



Water and Wastewater Regulatory Compliance Corner

Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)

Published March 18, 2022

Introduction

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 wells.

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 synthetic 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.

Background

The Federal Water Pollution Control Act of 1948 was the first major US law to address water pollution. Growing public awareness and concern for controlling water pollution led to sweeping amendments in 1972. As amended in 1972, the law became commonly known as the Clean Water Act (CWA). The CWA established the basic structure for regulating pollutant discharges into the waters of the US. It also gave the EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The EPA was also given authority to issue discharge permits to wastewater treatment facilities. These permits are called National Pollutant Discharge Elimination Permit System, or NPDES.

History

1989: EPA promulgated the Surface Water Treatment Rule that set MCLGs of zero for *Giardia lamblia*, viruses, and *Legionella* and promulgated regulatory requirements for all PWSs using surface water or GWUDI.

1992: EPA initiated a negotiated rulemaking committee recommended the development of three sets of rules: a two-staged Disinfectants/Disinfection Byproducts Rule (DBPR), an “interim” Enhanced Surface Water Treatment Rule (IESWTR), a “long term” Enhanced Surface Water Treatment Rule (LT1ESWTR), and an Information Collection Rule. The IESWTR was only to apply to those systems serving 10,000 or more persons. The Committee agreed that the “long term” Enhanced Surface Water Treatment Rule would be needed for systems serving fewer than 10,000 persons.

1998: EPA promulgated the IESWTR, which applies to surface water and GWUDI systems serving 10,000 or more persons. The purposes of the IESWTR are to improve control of microbial pathogens (specifically *Cryptosporidium*) and to address risk trade-offs with DBPs.

2002: EPA promulgated the LT1ESWTR that builds upon the requirements of the 1989 SWTR and the smaller system counterpart of the IESTWR.

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Definitions

Alternative Filtration Systems: Systems using filtration technologies other than conventional filtration, direct filtration, diatomaceous earth filtration, or slow sand filtration.

Conventional Filtration: Water treatment that includes coagulation, flocculation, sedimentation, and filtration.

Cryptosporidium: *Cryptosporidium* is a microscopic parasite that causes the diarrheal disease cryptosporidiosis. Both the parasite and the disease are commonly known as “Crypto.”

Direct Filtration: Water treatment that includes coagulation and filtration but excluding sedimentation.

Groundwater Under Direct Influence (GWUDI): A groundwater source that is located close enough to a surface water source, such as a river or lake, to receive direct surface water infiltration, or recharge. Since a portion of the groundwater source’s recharge is from surface water, the groundwater source is considered at risk of contaminations that are usually found in surface waters such as *Giardia lamblia*, *Cryptosporidium*, and viruses, which are not normally found in groundwaters.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

Turbidity: Turbidity is described as the opaqueness of a fluid due to the presence of suspended solids and is measured in terms of nephelometric turbidity units (NTU).

What is the purpose of the LT1ESWTR?

EPA has set enforceable drinking water treatment techniques to reduce the risk of waterborne disease outbreaks. Treatment technologies such as filtration and disinfection can remove or inactivate microbiological contaminants. The LT1ESWTR improves the control of a wide range of microbial pathogens in public drinking water systems and, specifically addressing *Cryptosporidium* for the first time in systems serving fewer than 10,000 people.

Cryptosporidium and Health Effects

Cryptosporidium is a parasite found in humans, other mammals, birds, fish, and reptiles. It is common in the environment and widely found in surface water supplies. In the infected animal, the pathogen multiplies in the gastrointestinal tract. The animal then excretes them in its feces. *Cryptosporidium* are very resistant to adverse factors in the environment and can survive dormant for months in cool, dark conditions such as moist soil, or for up to a year in clean water.

Physical removal of microbiological contaminants is critical to the control of *Cryptosporidium* because it is highly resistant to standard disinfection practices, they are relatively unaffected by chlorine and chloramines in the concentrations that are used for drinking water treatment.

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Cryptosporidiosis, the infection caused by *Cryptosporidium*, may manifest itself as a severe infection that can last several weeks and may cause the death of individuals with compromised immune systems. *Cryptosporidium* has become recognized as one of the most common causes of waterborne disease (drinking and recreational) in humans in the United States.

Overview of LT1ESWTR

Applies to all public water systems using surface water, or GWUDI, serving fewer than 10,000 persons.

