

# Comprehensive Surface Water Treatment Rules Quick Reference Guide: Unfiltered Systems

## Overview of the Rules

<b>Title</b>	<b>Surface Water Treatment Rule (SWTR)</b> - 40 CFR 141.70-141.75 <b>Interim Enhanced Surface Water Treatment Rule (IESWTR)</b> - 40 CFR 141.170-141.175 <b>Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)</b> - 40 CFR 141.500-141.571
<b>Purpose</b>	Improve public health protection through the control of microbial contaminants, particularly viruses, <i>Giardia</i> , and <i>Cryptosporidium</i> .
<b>General Description</b>	The <b>Surface Water Treatment Rules</b> : <ul style="list-style-type: none"> <li>▶ Applies to all public water systems (PWSs) using surface water or ground water under the direct influence of surface water (GWUDI), otherwise known as "<b>Subpart H systems.</b>"</li> <li>▶ Requires <u>all</u> Subpart H systems to disinfect.</li> <li>▶ Requires Subpart H systems to filter unless specific filter avoidance criteria are met.</li> <li>▶ Requires unfiltered systems to perform source water monitoring and meet site specific conditions for control of microbials.</li> </ul>

## Overview of Requirements

The purpose of this table is show how the requirements for the IESWTR and LT1ESWTR build on the existing requirements established in the original SWTR.

APPLICABILITY: PWSs that use surface water or ground water under the direct influence of surface water (Subpart H) that do not provide filtration.		Final Rule Dates		
		SWTR 1989	IESWTR 1998	LT1ESWTR 2002
Population Served	≥ 10,000	✓	✓	
	< 10,000	✓	N/A (except for sanitary survey provisions)	✓
Regulated Pathogens	99.99% (4-log) inactivation of viruses	✓	Regulated under SWTR	Regulated under SWTR
	99.9% (3-log) inactivation of <i>Giardia lamblia</i>	✓	Regulated under SWTR	Regulated under SWTR
	99% (2-log) removal of <i>Cryptosporidium</i> (through watershed control)		✓	✓
Residual Disinfectant Requirements	Entrance to distribution system (≥ 0.2 mg/L)	✓	Regulated under SWTR	Regulated under SWTR
	Detectable in the distribution system	✓	Regulated under SWTR	Regulated under SWTR
Unfiltered System Requirements	Avoidance Criteria	✓	✓	✓
Disinfection Profiling & Benchmarking	Systems must profile inactivation levels and generate benchmark, if required		✓	✓
Sanitary Surveys (state requirement)	CWS: Every 3 years NCWS: Every 5 years		✓	Regulated under IESWTR
Covered Finished Reservoirs/Water Storage Facilities (new construction only)			✓	✓
Operated by Qualified Personnel as Specified by State		✓	Regulated under SWTR	Regulated under SWTR

(CWS) Community Water System

(NCWS) Non-community Water System

## Filtration Avoidance Criteria

Since December 30, 1991, systems must meet source water quality and site specific conditions to remain unfiltered. If any of the following criteria to avoid filtration are not met, systems must install filtration treatment within 18 months of the failure. The following table outlines the avoidance criteria established by the SWTR and later enhanced by the IESWTR and LT1ESWTR.

