on any party, including EPA, States, or the regulated community. While EPA has made every effort to ensure the accuracy of the discussion in this guidance, the obligations of the regulated community are determined by statutes, regulations, or other legally binding requirements. In the event of a conflict between the discussion in this document and any statute or regulation, this document would not be controlling.

Interested parties are free to raise questions and objections to the guidance and the appropriateness of using it in a particular situation.

Although this manual describes suggestions for complying with GWR requirements, the guidance presented here may not be appropriate for all situations, and alternative approaches may provide satisfactory performance.

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Abbreviations

GWR	Ground Water Rule (40 CFR Part 141 Subpart S)
SDWA	Safe Drinking Water Act
TCR	Total Coliform Rule (40 CFR Part 141 Subpart C)
LCR	Lead and Copper Rule (40 CFR Part 141 Subpart I)
TC	Total Coliform

For more information, contact EPA's Safe Drinking Water Hotline, 1 (800) 426-4791, or see the Office of Ground Water and Drinking Water web page at <http://www.epa.gov/safewater>.

This guidance manual is available electronically at <http://www.epa.gov/safewater/disinfection/gwr/compliancehelp.html>. To order a paper copy of guidance manuals, you may contact the US EPA Water Resource Center at 202-566 -1729 or by mail at:

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Other Guidance Manuals

EPA has developed other guidance manuals to aid EPA, State agencies, and you in implementing the GWR and other rules and to help to ensure consistent implementation.

Consider the Source: A Pocket Guide to Protecting Your Source: Drinking Water Pocket Guide #3 - An electronic version is available at <http://www.epa.gov/safewater/sourcewater>.

Public Notification Handbook (EPA 816- R- 00-010) - An electronic version is available at <http://www.epa.gov/safewater/publicnotification/compliancehelp.html>.

Preparing Your Drinking Water Consumer Confidence Report (CCR), Revised Guidance for Water Suppliers EPA 816-R-002, April 2005. This document provides information to assist drinking water systems with preparing and distributing CCRs. An electronic version is available at <http://www.epa.gov/safewater/ccr/compliancehelp.html>.

Consumer Confidence Report Rule: A Quick Reference Guide (EPA 816-F-02-026), November 2002 - A condensed guide that provides a brief overview of the Consumer Confidence Report Rule. An electronic version is available at <http://www.epa.gov/safewater/ccr/compliancehelp.html>.

Surface Water Treatment Rule Guidance Manual - The Appendices also include CT tables for the inactivation of Giardia and viruses for chlorine, chlorine dioxide and ozone.

EPA is also developing a series of guidance documents to help public water systems implement requirements associated with the GWR. Electronic versions of the guidance documents are, or will be, available on the GWR Compliance Help page at

<http://www.epa.gov/safewater/disinfection/gwr/compliancehelp.html>.

Complying with the Ground Water Rule: Small Entity Compliance Guide (EPA 815-R-07-018) - This guide is designed for owners and operators of public water systems serving 10,000 or fewer persons that are required to comply with the Ground Water Rule.

Ground Water Rule Corrective Action Guidance Manual - This manual provides information for ground water systems that must provide corrective action as a result of significant deficiencies or fecally-contaminated source water. The guidance includes technical information on selecting appropriate disinfection technologies to enable primacy agencies and PWSs to select the treatment most appropriate for a given system. It also provides technical information to States and systems on eliminating sources of contamination, utilizing alternate sources, and correcting significant deficiencies for situations in which disinfection is not the selected corrective action.

Sanitary Survey Guidance Manual for Ground Water Systems - This guidance provides information to assist States and other primacy programs in conducting sanitary surveys of ground water systems.

Ground Water Rule Source Water Monitoring Methods Guidance Manual (EPA 815-R-01-019) - This manual provides guidance on triggered and optional assessment source water monitoring issues such as: selection of fecal indicators, sample collection and shipping, source water monitoring methods, laboratory quality assurance (QA) and quality control (QC), and evaluation of fecal indicator data. This manual also provides an overview of GWR requirements and includes frequently asked questions regarding source water monitoring.

Ground Water Rule Source Assessment Guidance - This manual provides information on procedures for identifying ground water sources at risk for contamination. Risk factors are discussed with emphasis on identifying readily available factors suitable for office, rather than field determination of risk at an individual PWS well. The guidance also lists sources of information for making determinations and includes field methods for determining the presence of a hydrogeologic barrier.

1. Introduction

This guide describes the regulatory requirements of the Ground Water Rule (GWR) as it applies to wholesale systems that supply ground water and to the consecutive water systems that receive and distribute that ground water supply.

The GWR applies to all public water systems that use **ground water unless** the system combines all of its ground water with surface water **prior** to treatment under 40 CFR 141 Subpart H (Filtration and Disinfection).

A **wholesale system** is a public water system that supplies finished water to one or more other public water systems.

A **consecutive system** is a public water system that buys or otherwise receives some or all of its finished water from a wholesale system.

This document is intended to provide guidance to wholesale and consecutive ground water systems and States in employing source water monitoring to identify fecal contamination of ground water sources, one of the risk-based components of the GWR

Consecutive systems, and wholesale/consecutive system interactions and contractual relationships, can be complex. There are a variety of State approaches to addressing regulatory requirements for consecutive systems since most previous regulations under the SDWA did not specifically address consecutive systems.

In the development of the GWR, the Stage 2 Disinfectants and Disinfection Byproducts Rule and the Long Term 2 Enhanced Surface Water Treatment Rule under the SDWA, EPA has explicitly addressed the applicability of these regulations to consecutive systems. EPA is providing guidance to assist public water systems and States in implementing these regulations addressing consecutive systems.

