Water and Wastewater Regulatory Compliance Corner
Ground Water Rule
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Introduction to the Ground Water Rule

To protect customers, the EPA has issued specific regulations and rules water utility systems must follow in order to make sure they are providing safe drinking water. EPA issued the Ground Water Rule (GWR) to improve drinking water quality and provide protection from disease-causing microorganisms. Water systems that have ground water sources may be susceptible to fecal contamination from warm blooded animals such as human feces or runoff from livestock feces that can soak into the ground water source. In many cases, fecal contamination can contain disease causing pathogens. The purpose of the GWR is to reduce disease incidence associated with harmful microorganisms in drinking water supplies that use ground water as source water.

Drinking Water Regulation in America

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs, and ground water.

SDWA authorizes the United States Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. EPA, Tribal Nations, states, and water systems then work together to make sure that these standards are met.

Timeline of Regulation

2000: EPA proposed the GWR.
2006: EPA published the GWR in the Federal Register.
2007: The final rule was made effective on January 8, 2007.

Why is this important?

How does the GWR affect my health? It reduces the risk of illness caused by microbial contamination in public ground water systems (GWSs).

How does GWR make my water safer? The GWR establishes a risk-targeted approach to identify GWSs susceptible to fecal contamination and requires corrective action to rectify significant deficiencies and source water fecal contamination in all public GWSs.

Important Terms and Definitions

Water table: Underground boundary between the soil surface and the area where ground water saturates spaces between sediments and cracks in rock.

Aquifers: Aquifers are a body of permeable rock, gravel, sand, or clay which can contain or transmit ground water.

Total coliform: A variety of bacteria, parasites, and viruses, known as pathogens, can potentially cause health problems if humans ingest them. Total coliform is a useful indicator of many pathogens found in drinking water.

Ground water recharge: When water enters and fills aquifers.

4-Log Treatment: Log inactivation of viruses relates to % inactivation of viruses. (See page 4.)

Parts per billion (PPB): µg/L or micrograms per liter.

Parts per million (PPM): mg/L or milligrams per liter.

GWS: Ground water system.

Source water: Source where water is drawn from to be treated and distributed.

Treatment techniques: Methods and techniques used for treating raw/source water before it is distributed to customers.

Ground Water Rule

Who does the GWR apply to?

Entities regulated by the GWR are PWSs using ground water as a drinking water source.

About Ground Water

What is it? Ground water is water that accumulates underground. It can exist in spaces between loose particles of dirt and rock, or in cracks and crevices in rocks. Different types of rocks and dirt can contain different amounts of water.

How does water get there? When it rains, the water infiltrates the soil and percolates downwards until it reaches the water table. Some types of soils allow more water to infiltrate than others. Permeable surfaces, such as sand and gravel, allow up to 50 percent of precipitation to enter the soil. Rainwater can take years or even decades to reach the water table.

Can ground water get contaminated? Materials from the land's surface can move through the soil and end up in the ground water. Ground water contamination occurs when synthetic-made products such as gasoline, oil, chemicals, and human or animal waste can get into the ground water causing it to become unsafe for consumption.

What does the GWR require?

The GWR establishes a risk-targeted approach to identify ground water systems (GWSs) susceptible to fecal and synthetic contamination and requires corrective action.

This risk-targeting strategy includes the following:

- Regular GWS sanitary surveys to check for significant deficiencies in eight key operational areas.
- Source water monitoring to detect fecal contamination at targeted GWSs that do not provide 4-log treatment of viruses.

Measures to protect public health include the following:

- Compliance monitoring to ensure that 4-log treatment of viruses is maintained where it is used to comply with this rule.
- Treatment technique requirements to address sanitary survey significant deficiencies and fecal contamination in ground water.

What are sanitary surveys?

A sanitary survey is a review of a public water system to assess their capability to supply safe drinking water. EPA or the state is required to conduct sanitary surveys of all GWSs to identify significant deficiencies.

The eight system components monitored via the sanitary surveys are as follows:

1. source water
2. treatment techniques
3. distribution system
4. finished water storage
5. pumps, pump facilities, and controls
6. monitoring, reporting, and data verification
7. system management and operation
8. operator compliance with EPA or state requirements

Following the initial sanitary survey, EPA or the state must conduct sanitary surveys every 3 years for most Community Water Systems and every 5 years for non-Community Water Systems and Community Water Systems that provide at least 4-log treatment of viruses or have outstanding performance records, as determined by EPA or the state.

Source Water Monitoring

Source water monitoring is an effective tool to target at-risk systems that must take corrective action to protect public health. Indications of risk may come from total coliform monitoring, hydrogeologic sensitivity analyses, or other system-specific data and information.

Sample Location

For both triggered source water monitoring and assessment source water monitoring, samples must be collected at the ground water source before treatment, unless another location is approved by EPA or the state.

GWSs should install a sample tap at each source to enable source water monitoring.

Monitoring Procedures

When conducting assessment of source water, proper procedures must be followed to ensure accuracy and dependency of results. The following table covers several best practices.

