



## SWTR FACT SHEET - EPA Region 8 – July 2016

Requirements for Filtered Public Water Systems under the following regulations:

**Surface Water Treatment Rule (SWTR)** - 40 CFR Part 141, Subpart H

**Filter Backwash Recycling Rule** (Recycle provisions within Subpart H)

**Interim Enhanced SWTR (IESWTR)** - 40 CFR Part 141, Subpart P

**Long Term 1 Enhanced SWTR (LT1ESWTR)** - 40 CFR Part 141, Subpart T

**Long Term 2 Enhanced SWTR (LT2)** – 40 CFR Part 141, Subpart W

### **GENERAL INFORMATION**

The following requirements apply to Subpart H systems (those using a **surface water source, or those that have been notified by EPA Region 8 that they are using a source determined to be Groundwater Under the Direct Influence of Surface Water (GWUDISW)**). EPA may designate a groundwater system as GWUDISW at any date, based upon new information. At that point, EPA will notify the system when the requirements outlined in this Fact Sheet begin (typically within 18 months of the GWUDISW determination).

The original SWTR of 1989 addressed the pathogens *Giardia lamblia* and viruses. The SWTR was later modified with additional requirements to address *Cryptosporidium*, through the **Interim Enhanced SWTR (IESWTR) for systems serving at least 10,000 people**, and the **Long Term 1 Enhanced SWTR (LT1ESWTR) for systems serving less than 10,000 people**. The main compliance dates for the new treatment technique requirements of the IESWTR and LT1ESWTR were January 1, 2002 and January 1, 2005, respectively.

The LT2 Enhanced Treatment for *Cryptosporidium* regulation was finalized in 2006. It applies to ALL Subpart H systems. This rule requires an initial and second round of source water monitoring for each plant that treats a SW or GWUDISW source. Based upon the monitoring results, additional treatment for *Cryptosporidium* may be required. The Subpart H, P, and T requirements discussed in this Fact Sheet remain in effect with the LT2 rule. **For additional information on LT2, please contact EPA Region 8.**

The following information in this Fact Sheet deals with the ongoing requirements of these rules for systems that filter: operating personnel, treatment technique requirements, monitoring and test methods, equipment calibration, public notice, and reporting. Note that there are additional, specific requirements in the SWTRs (such as for unfiltered systems meeting avoidance criteria, for disinfection profiling, and for recordkeeping of backwash recycle rates). Please refer to the specific rules for these requirements, or contact EPA Region 8 with questions.

## **PERSONNEL**

**Qualified operators** Every public water system using a surface water or GWUDISW must be operated by a qualified operator.

***Wyoming Public Water Systems:*** EPA Region 8 considers an operator qualified if they are certified according to Wyoming Department of Environmental Quality (WDEQ) requirements. Contact the WDEQ at (307) 777-7594 or 777-6128 or email [opcet@wyo.gov](mailto:opcet@wyo.gov) for operator certification requirements and procedures.

***Tribal Public Water Systems:*** EPA Region 8 considers an operator qualified if they are certified at the appropriate level under an approved program operated by one of the states in Region 8 or through the EPA National Operator Certification Program.

**Approved parties** On-site measurements of certain water quality parameters (e.g. turbidity, pH, disinfectant residual, temperature) may be made by an approved party; this is someone under the supervision of a certified operator, who has been adequately trained to use the equipment needed for testing.

## **TREATMENT TECHNIQUES**

**Objectives** At least 99.9% (3-log) removal and/or inactivation of *Giardia lamblia* cysts

AND

At least 99.99% (4-log) removal and/or inactivation of viruses.

The above treatment objectives can be met by combining filtration and inactivation (disinfection) barriers. You can add up the logs achieved from each barrier to get the total treatment for that micro-organism

AND

At least 99% (2-log) removal of *Cryptosporidium*

Note that for *Cryptosporidium*, the IESWTR and LT1ESWTR require that 2-log removal be achieved by the filters; inactivation of *Cryptosporidium* is not credited for compliance with these two rules. Additional removal and/or inactivation of *Cryptosporidium* based on LT2ESWTR monitoring results or commitment to install maximum treatment may apply. Exact level of additional treatment required is system specific.

### **Treatment Credit**

Well operated/maintained filtration is granted removal credit for *Giardia lamblia*, viruses, and *Cryptosporidium*.

Inactivation (disinfection) credit can be determined by CT (concentration x time) values (or IT (intensity x time) values for ultraviolet radiation (UV)).

CT is calculated by multiplying C (the concentration of free chlorine or other disinfectant in mg/L) by T (the disinfection contact time in minutes, at or before the first service connection.)

Calculate CT based on your specific treatment parameters.