1.1 General requirements of the GWR

The requirements of the GWR (40 CFR Subpart S) constitute national primary drinking water regulations. The GWR was published in the Federal Register on November 8, 2006 (71 Federal Register 65574). A copy of the rule language can be found on EPA's website at <http://www.epa.gov/safewater/disinfection/gwr/regulation.html>.

The following are general GWR requirements applicable to wholesale and consecutive ground water systems:

- (a) Provide requested existing information to the State to aid the State in performing a sanitary survey of your system.
- (b) Correct any significant deficiencies identified by the State in your system within a required timeframe.
- (c) A consecutive system is required to report TC-positive routine sample collected under TCR to the wholesale supplier(s) within 24 hours of being notified of the TC-positive sample, unless the consecutive system or wholesale system(s) provide(s) 4-log (99.99 percent) treatment of viruses (by inactivation, removal or a combination of inactivation or removal) for the wholesale ground water source(s).
- (d) Wholesale systems and consecutive systems with their own ground water sources must perform triggered microbial monitoring of ground water source(s) after a TC-positive routine sample collected under TCR if they do not provide 4-log (99.99 percent) treatment of viruses (by inactivation, removal or a combination of inactivation or removal) for the source.
- (e) A wholesale system is required to notify the consecutive system(s) of a fecal indicator-positive ground water source sample within 24 hours of being notified of the fecal indicator-positive sample.
- (f) Correct fecal contamination of your ground water source(s) within a required timeframe.
- (g) If required by your State, provide existing information to the State to aid the State in performing a hydrogeologic sensitivity assessment for your source(s).
- (h) Wholesale systems and consecutive systems with their own ground water sources must perform assessment microbial monitoring of ground water source(s) if required by the State.
- (i) If required by the State, monitor any treatment process used to provide 4-log (99.99 percent) treatment of viruses (by inactivation, removal or a combination of inactivation or removal) of viruses for your source(s), and
- (j) Keep records and report to the State for certain requirements listed in (a)-(i) above.

The requirements specific to wholesale and consecutive systems are discussed in greater detail in the next section.

2. GWR Requirements for Consecutive and Wholesale Ground Water Systems

Exhibit 2.1 describes some of the specific responsibilities of consecutive and wholesale ground water systems under the GWR.

**Exhibit 2.1 GWR Requirements for Wholesale and Consecutive Systems
(Yes=Required, No=Not Required)**

Ground Water Rule Requirement	Wholesale System	Consecutive System -100% of supply purchased	Consecutive system - purchased and own supply
Provide the State with information it requests to complete the sanitary survey.	Yes	Yes	Yes
Correct any significant deficiencies identified by the State within a required timeframe.	Yes	Yes	Yes
Notify your wholesale supplier within 24 hours of being notified by your laboratory of a TC-positive routine sample collected under TCR in your distribution system if you or your wholesale supplier do not provide 4-log treatment of viruses for your ground water supply.	No	Yes	Yes
Triggered ¹ source water monitoring of your own sources ² if you do not provide 4-log treatment of viruses for those sources	Yes	No	Yes
Triggered ¹ source water monitoring of your source(s) ² if you are notified of TC-positive routine sample collected under TCR by a consecutive system you serve and if you or the consecutive system do not provide a 4-log treatment of viruses for your sources.	Yes	No	No
Notify consecutive systems you serve within 24 hours if a ground water source sample is fecal indicator-positive.	Yes	No	No
Corrective action and/or treatment of your ground water sources, if required, after a fecal indicator-positive source water sample.	Yes	No	Yes
If directed by the State, provide the State with information it requests to complete the hydrogeologic sensitivity assessment for your water system.	Yes	No	Yes
If directed by the State, conduct assessment source water monitoring of your ground water sources.	Yes	No	Yes
Monitor treatment processes in accordance with GWR and State requirements.	Yes	Yes	Yes
Reporting, record keeping and public notification requirements of the GWR.	Yes	Yes	Yes

1 Triggered source monitoring consists of collecting a sample from your ground water sources(s) after a TC-positive routine sample collected under TCR and analyzing the sample for a fecal indicator approved by the State.

2 All sources do not have to be monitored under triggered monitoring if a “triggered source water monitoring plan” has been developed and approved by the State.

2.1 Is triggered source water monitoring always required?

A wholesale system or a consecutive system with its own ground water source(s) that has evidence that the TC-positive routine sample collected under TCR is due to a distribution system deficiency in the wholesale or consecutive system distribution system, rather than source water contamination, may apply to the State for an exception to the triggered source water monitoring requirements on a case-by-case basis.

If the wholesale system or consecutive system **provides 4-log treatment** of viruses for a ground water source and conducts compliance monitoring, triggered source water monitoring for that source **is not required**.

- The State is then required to make a determination that the total coliform-positive sample is caused by a distribution system deficiency in the wholesale or consecutive distribution system.
- If the State decides to grant an exception to the triggered source water monitoring requirements, then the State must document the decision in writing.
- You should have information that demonstrates the distribution problem that caused the positive sample available for the State when you make your request for an exception.

The State may also establish criteria for distribution system conditions that will cause total coliform-positive samples. If the total coliform-positive sample was collected in the wholesale or consecutive distribution system under conditions that meet those State-specified criteria, you are not required to conduct triggered source water monitoring. You must notify the State within 30 days of the total coliform-positive sample that met State criteria for an exception to the triggered monitoring requirements of the GWR. You should become familiar with your State's criteria for exceptions to triggered monitoring.

2.2 What if you believe a fecal indicator-positive source water sample is due to a lab error or other cause rather than source water contamination?

The State may invalidate a fecal indicator-positive source sample if the laboratory establishes that improper sample analysis occurred or if the State has substantial grounds to believe that a sample result is due to circumstances that do not reflect source water quality.