- Set maximum contaminant level goal (MCLG) at zero.
- Sets a 2-log *Cryptosporidium* removal requirement for systems that filter during the treatment process.
- Requires that watershed protection programs address *Cryptosporidium* for system that are not required to provide filtration. Under the Surface Water Treatment Rule of 1989, public water systems are required to filter surface water sources unless water quality and disinfection requirements are met, and a watershed control program is maintained. This, however, did not address *Cryptosporidium*, until the passing of the LT1ESWDR.
- *Cryptosporidium* is included as an indicator of GWUDI systems.
 - GWUDI means the groundwater source is located close enough to nearby surface water, that the groundwater source is directly affected by the quality of the surface water.
 - *Cryptosporidium* as an indicator means that, once *Cryptosporidium* is detected in a groundwater source, it is assumed that source is under direct influence from surface water.

Setting an MCLG

As in the IESTWR for systems that serve a population of above 10,000 people, the LT1ESWTR established a maximum contaminant level goal (MCLG) of zero for *Cryptosporidium* for system that serves less than 10,000 people. When establishing an MCLG, EPA must also establish either a corresponding Maximum Contaminant Level (MCL) or a treatment technique.

In the IESWTR and in LT1ESWTR, the Agency chose to establish a treatment technique that relies on strengthening water treatment processes already in place. For filtered systems this means achieving at least 2-log (99 percent) removal of *Cryptosporidium* by meeting strengthened combined filter effluent turbidity limits as established by today's rule. For unfiltered systems it means maintaining and improving *Cryptosporidium* control under existing watershed control plans.

What Level of *Cryptosporidium* Removal Does the LT1ESWTR Require?

The LT1ESWTR established a requirement for 2-log removal of *Cryptosporidium* for surface water and GWUDI systems serving fewer than 10,000 persons. Logarithmic (or simply Log) reduction relates to the percentage of pathogens physically removed or inactivated by a given process and operate on a base 10 scale.

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

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Individual Filter Monitoring Requirements

- The LT1ESWDR requires surface water systems using direct or conventional filtration serving populations less than 10,000 to monitor each filter's turbidity on a continuous, individual.
- Continuous monitoring of effluent from individual filters (IFE) is required for systems using conventional or direct filtration, as well as individual membrane units.
- Individual filter effluent turbidity should be monitored every 15 minutes at a minimum
- Systems must keep the results of this monitoring for at least three years.
- Each month systems must report to the EPA that they have conducted individual filter turbidity monitoring, and are required to indicate the dates, filter number, and turbidities of any measurements that exceeded 1.0 NTU.
- Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring.
- If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, the system must contact the State to arrange for the State or an approved third party to conduct a Comprehensive Performance Evaluation (CPE) not later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. The CPE must be completed and submitted to the State no later than 120 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month.

Combined Filter Effluent Requirements

- Combined filter effluent (CFE) is the monitoring of the combined effluent from all filters in the system and is required for every regulated filtered system.
- One sample every four hours is the minimum required for combined filter effluent systems.
- For conventional and direct filtration systems:
 - The turbidity level of representative samples of a system's combined filter effluent water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month.
 - The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU.
 - Conventional and direct filtration plants meeting these filter performance requirements are presumed to achieve at least a 2-log removal of *Cryptosporidium*.
- Systems using alternative filtration (membrane filtration, cartridge filtration, etc.) must demonstrate to the EPA that their system achieves 2-log removal of *Cryptosporidium*. The EPA will then establish appropriate turbidity limits to reflect this performance.
- At the end of each month, systems must report:
 - The total number of filter effluent turbidity measurements taken each month.
 - The number and percentage of turbidity measurements that exceeded their 95th percentile turbidity limit.
 - Number of measurements that exceeded their maximum turbidity limit.

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Public Notice

Public notice is required for any violations that may influence the health of the customers. The type of public notice is dependent on the violation.

IF	THEN
CFE Turbidity Exceeds 5 NTU	System must inform EPA within 24 hours after learning of the violation. EPA will consult with the system to determine if Tier 1 (24 hour) public notice is needed.
IFE Turbidity Exceeds 1 NTU	System must inform EPA within 24 hours after learning of the violation. EPA will consult with the system to determine if Tier 1 (24 hour) public notice is needed.
System does not consult with EPA within 24 hours of exceedance notification	Tier 1 Public Notice is mandatory
Other turbidity technique violations occur	Tier 2 Public Notice is issued
Monitoring and testing procedure violation occurs	Tier 3 Public Notice is required

For more information on Public Notices, consult the [USET Public Notice Regulatory Compliance Corner](#).

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