Filtration Avoidance Criteria			
		Requirement	Frequency
SOURCE WATER QUALITY CONDITIONS	Microbial Quality	<p>Monitor fecal coliform or total coliform density in representative samples of source water immediately prior to the first point of disinfectant application:</p> <ul style="list-style-type: none"> <li>▶ <b>Fecal coliform density</b> concentrations must be <math>\leq 20/100</math> mL; <b>OR</b></li> <li>▶ <b>Total coliform density</b> concentrations must be <math>\leq 100/100</math> mL.</li> </ul> <p>Sample results must satisfy the criteria listed above in at least 90% of the measurements from previous 6 months.</p>	1 to 5 samples per week depending on system size and every day the turbidity of the source water exceeds 1 NTU.
	Turbidity	Prior to the first point of disinfectant application, turbidity levels cannot exceed 5 NTU.	Performed on representative grab samples of source water every four hours (or more frequently).
SITE SPECIFIC CONDITIONS	Systems must:	Calculate total inactivation ratio daily and provide 3-log <i>Giardia lamblia</i> and 4-log virus inactivation daily (except any one day each month) in 11 of 12 previous months (on an ongoing basis).	<p>Take daily measurements before or at the first customer at each residual disinfectant concentration sampling point:</p> <ul style="list-style-type: none"> <li>▶ Temperature</li> <li>▶ pH (if chlorine used)</li> <li>▶ Disinfectant contact time (at peak hourly flow)</li> <li>▶ Residual disinfectant concentration measurements (at peak hourly flow)</li> </ul>
	System must comply with:	<ul style="list-style-type: none"> <li>▶ MCL for total coliforms in 11 of 12 previous months (as per Total Coliform Rule).</li> <li>▶ Stage 1 Disinfection Byproducts Rule requirements (as of January 1, 2002, for systems serving <math>\geq 10,000</math> or January 1, 2004, for systems serving <math>&lt; 10,000</math>).</li> </ul>	
	Systems must have:	<ul style="list-style-type: none"> <li>▶ Adequate entry point residual disinfectant concentration (see disinfection requirements).</li> <li>▶ Detectable residual disinfectant concentration in the distribution system (see disinfection requirements).</li> <li>▶ Redundant disinfection components or automatic shut-off whenever residual disinfectant concentration <math>&lt; 0.2</math> mg/L.</li> <li>▶ A watershed control program minimizing potential for contamination by <i>Giardia lamblia</i> cysts and viruses in source water; IESWTR and LT1ESWTR update this requirement by adding <i>Cryptosporidium</i> control measures.</li> <li>▶ An annual on-site inspection by state or approved third party with reported findings.</li> <li>▶ Not been identified as a source of a waterborne disease outbreak.</li> </ul>	

## Disinfection

Disinfection must be sufficient to ensure that the total treatment process of the system achieves at least:

- ▶ 99.9% (3-log) inactivation of *Giardia lamblia*.
- ▶ 99.99% (4-log) inactivation of viruses.

Currently, *Cryptosporidium* must be controlled through the watershed control program and no inactivation credits are currently given for disinfection. Systems must also comply with the maximum residual disinfectant level (MRDL) requirements specified in the Stage 1 Disinfectants/Disinfection Byproducts Rule (Stage 1 DBPR).

Residual Disinfectant Monitoring and Reporting Requirements			
Location	Concentration	Monitoring Frequency	Reporting (Reports due 10 <sup>th</sup> of the following month)
Entry to distribution system.	Residual disinfectant concentration cannot be < 0.2 mg/L for more than 4 hours.	Continuous, but states may allow systems serving 3,300 or fewer persons to take grab samples from 1 to 4 times per day, depending on system size.	Lowest daily value for each day, the date and duration when residual disinfectant was < 0.2 mg/L, and when state was notified of events where residual disinfectant was < 0.2 mg/L.
Distribution system - same location as total coliform sample location(s).	Residual disinfectant concentration cannot be undetectable in greater than 5% of samples in a month, for any 2 consecutive months. Heterotrophic plate count (HPC) # 500/mL is deemed to have detectable residual disinfectant.	Same time as total coliform samples.	Number of residual disinfectant or HPC measurements taken in the month resulting in no more than 5% of the measurements as being undetectable in any 2 consecutive months.