- If the State invalidates a fecal indicator-positive sample, then the GWR requires that the State document the decision in writing.
- You should have information from the laboratory about the analysis or information that demonstrates the fecal indicator-positive does not reflect source water quality available for the State to review when you make your request to invalidate.
- If the State invalidates a fecal indicator-positive source water sample, the GWR requires that the system must collect another source water sample and have it analyzed for the same fecal indicator within 24 hours of being notified of the invalidation.

2.3 What does the GWR require for a consecutive system that has a TC-positive routine sample collected under TCR in its distribution system?

The GWR requires that a consecutive system that serves ground water from a wholesale system that has not received 4-log treatment for viruses do the following after it is notified of a TC-positive routine sample collected under TCR in the consecutive system's distribution system:

- Notify the wholesale system(s) of the TC-positive routine sample collected under TCR within 24 hours.
- Conduct public notification if a source water sample from a source that serves the consecutive system is fecal indicator-positive.

2.4 What does the GWR require for wholesale systems that are notified that its consecutive system has a TC-positive routine sample collected under TCR in the consecutive system distribution system?

The GWR requires that a wholesale system that supplies ground water that has not received 4-log treatment for viruses do the following when it is notified that its consecutive system has a TC-positive routine sample collected under TCR in the consecutive system's distribution system:

- Collect a sample from the wholesale system's ground water source(s) and analyze the sample for a fecal indicator;
- If a source water sample is fecal indicator-positive, notify all consecutive systems served by the source (and conduct public notification if the source also serves the wholesale system's consumers);
- Complete corrective action if required by the State after the initial fecal indicator-positive sample; and
- Complete corrective action if any of the five additional samples collected after the initial fecal-indicator positive is also fecal indicator-positive.

2.5 What are the GWR triggered source water monitoring requirements for a consecutive system with its own ground water sources?

One of the main elements of the GWR is to identify contaminated ground water sources through sampling and correct them as needed. If a consecutive system that has its own source(s) of ground water has a TC-positive routine sample collected under TCR in its distribution system and does not know which source is the cause, it must sample its source(s) and must notify its wholesale supplier as required by the GWR.

However, if the consecutive system can identify portions of its system that are served by only one source, monitoring of all the sources may not be necessary. Consecutive systems with their own sources should review their distribution system and available water quality data to determine if certain parts of its system are served by a particular source. Information that could help identify areas served by a particular source includes:

- Distribution system maps with pressure zones, isolation valves, storage tanks, sources, flow meters, and any other significant facilities identified,
- Normally closed valves between service areas or pressure zones,
- Water quality information that identifies a particular source (alkalinity, pH, disinfectant residual, fluoride, Lead and Copper Rule parameters etc.), and/or
- Distribution system models (proprietary software , EPANET). These tools need to be properly calibrated and verified for valid results to be obtained in a specific distribution system.

If sufficient information is available, it may be possible to associate a routine TCR monitoring site with a particular source. In the event of a TC-positive routine sample collected under TCR at such a site, the system and the State can be confident that the correct source is being sampled.

A triggered source water monitoring plan can help ensure the correct source is sampled without collecting unnecessary samples. Under the GWR, States may require a triggered source water monitoring plan to be submitted for systems with more than one ground water source. Even if your State does not require you to submit a triggered source water monitoring plan, you may wish to develop one anyway and discuss it with your State. You may also want to develop a monitoring plan if you rotate the wells you use on a regular basis or if you only use a well during certain times of the year. For example, a triggered source water monitoring plan for a system with seasonal sources could include both a summer and winter monitoring plan. The GWR requires that a triggered source water sample be collected within 24 hours of being notified of a TC-positive routine sample collected under TCR. A triggered source water monitoring plan can help you make a decision about where to collect a sample more rapidly.

If directed by the State, systems must submit for State approval **a triggered source water monitoring plan** that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under 141.21(a) (commonly known as the Total Coliform Rule) and that the system intends to use to meet the triggered monitoring requirements of the Ground Water Rule (§141.402).

2.6 What are the GWR triggered source water monitoring requirements for a consecutive system with more than one connection to a wholesale system (or connections to more than one wholesale system)?

A consecutive system with multiple connections to a wholesale system or with connections to more than one wholesale system may not know which connection is responsible for a TC-positive routine sample collected under TCR in its distribution system. If the system does not know which connection could be the cause and has more than one wholesale supplier, it must notify all its wholesale suppliers as required by the GWR. However, if the consecutive system can identify portions of its system that are served by a particular connection, monitoring of all the wholesale sources may not be necessary.

Wholesale systems that serve through multiple connections should review their distribution system and available water quality data to determine if certain consecutive systems or certain connections are served by a particular source. As in the previous discussion, water quality data, pressure zone and valve maps, and modeling can be useful in determining if a particular consecutive system connection is served by particular source. This would also apply to wholesale systems that serve consecutive systems served by more than one wholesale system. If there is sufficient information to demonstrate that a particular sample location in a consecutive system is served by a particular wholesale supply, then the required triggered source water monitoring may not have to be completed for all sources.

For wholesale systems with multiple consecutive systems and consecutive systems with multiple wholesale suppliers, the decision about where to collect a source water sample may not be straightforward. As discussed previously, a triggered source water monitoring plan can help ensure the correct source is sampled without collecting unnecessary samples. States may require a triggered source water monitoring plan to be submitted for consecutive systems. Even if your State does not require you to submit a triggered source water monitoring plan, you may wish to develop one and have it reviewed by your State.