Adequate CT should be maintained daily to consistently meet the treatment technique requirements, although EPA does not require filtered water systems to provide daily calculations. A calculator spreadsheet for daily or weekly calculations of inactivation for *Giardia* and viruses can be provided upon request. UV dose values for logs inactivation by ultraviolet radiation (UV) are found in the LT2ESWTR at 40 CFR 141.720(d).

### **Filtration Removal Credit**

Please see EPA Region 8 policy SWTR #2 revised May 17, 2004 for a discussion of the various types of filtration which are acceptable for SWTR compliance, and the associated microbial pathogen removal credits associated with each type of filtration. This information is summarized in Table 1, taken from policy SWTR #2, which indicates for each filtration type the expected log removal credits for *Cryptosporidium*, *Giardia* and viruses, and the necessary remaining disinfection (inactivation) credits to achieve the treatment technique requirements. These removal credits are based upon filtration systems meeting the operational and design requirements specified in policy SWTR #2, and consistently meeting the specified, combined filter effluent (CFE) and individual filter effluent (IFE) turbidity requirements.

**Note that for *Cryptosporidium*, the IESWTR and LT1ESWTR require that 2-log removal be achieved by the filters; inactivation of *Cryptosporidium* is not credited for compliance with those rules.**

**Table 1**

**FILTRATION CREDITS FOR MICROBIAL REMOVAL, TO MEET SWTR, IESWTR and LT1ESWTR\*\***

(systems consistently meeting the CFE turbidity limits in the table below, and the operational and design requirements outlined in policy SWTR #2, are granted the Logs removal credit in the table below.)

FILTRATION TREATMENT TECHNOLOGY	COMBINED FILTER EFFLUENT (CFE) TURBIDITY (95% MNTHLY/MAX) ntu	MAXIMUM LOGS OF CREDIT FOR PHYSICAL REMOVAL			MINIMUM LOGS OF INACTIVATION NEEDED BY DISINFECTION	
		<i>Cryptosporidium</i>	<i>Giardia</i>	Viruses	<i>Giardia</i>	Viruses
Conventional	*** 0.3/1	>2	2.5	2.0	0.5	2.0
Direct	***0.3/1	>2	2.0	1.0	1.0	3.0
Slow Sand	1/5	>2	2.0	2.0	1.0	2.0
Diatomaceous Earth	1/5	>2	2.0	1.0	1.0	3.0
Reverse Osmosis	0.3/1	>2	>3.0	3.0	0	1.0
Nanofiltration	0.3/1	>2	>3.0	3.0	0	1.0
Ultrafiltration	0.3/1	>2	>3.0	0	0	4.0
Microfiltration	0.3/1	>2	>3.0	0	0	4.0
Pretreatment plus Bag or Cartridge (B/C) *	1/5	2	2.0	0	1.0	4.0
Conventional Filtration followed by (B/C)	0.5/5	2	2.5	2.0	0.5	2.0

\* See policy for description of adequate pretreatment for SW and for GWUDISW using B/C Filtration

\*\* Additional types of alternative filtration should be evaluated on a case-specific basis. 95<sup>th</sup> percentile and maximum turbidity values will be no more than 1 NTU and 5 NTU, respectively, for all alternative filtration technologies, unless different site specific values are assigned. All NTU rounding shall be in accordance with EPA established policy. Also, these filtration credits do not apply to point-of-use devices, which are not compliant with the SWTRs.

\*\*\* Conventional, direct, and membrane filtration also have requirements for monitoring of individual filter effluent turbidity (IFE). See IESWTR and LT1ESWTR.

## **MONITORING REQUIREMENTS**

**Monthly reporting is required under the SWTRs. These reports and instructions can be found at <https://www.epa.gov/region8-waterops/reporting-forms-and-instructions-reporting-forms>.** Please note that the report you should use depends upon your type of filtration and population served.

**Public Notice requirements** for the violations discussed in each section below may be found at: <https://www.epa.gov/region8-waterops/reporting-forms-and-instructions-public-notification>.

### **(I) Turbidity - REPORT TO EPA IN MONTHLY REPORT**

Continuous monitoring of effluent from individual filters (IFE) is required for systems using **conventional or direct filtration, as well as individual membrane units**. Monitoring of the **combined effluent from all filters (CFE) is required for every regulated filtered system**. The CFE turbidimeter must be sited at a sampling location which is representative of the filtered water. The CFE turbidity is most representative of filtered water turbidity in the pipe where the individual filter effluents first combine, or near a clearwell inlet. Measuring turbidity at locations further downstream (after pumping operations or after storage tanks) may result in inaccurate readings due to air entrainment, particle resuspension, etc. For a further discussion on appropriate turbidimeter locations, please see EPA Region 8 policy SWTR #5, dated June 30, 2003.