System Reporting Requirements	
Report to State:	What to report:
Within 10 days after the end of the month:	<ul style="list-style-type: none"> <li>▶ Source water quality information (microbial quality and turbidity measurements).</li> <li>▶ In addition to the disinfection information above, systems must report the daily residual disinfectant concentration(s) and disinfectant contact time(s) used for calculating the CT value(s).</li> </ul>
By October 10 each year:	<ul style="list-style-type: none"> <li>▶ Report compliance with all watershed control program requirements.</li> <li>▶ Report on the on-site inspection unless conducted by state in which the state must provide the system a copy of the report.</li> </ul>
Within 24 hours:	<ul style="list-style-type: none"> <li>▶ Turbidity exceedances of 5 NTU and waterborne disease outbreaks.</li> </ul>
As soon as possible but no later than the end of the next business day:	<ul style="list-style-type: none"> <li>▶ Instance where the residual disinfectant level entering the distribution system was less than 0.2 mg/L.</li> </ul>

## Disinfection Profiling and Benchmarking Requirements

A **disinfection profile** is the graphical representation of a system's microbial inactivation over 12 consecutive months.

A **disinfection benchmark** is the lowest monthly average microbial inactivation value. The disinfection benchmark is used as a baseline of inactivation when considering changes in the disinfection process.

Disinfection Profiling and Benchmarking Requirements Under IESWTR & LT1ESWTR		
The purpose of disinfection profiling and benchmarking is to allow systems and states to assess whether a change in disinfection practices creates a microbial risk. Systems should develop a disinfection profile that reflects <i>Giardia lamblia</i> inactivation (systems using ozone or chloramines must also calculate inactivation of viruses), calculate a benchmark (lowest monthly inactivation) based on the profile, and consult with the state prior to making a significant change to disinfection practices.		
REQUIREMENT	IESWTR	LT1ESWTR
<b>AFFECTED SYSTEMS:</b>	Community, non-transient non-community, <u>and transient</u> systems.	Community and non-transient non-community systems only.
<b>BEGIN PROFILING BY:</b>	April 1, 2000	<ul style="list-style-type: none"> <li>▶ July 1, 2003 for systems serving 500-9,999 people.</li> <li>▶ January 1, 2004 for systems serving fewer than 500 people.</li> </ul>
<b>FREQUENCY &amp; DURATION:</b>	<b>Daily</b> monitoring for 12 consecutive calendar months to determine the total logs of <i>Giardia lamblia</i> inactivation (and viruses, if necessary) for each day in operation.	<b>Weekly</b> inactivation of <i>Giardia lamblia</i> (and viruses, if necessary), on the same calendar day each week over 12 consecutive months.
<b>STATES MAY WAIVE DISINFECTION PROFILING REQUIREMENTS IF:</b>	TTHM annual average <0.064 mg/L <u>and</u> HAA5 annual average <0.048 mg/L: <ul style="list-style-type: none"> <li>▶ Collected during the same period.</li> <li>▶ Annual average is arithmetic average of the quarterly averages of four consecutive quarters of monitoring.</li> <li>▶ At least 25% of samples at the maximum residence time in the distribution system.</li> <li>▶ Remaining 75% of samples at representative locations in the distribution system.</li> </ul>	One TTHM sample <0.064 mg/L <u>and</u> one HAA5 sample <0.048 mg/L: <ul style="list-style-type: none"> <li>▶ Collected during the month of warmest water temperature; <b>AND</b></li> <li>▶ At the maximum residence time in the distribution system.</li> </ul> Samples must have been collected after January 1, 1998.
<b>DISINFECTION BENCHMARK MUST BE CALCULATED IF:</b>	Systems required to develop a disinfection profile and are considering any of the following: <ul style="list-style-type: none"> <li>▶ Changes to the point of disinfection.</li> <li>▶ Changes to the disinfectant(s) used.</li> <li>▶ Changes to the disinfection process.</li> <li>▶ Any other modification identified by the state.</li> </ul> Systems must consult the state prior to making any modifications to disinfection practices.	Same as IESWTR, and systems must obtain state approval prior to making any modifications to disinfection practices.