- A triggered source water monitoring plan is particularly useful for wholesale systems with multiple consecutive systems and multiple sources and for consecutive systems with their own sources, multiple wholesale suppliers, or multiple connections to a wholesale supplier.
- Wholesale and consecutive systems may also want to develop a triggered source water monitoring plan if they rotate the wells used on a regular basis or only use a well during certain times of the year.

The GWR **requires** that each source in use be sampled **within 24 hours of being notified of a TC-positive routine sample collected under TCR**. However, a State-approved triggered source water monitoring plan can reduce the number of sources that need to be sampled by identifying the specific source(s) serving the site of the TC-positive routine sample collected under TCR.

With a triggered source water monitoring plan approved by the State, the system and the State can have confidence that the correct source is being sampled after a TC-positive routine sample collected under TCR without collecting a sample from every source in the system. Part 4 of this guidance document describes the recommended minimum elements of a triggered source water monitoring plan

2.7 What are the GWR triggered source water monitoring requirements for a wholesale system with multiple wells?

Most wholesale ground water systems will have more than one well. The wells may not draw from the same aquifer or certain wells may not serve certain parts of the system or customers. Once the wholesale system is notified of a TC-positive routine sample collected under TCR by one of its consecutive systems it must decide (within 24 hours) where to collect the required source water samples and then collect the sample.

- If you are a wholesale system with more than one ground water source and you cannot identify which wells serve the consecutive system, or identify a well or wells representative of the ground water you supplied, you must sample all your sources.
- A representative well (or wells) should represent all your ground water sources that have the potential to serve the area that had the total-coliform positive sample. Use of a representative well (or wells) requires State approval.
- If a well (or wells) only serves some of the consecutive system(s) or portions of the wholesale distribution system and you provide this information to the State in a triggered source water monitoring plan, you may be able to sample only the source(s) that serves the system, or portions of the system, with a TC-positive routine sample collected under TCR.

A triggered source water monitoring plan can help ensure that the source(s) that serve(s) the TCR sample site is sampled without collecting samples from every source. States may require a triggered source water monitoring plan to be submitted for systems with more than one ground water source. The triggered source water monitoring plan can identify representative sources, or areas served by different sources for likely distribution system scenarios, as well as sources used only seasonally or on a rotating schedule so that the appropriate sources are sampled. Even if your State does not require you to submit a triggered source water monitoring plan, you may wish to develop one anyway and discuss it with your State. Part 4 of this guidance document describes the recommended minimum elements of a triggered source water monitoring plan.

2.8 What steps can a wholesale system take to facilitate meeting the requirements for triggered source water monitoring under the GWR?

Under the GWR, a wholesale system is responsible for collecting a source water sample from each source in use after being notified of a TC-positive routine sample collected under TCR in its own or any of its consecutive systems' distribution system(s) unless it has a State-approved triggered source water monitoring plan that permits more focused source monitoring. Information about and communication with the consecutive systems is needed to meet the GWR requirements

Steps a wholesale system can take to facilitate notification of TC-positive routine samples collected under TCR in the consecutive systems it serves include:

- Identify all consecutive systems subject to TCR and to GWR triggered source water monitoring under the GWR.
- Identify all connection(s) to those consecutive systems. Include information about the source and status (active, standby, abandoned etc.) of each connection. Identify who has the ability to alter the status of the connection and the date the status was last confirmed, if applicable.
- Identify those consecutive systems with their own ground water sources and those supplied by another wholesale water system.
- Identify a contact (and alternates and after hours contacts) for each consecutive system, keep a record of contact phone numbers, and develop a procedure to keep the contact list up to date and accurate.
- Provide training and/or outreach materials on the requirements for notification by consecutive systems to their wholesale suppliers and the need for timely notification to the wholesaler of TC-positive routine samples collected under TCR in the consecutive system(s) distribution system(s).
- Identify any consecutive systems that are non-community water systems. These systems may not have full time staff and may have special needs for communication and training and outreach. Timely notification of the wholesale system is an important element of the triggered monitoring requirements of the GWR. The wholesale system may need to make special efforts and arrangements for non-community consecutive systems.
- Identify the local laboratories used by the consecutive systems and contacts in those laboratories. With cooperation of the consecutive systems and the laboratory, develop a response plan for notification of any TC-positive routine samples collected under TCR from either the wholesale system or the consecutive system.
- Identify staff contacts within the wholesale systems for consecutive system communication and liaison functions.
- Develop a documentation process for all communications.

2.9 What steps can a consecutive system take to facilitate meeting the GWR notification requirements for TC-positive samples collected under TCR?

It is important to establish a communication process for the consecutive systems to notify the wholesale system of TC-positive routine samples collected under TCR and be aware of water quality and operational issues in the wholesale systems. Communication processes could include:

- Written communication and notification procedures. Non-community water systems without full-time staff may need to make special arrangements to ensure timely notification from the laboratory and timely notification of and communication with the wholesale system.
- Dedicated phone lines with after hours forwarding or recorded message capacity.
- Web-based information pages and message posting.
- Pager, cell phone, and wireless message transmission.
- E-mail notification.
- Laboratory notification of both the consecutive and wholesale system for a TC-positive routine sample collected under TCR.

2.10 What if a consecutive system is supplied with ground water by another consecutive system?

The GWR requires that a wholesale system collect and analyze at least one source water sample if the wholesale system (or the consecutive system) does not provide 4-log virus treatment of the ground water supplied to the consecutive system and a TC-positive routine sample collected under TCR occurs in the consecutive system.

