

Quick Guide

Minimum Disinfection for Groundwater



PROVIDED TO PUBLIC WATER SYSTEMS FROM THE COMPLIANCE ASSURANCE SECTION
OF THE WATER QUALITY CONTROL DIVISION

Purpose

Disinfection of drinking water is one of the major public health advances in the 20th century. One hundred years ago, typhoid and cholera epidemics were common throughout American cities. Disinfection was a major factor in reducing these epidemics.

Once drinking water is disinfected to meet public health standards, the residual disinfectant level in the distribution system must be maintained as a final barrier in protecting against disease outbreak. Maintaining this residual disinfectant prevents bacterial re-growth and protects against the intrusion of microbial contamination (viruses, bacteria, parasites, etc.), especially in the unfortunate event of a pipe break or backflow event.

Even under normal conditions, residual disinfectants degrade based on demand and water age. Operators must manage disinfectant levels on a frequent and ongoing basis to protect consumers.

Common Reasons for Noncompliance

- Failing to measure a distribution system residual disinfectant with each total coliform sample (including repeats).
- Sampler forgets to write the residual down on the total coliform lab slip.
- Failing to maintain a minimum residual disinfectant at each entry point and in the distribution system.
- Entry point monitoring equipment failure.



Chlorine injection system. Photo by Paul Kim.



Gas chlorine cylinders. Photo by Serenity Valdez.

Overview of the Groundwater Disinfection Residual Requirements for Colorado Public Water Systems

Colorado Primary Drinking Water Regulations

- Applicability: All public water systems must chemically disinfect.
- All systems must maintain a minimum 0.2 mg/L residual disinfectant in the distribution system. This must be measured at the same time and place as total coliforms are sampled. (See reverse for more details.)
- The risk for disease outbreaks increases when treatment is not adequate. Therefore groundwater systems must maintain a minimum 0.2 mg/L, or system specified if 4-log certified by the Department, residual disinfectant at each entry point to the distribution system. (See reverse for more details.)

EPA Guidance Documents

- *Microbial and Disinfection Byproduct Rules Simultaneous Compliance Guidance Manual* (EPA 815-R-99-015) August 1999
- *Alternative Disinfectants and Oxidants Guidance Manual* (EPA 815-R-99-014) April 1999
- *Ground Water Rule Compliance Monitoring: A Quick Reference Guide* (EPA-815-F-08-008) July 2008

Questions?

<https://www.colorado.gov/cdphe/dwcontact>

TIPS

Sampling and Compliance Tips

DISTRIBUTION SYSTEMS

Measure the distribution system residual disinfectant at the same time and place as total coliform bacteria samples (including any repeat total coliform samples).

Use a field test kit that is designed to comply with approved analytical methods for distribution system monitoring.

Make sure the sampler knows how to follow the method and how to maintain the accuracy of the field test kit. Check with the manufacturer if you are not sure how to do this.

For compliance monitoring purposes, systems using chlorine should measure **free chlorine** as the residual disinfectant. Systems using chloramines should report **total or combined chlorine** as the residual.

To protect public health, systems are allowed to temporarily increase disinfectant residual, beyond the maximum residual disinfectant level (MRDL), to address a specific microbiological contamination problem.

The Department expects wholesalers to cooperate with consecutive water systems to ensure their compliance, but each water system is ultimately responsible for its own compliance.

ENTRY POINTS

Entry-point residual disinfectant (EPRD) should be taken after required contact time but before the first customer. If a sample tap is not available prior to the first customer, systems may sample at the first customer.

If a system's entry point is at a storage tank, the system must monitor its EPRD at least weekly even if the well or treatment plant is not producing water at the time.

Distribution System Requirements

- Maintain a minimum 0.2 mg/L residual disinfectant in all locations in the distribution system.
- If a public water system fails to maintain 0.2 mg/L this may result in a treatment technique violation. Treatment technique violations will require Tier 2 public notification.
- Do not exceed 4.0 mg/L on a running annual average. Exceeding this level is considered a violation for community and non-transient water systems and will require public notification.

Entry Point Requirements

- Continuously chemically disinfect all sources whenever in use.
- For systems **not** 4-log certified by the Department:
 - Maintain at least 0.2 mg/L residual disinfectant at each entry point to the distribution system and measure residual at least once every week the water is served from the groundwater source.
 - If the entry point residual disinfectant falls below 0.2 mg/L, the system must continue to sample the residual disinfectant **at least every 24 hours** until the residual has been restored.
 - If the entry point residual disinfectant is **not restored to at least 0.2 mg/L within 72 hours** a treatment technique violation has occurred and requires Tier 2 public notice. The Department must be notified as soon as possible, but no later than the next business day.
- For systems 4-log certified by the Department:
 - Maintain a minimum system specified residual disinfectant at each entry point to the distribution system and measure the residual disinfectant according to the monitoring schedule.
 - If the entry point residual disinfectant falls below the systems specified minimum and is **not restored within 4 hours** a treatment technique violation has occurred and requires Tier 2 public notice. The Department must be notified as soon as possible, but no later than the next business day.
- When calling, make sure to know (1) when the disinfectant level dropped below the minimum, (2) how long it was below, and (3) what was the lowest disinfectant level. Note, according to rounding rules, 0.15 mg/L is not below 0.2 mg/L, but 0.14 mg/L is.



In-line chloramine analyzer.
Photo by Serenity Valdez.

Reporting Made Simple

Distribution System Reporting

Systems must report a field residual measurement to the lab **with each total coliform sample**. All labs certified for total coliform analysis report the field residual measurement to the state with each total coliform sample result.

Groundwater System Entry Point Reporting

Systems should use the appropriate form and report to the Department within 24 hours of a treatment technique violation being identified.

ALL laboratory and system reporting forms can be found at:

<https://www.colorado.gov/cdphe/wq-drinking-water-compliance-forms>