SAMPLE CONTAINERS	Samples should be collected in sterile, plastic or glass containers with a leak-proof lid. The GWR requires GWSs conducting source water monitoring to analyze at least a 100-mL sample volume.
RECORDS	All samples taken should be recorded in an on-site sample logbook or on a sample collection form (chain of custody) if it is to be sent to a laboratory for analysis. Sample logbooks and sample collection forms should contain the following information: • Name of system (e.g., Public Water System Identification number) • Sample site location • Sample type (assessment, triggered) • Sampler's name • Sample number • Date of sample collection • Time of sample collection • Analysis requested
WATER TAPS AND SERVICE LINE	Water taps used for sampling should be free of aerators, bubblers, strainers, hose attachments, mixing type faucets, and purification devices. The tap should be cleaned and flushed prior to sampling. The service line should be cleared before sampling by maintaining a steady water flow for at least two minutes (or until the water changes temperature).

COLLECTING SAMPLES	Using aseptic technique (i.e., sanitize tap, do not touch the inside of the sample container), the individual taking the sample should directly fill the sample containers from the outlet.
CHAIN-OF-CUSTODY	Sample collectors and laboratories should follow applicable EPA or state regulations pertaining to chain-of-custody procedures, since it is necessary to have an accurate written record to trace the possession and handling of samples from collection through reporting.

What is Log-4 Treatment?

Removal/inactivation of microorganisms, including viruses, is measured on logarithmic scale. MiLog inactivation of viruses relates to % inactivation of viruses:

- 1-log inactivation = 90% inactivation
- 2-log inactivation = 99% inactivation
- 3-log inactivation = 99.9% inactivation
- 4-log inactivation = 99.99% inactivation

Contamination Indicators

IF...	THEN...
GWS with a distribution system sample tests total coliform positive (TC+).	They must conduct triggered source water monitoring.
A GWS does not provide at least 4-log treatment and source sample is total coliform positive (TC+).	They must conduct triggered source water monitoring.
Source sample is fecal indicator positive.	GWS must notify the EPA or the state and the public.

Upon receiving positive total coliform results, the GWS must test the ground water source sample(s) for the presence of one of three EPA or state-specified fecal indicators: E. coli, enterococci, or coliphage.

Compliance Monitoring

GWSs using chemical treatment and serving fewer than 3,300 people must:

- monitor for the residual disinfectant concentration and meet the EPA or state-specified minimum concentration at or before the first customer.
- monitor daily and collect a grab sample during the hour of peak flow. If any daily grab sample is less than the minimum disinfectant residual concentration, the system must take follow-up samples every four hours until the residual meets or exceeds minimum concentration.
- monitor at an EPA or state-approved location.

GWSs using chemical treatment serving more than 3,300 people must:

- monitor for the residual disinfectant concentration and meet the EPA or state-specified minimum concentration at or before the first customer. GWSs of this size must monitor continuously and record the lowest residual disinfectant concentration each day that water from the ground water source is served to the public.
- monitor at an EPA or state-approved location.

GWS using membrane filtration systems for treatment must…

- operate the process in accordance with EPA or state-specified compliance requirements.
- monitor the membrane filtration process in accordance with all EPA or state-specified monitoring requirements.

SYSTEM TYPE	MONITOR FOR	HOW OFTEN TO SAMPLE
GWSs serving ≤ 3,300 using chemical disinfection	Residual disinfectant concentration (must meet EPA or state minimum)	Daily or continuous
GWSs serving > 3,300 using chemical disinfection		Continuous
GWSs using membrane filtration	Membrane filtration process effectiveness	Consult EPA or state for specific information

Treatment Technique Requirements

This rule requires a GWS to comply with the treatment technique requirements if a significant deficiency is identified during a sanitary survey.

The treatment technique requires that a GWS implement at least one of the following corrective actions:

- correct all significant deficiencies.
- provide an alternate source of water.
- eliminate the source of contamination.
- provide treatment that reliably achieves at least 4-log treatment of viruses.

GWR Requirements

In both figures below, solid lines reflect requirements the GWR system must meet, while dashed lines reflect elements required if indicated by the state.

Figure 1. GWR Requirements for Systems Providing 4-log Treatment

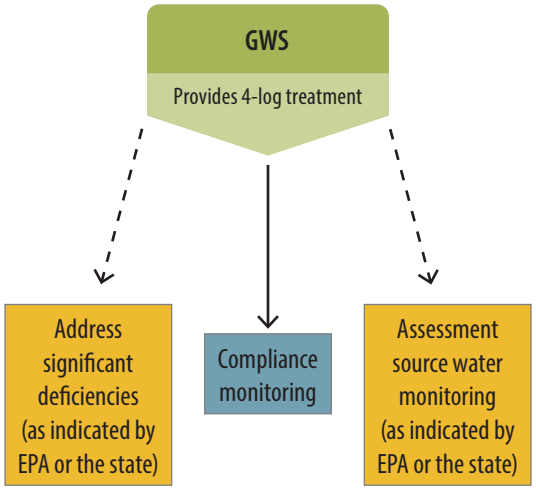

Figure 2. GWR Requirements for Systems Not Providing 4-log Treatment