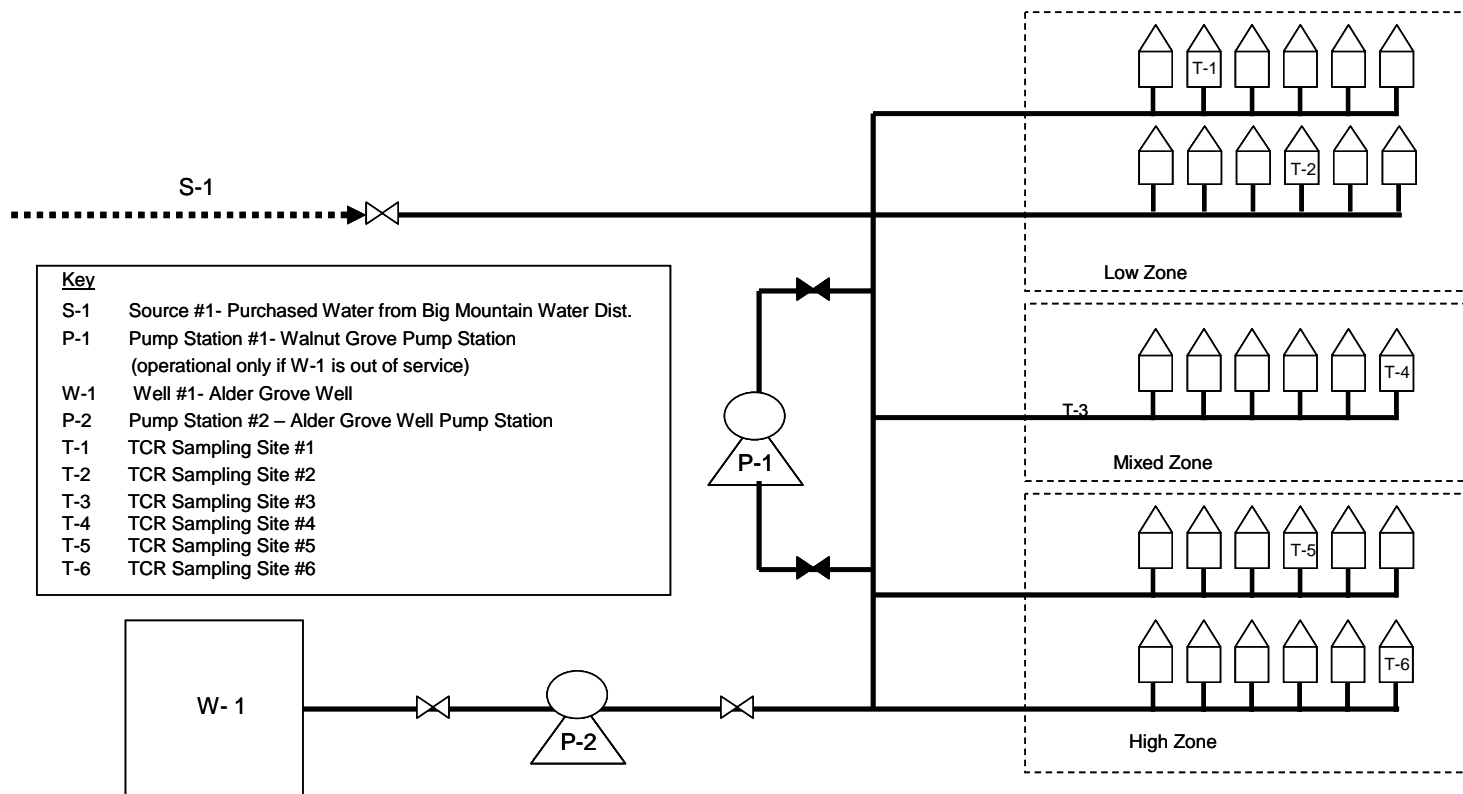
In some systems, the wholesale supply may pass through one or more consecutive systems before reaching its final consecutive connection. In these cases, a triggered source water monitoring plan and reliable communications and notification processes are important to ensure that both the consecutive system and the wholesale system meet their responsibilities under the GWR. Triggered source water monitoring plans can be prepared for the combined wholesale/consecutive distribution system or on a system-by-system basis.

Source water monitoring plans for wholesale systems should identify the consecutive systems served and, if applicable, the sources serving each consecutive system. Source water monitoring plans for consecutive systems should identify the wholesale supply or suppliers for the points of entry. Source water monitoring plans for combined wholesale/consecutive should include all the information describe previously for individual wholesale or consecutive systems. Sections 2.8 and 2.9 describe important elements of communication and notification between wholesale and consecutive systems. Part 4 of this guidance document describes the recommended minimum elements of a triggered source water monitoring plan.

3. GWR Consecutive System Examples

3.1 Example 1

Figure 3.1 – First Valley Water District System



- The First Valley Water District purchases ground water from the Big Mountain Water District in addition to having one well.
- The First Valley supply is delivered through valved connections from Big Mountain’s Cross County Pipeline.
- First Valley Water District also has its own well that is used routinely.
- Pressure in the Big Mountain supply is only adequate to serve the low zone of the system.
- Some mixing of the Big Mountain supply and First Valley’s own supply occurs between the low and the high zone (Mixed Zone).
- The Big Mountain supply can only reach the high zone when the Walnut Grove Pump Station is operated to move water between zones and this occurs only when the Alder Grove Well is

out of service or in an emergency (fire, major leak).

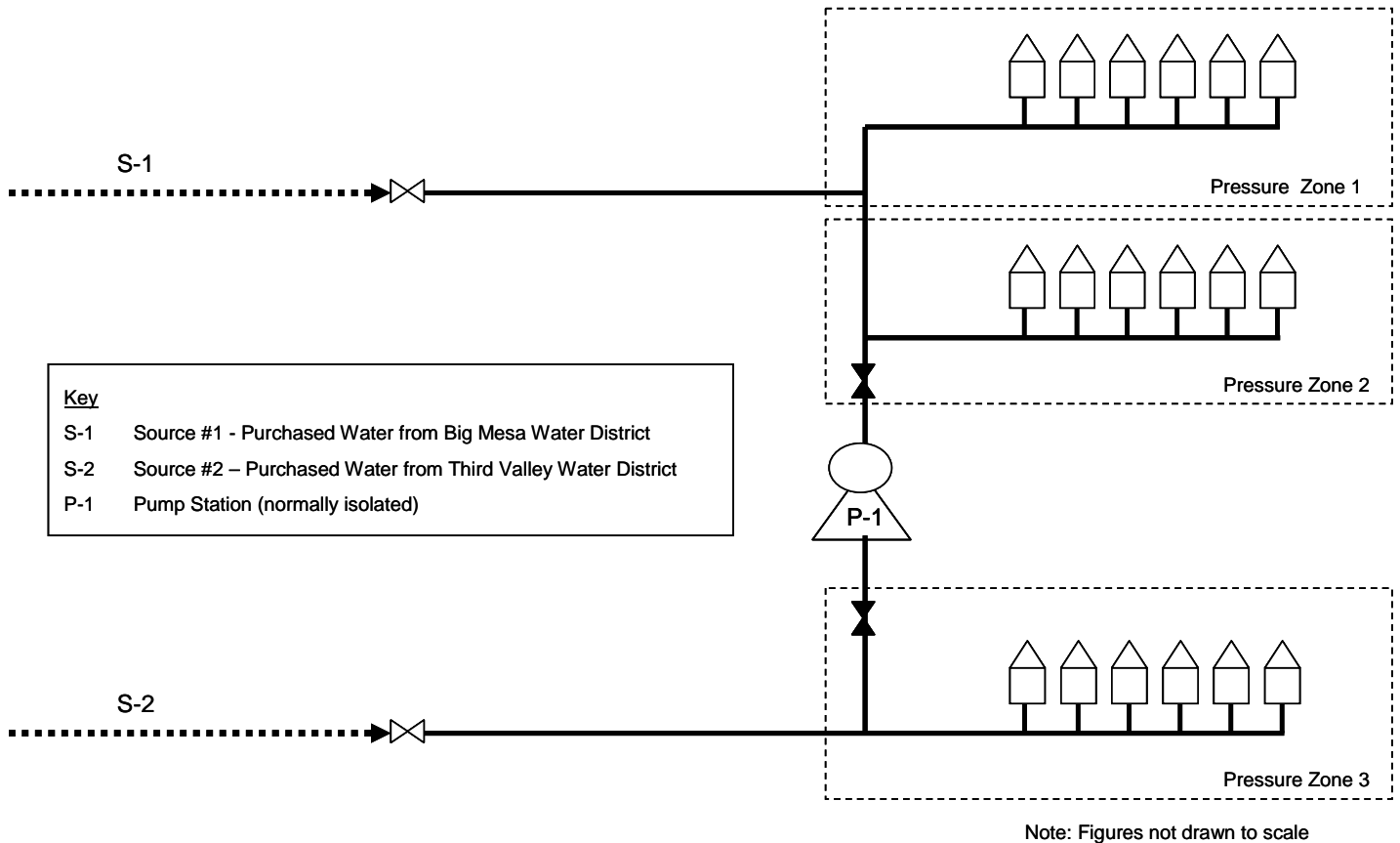
Based on the hydraulics of the First Valley system:

- A TC-positive routine sample collected under TCR in the low zone (TCR sites 1 and 2) triggers source water sampling in the Big Mountain Water District's sources.
- A TC-positive routine sample collected under TCR in the high zone (TCR sites 5 and 6) triggers a source water sample from the Alder Grove Well. This is true as long as the Walnut Grove Pump Station was not operating at the time of the TC-positive routine sample collected under TCR.
- The mixed zone contains water from both sources. Since a single source cannot be identified for this zone, triggered source water samples must be collected from both the Big Mountain source(s) and the Alder Grove Well after a TC-positive routine sample collected under TCR in the mixed zone (TCR sites 3 and 4).

In this example, system hydraulics and operation allow for some of the routine TCR monitoring sites to be identified as supplied by only one of the First Valley District's sources. The GWR requires that source water samples be collected no more than 24 hours after being notified of a TC-positive routine sample collected under TCR, or for a wholesale system, no more than 24 hours after being notified by their consecutive system of TC-positive routine sample collected under TCR in the consecutive system's distribution system. To meet these requirements, it important that samples be properly identified and that system personnel are aware of the correct response to a TC-positive routine sample collected under TCR at a particular sample location. Also, the State would have to approve representative sampling or a triggered source water monitoring plan.

3.2 Example 2

Figure 3.2 – Second Valley Water District System



The Second Valley Water District purchases its entire supply from the Big Mesa Water District and the Third Valley Water District.

- Second Valley has three pressure zones in its system.
- Two zones are served by connection to Big Mesa; the third zone is served by a connection to a Third Valley Water District pipeline.
- The Big Mesa Water District adds chlorine to its ground water supply but does not provide a 4-log inactivation of viruses.
- The Third Valley Water District adds chloramine to its supply.
- The Third Valley supply is a mix of surface water and ground water depending on the time of year and Third Valley provides a 4-log virus inactivation for its ground water supply.

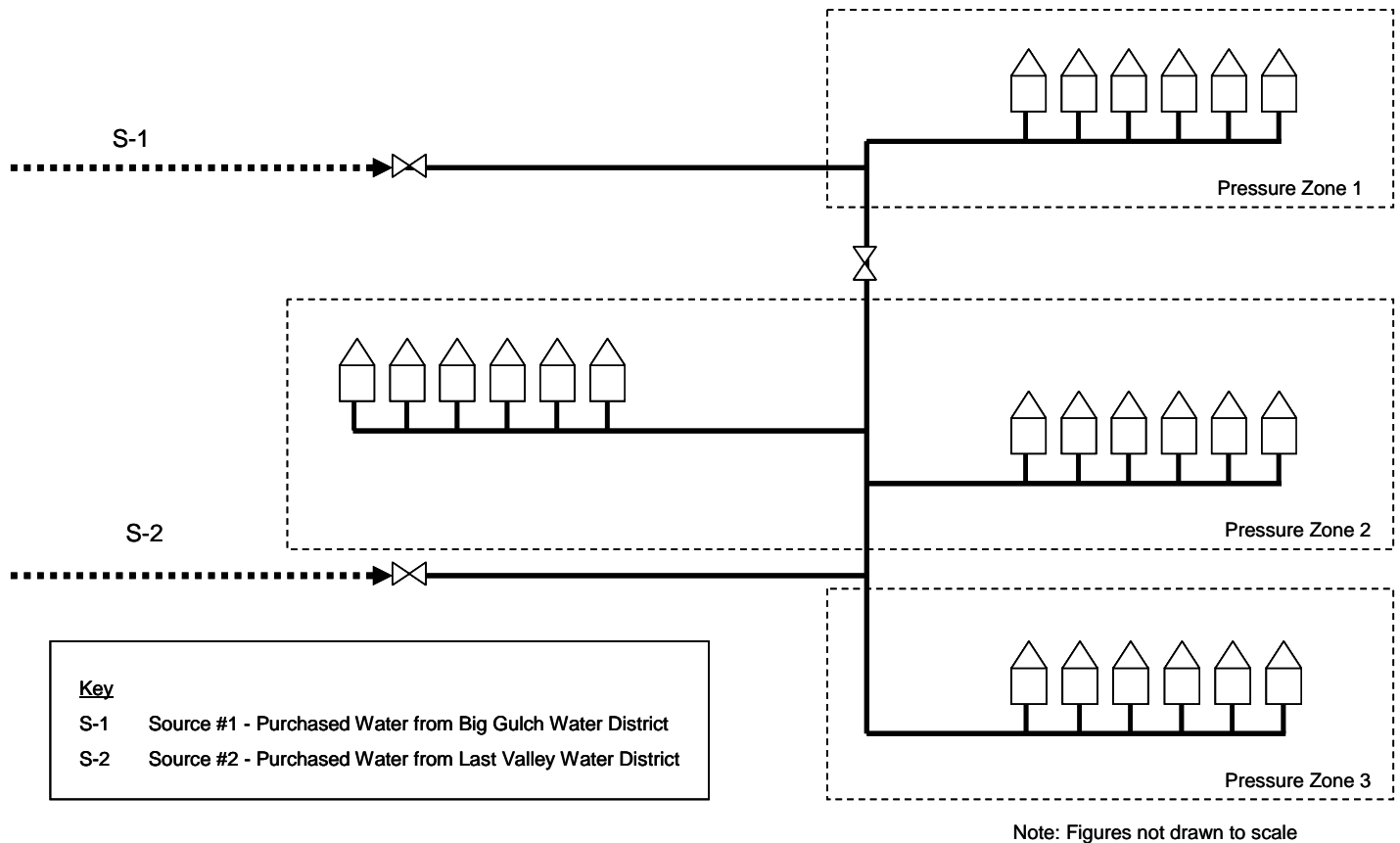
- The three zones are interconnected but the Second Valley operators keeps the connections between the zones at valves and pump stations closed to prevent mixing and the taste and odor complaints that often happen when the two supplies mix.

In this example, there are multiple wholesale sources, however the two sources do not mix under normal conditions. If a TC-positive routine sample collected under TCR occurred in the Second Valley system:

- A source water sample from the Big Mesa sources would be required for a TC-positive routine sample collected under TCR in the two zones served by the Big Mesa supply.
- No source water sample would be required for TC-positive routine sample collected under TCR that occurred in the zone served by the Third Valley supply since Third Valley provides a 4-log virus inactivation for its sources.

3.3 Example 3

Figure 3.3 – Fourth Valley Water District System



The Fourth Valley Water District purchases its entire supply from the Big Gulch Water District and the Last Valley Water District. Fourth Valley has three pressure zones in its system. One zone is served by the connection to Big Gulch the other two zones are served by connections to the Last Valley Water District transmission pipeline.

- The Big Gulch Water District adds chlorine to its wholesale ground water supply but does not provide a 4-log inactivation of viruses.
- The Last Valley Water District supply is a mix of surface water and ground water.
- The Last Valley Water District also adds chlorine to its supply but does not provide a 4-log inactivation of viruses for its ground water sources.

- The Last Valley Water District surface water supply has a low alkalinity and the Last Valley District adjusts the pH to protect its pipelines and meet the water quality parameters set by the State under the Lead and Copper Rule.
- As Fourth Valley has conducted its Lead and Copper Rule water quality parameters tap sampling it has identified the parts of its service area that receive the Last Valley supply. That information has been put on a distribution system map along with the locations of the routine TCR monitoring sites.

This example is more complicated than the first two because Fourth Valley has two wholesale supplies with both surface and ground water sources and multiple pressure zones. For large wholesale systems with multiple customers and multiple sources, deciding where to collect the required source water samples could be even more complicated.

In this example, Fourth Valley has information it collected for the Lead and Copper Rule that could allow it to identify the wholesale supply at any of its routine TCR monitoring sites and reduce the number of source water samples that must be collected. The water quality information combined with a triggered source water monitoring plan would allow the Fourth Valley system to quickly identify the source and notify the correct wholesale supplier.

4. Example: Triggered Source Water Monitoring Plan

A triggered source water monitoring plan can help ensure that the source(s) that serve the TCR sample site is sampled without collecting samples from every source. States may require a triggered source water monitoring plan to be submitted for systems with more than one ground water source. The triggered source water monitoring plan can identify representative sources, or areas served by different sources for likely distribution system scenarios, as well as sources used only seasonally or on a rotating schedule so that the appropriate sources are sampled. For example, a triggered source water monitoring plan for a system with seasonal sources could include both a summer and a winter monitoring plan. Even if your State does not require you to submit a triggered source water monitoring plan, you may wish to develop one anyway and discuss it with your State.

A triggered source water monitoring plan is particularly useful for wholesale systems with multiple consecutive systems and multiple sources and for consecutive systems with their own sources, multiple wholesale suppliers, or multiple connections to a wholesale supplier. A triggered source water monitoring plan should include the following minimum elements:

- 1) Map or schematic of the system with sources and/or points of entry and TCR compliance monitoring locations identified. **Your distribution system map or schematic should not contain information that poses a security risk to your system.** EPA recommends that you submit either a distribution system schematic with no landmarks or addresses or a City map without locations of pipes indicated.
- 2) Identify the source type for each source/point of entry (e.g., seasonal, emergency, ground water, surface water etc.).
- 3) Identify the source(s) serving each TCR compliance monitoring location and the basis for the determination (e.g., system hydraulics, operation, water quality data, etc.).
- 4) For wholesale systems, the consecutive systems served and, if applicable, the sources serving each consecutive system.
- 5) For consecutive systems, the wholesale supply or suppliers for the points of entry.
- 6) Identify any representative ground water source(s) that will be used to satisfy the triggered monitoring requirements of the GWR and the basis for the selection (e.g. geologic/hydrogeologic information, well construction data, water quality data, sanitary surveys, Source Water Assessments, etc.).
- 7) Any changes or variations expected in the monitoring plan (e.g., use of seasonal sources, rotating sources, etc.).

Exhibit 4-1 is an example triggered source water monitoring plan. The plan is for the First Valley Water system described in Section 3.1 and illustrated in Figure 3.1.

**Exhibit 4.1 Triggered Source Water Monitoring Plan – First Valley Water System
(See Section 3.1 and Figure 3-1)**

Routine TCR site	Served by	Source sample at/by	Comments/Instructions
#1 Turnout Valve lot	Big Mountain	Big Mountain WD	Contact Big Mountain WD Water Quality Section
#2 Redwood Park	Big Mountain	Big Mountain WD	Day phone: Fax: After hours:
#3 Old Town	Both	Big Mountain WD First Valley WD (Alder Grove Well sample tap)	Contact Big Mountain WD Water Quality Section. Contact lab for sample pick up. Day phone: Fax: After hours :
# 4 Walnut Grove PS	Both	Big Mountain WD First Valley WD (Alder Grove Well sample tap)	Sample bottles at corp yard -label as SOURCE and follow chain of custody
# 5 Freshwater School	Alder Grove Well	First Valley WD (Alder Grove Well sample tap)	Contact lab for sample pick up.
# 6 Corporation Yard	Alder Grove Well	First Valley (Alder Grove Well sample tap)	Sample bottles at corp yard -label as SOURCE and follow chain of custody

5. Glossary

Consecutive system - A public water system that buys or otherwise receives some or all of its finished water from a wholesale system.

Fecal Indicator – Microorganisms (i.e., bacteria and viruses) that are closely associated with fecal contamination and indicate that a source of water may be fecally-contaminated. For the GWR, fecal indicators are *E. Coli*, enterococci, or coliphage, as specified by the State.

Sanitary survey – A “sanitary survey”, as conducted by the State, includes, but is not limited to, an onsite review of the water source (identifying sources of contamination by using results of source water assessments or other relevant information, where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water.

Significant deficiency – A “significant deficiency” includes, but is not limited to, a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the State determines to be causing, or has the potential for causing, the introduction of contamination into the water delivered to consumers.

State – Refers to the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State or Tribal government does not have primary enforcement responsibility pursuant to Section 1413 of the Safe Drinking Water Act, the term ‘State’ means the Regional Administrator of the U.S. Environmental Protection Agency.

Source sample – A sample collected at the source of water for the public water system before treatment or, if no treatment is provided, before the distribution system (i.e., at the wellhead)

Subpart H system – A public water system serving surface water or ground water under the influence of surface water. These systems are subject to the filtration and disinfection requirements of 40 CFR Subpart H.

Total Coliforms – A group of closely related bacteria that are generally harmless. They are natural and common inhabitants of the soil and ambient waters (such as lakes and rivers).

Treatment technique violation – Violation of a treatment technique established in lieu of a Maximum Contaminant Level. For the GWR, this includes failure to provide corrective action for fecal contamination of ground water source and failure to correct significant deficiencies. Treatment technique violations require the system to provide public notification and systems in violation of treatment technique requirements are subject to enforcement actions by the State and EPA.

Triggered Monitoring – For the GWR, ground water source samples collected after a routine TC-positive routine sample collected under TCR and analyzed for a fecal indicator. Triggered monitoring consists of collection of source water samples and analysis of those samples for a fecal indicator specified by the State. For systems collecting one routine TCR sample or fewer each month, one of the

four repeat samples required under the TCR may be collected from the ground water source to satisfy the triggered ground water source monitoring requirements of the GWR. The GWR is not applicable to any source determined by the State to be ground water under the direct influence of surface water (GWUDI).

Well- For the purposes of the GWR, the term “well” includes springs, spring boxes, vertical and horizontal wells, infiltration galleries and any other method of delivering ground water.

Wholesale system – A wholesale system is a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system.