**The turbidity limits depend upon the type of filtration:**

#### **Conventional and direct filtration:**

- The turbidity level of representative samples of CFE must be less than or equal to 0.3 NTU in at least 95% of the measurements taken each month.
- The maximum level of turbidity of the CFE must not exceed 1 NTU at any time.

Since CFE may meet the regulatory requirements even though one filter is producing high turbidity water, the IFE must also be measured to help the operators assess individual filter performance. IFE turbidity must be monitored continuously and recorded at least every 15 minutes. **This IFE turbidity data is kept on-site**, only summarized results and corrective actions are reported monthly to EPA. If you have two or fewer filters, you can conduct the continuous monitoring of the CFE instead. Certain follow-up actions are required if the IFE turbidity (or CFE turbidity if you have 2 filters) exceeds certain levels, typically 0.5 NTU. These followup actions can include additional reporting, filter profiles or self-assessments, and/or comprehensive performance evaluations. **If you use conventional or direct filtration, PLEASE review the regulations for these specific requirements.**

**Slow sand and diatomaceous earth (DE) filtration:**

- The turbidity level of representative samples of CFE must be less than or equal to 1 NTU in at least 95% of the measurements taken each month.
- The maximum level of turbidity of the CFE must not exceed 5 NTU.

**Alternative technologies (other than conventional, direct, slow sand or DE):**

- Operational and design requirements for alternative filtration are discussed in EPA Region 8 policy memo SWTR #2. In general, the water system must demonstrate that the filtration combined with disinfection consistently meets the treatment technique requirements; specific turbidity limits for maintaining this performance may be set from performance demonstration data. The turbidity limits for alternative filtration are also shown in Table 1. For membrane technologies, the turbidity level of representative samples of CFE must be less than or equal to 0.3 NTU in at least 95% of the measurements taken each month; for bag or cartridge (B/C) filtration this limit is 1 NTU. Membrane systems must continuously monitor filtrate turbidity from each unit/skid, and record the values once/15 minutes. Membranes also have requirements for Direct Integrity testing of each unit.
- The maximum level of turbidity of the CFE must not exceed 1 NTU for membrane filtration and 5 NTU for B/C filtration.

**The frequency of CFE turbidity monitoring depends on the system size and type of filtration:**

**All Systems**

Turbidity must be monitored on representative samples of the CFE every 4 hours that the system serves water to the public.

A public water system can substitute continuous CFE turbidity monitoring for 4-hour grab samples. You must record the current CFE turbidity value at equal intervals of 4 hours. Averaging of 4 hours of data, or monitoring at any other intervals longer than 4 hours, is not permitted, except as discussed below.

**Systems serving populations < 500**

If approved by EPA, they have the option of reducing CFE turbidity monitoring frequency to one per day regardless of the type of treatment.

**Systems using acrylamide or epichlorohydrin**

Must provide annual written certification (third party or manufacturer's certification) to EPA. The combination/product of dose and monomer level dose cannot exceed the following levels:

Acrylamide = 0.05% dosed at 1 ppm, or equivalent

Epichlorohydrin = 0.01% dosed at 20 ppm, or equivalent

**What you must know about violations**

A treatment technique violation results when a system cannot meet the turbidity criteria outlined above. Public notice is required; the type of notification depends upon the type of treatment technique violation:

**If at any time the CFE turbidity exceeds 5 NTU (or 1 NTU for conventional or direct filtration, or membrane systems, pursuant to the IESWTR or LT1ESWTR), the 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; Tier 1 is mandatory if the system does not consult with EPA within 24 hours. Also, if it appears that a waterborne disease outbreak has occurred resulting from the water system, EPA must be notified as soon as possible, but no later than by the end of the next business day. In this case, Tier 1 public notice is required.

For other turbidity treatment technique violations, Tier 2 (30 day) public notice is needed. For monitoring and testing procedure violations, Tier 3 (within 1 year) public notice is required.

**(II) Disinfection - - REPORT TO EPA IN MONTHLY REPORT**

**Disinfectant levels must be measured at BOTH (i) the entry point to the distribution system and (ii) within the distribution system.**

**(i) AT THE ENTRY POINT TO THE DISTRIBUTION SYSTEM**

**Concentration**

The disinfectant residual concentration at the point of entry (POE) cannot be less than 0.2 mg/L (measured as free chlorine residual) for more than 4 hours.

The concentration and contact time must be adequate to ensure sufficient CT to achieve the necessary logs of inactivation (see Table 1)

Disinfectant concentration must be monitored continuously and the lowest value be recorded every day the system serves water to the public. Grab sampling may be conducted every 4 hours in lieu of continuous monitoring if the equipment fails, but

for no more than 5 working days following the failure.

**If your system serves less than 3,300 population**

You have the option of monitoring the residual disinfectant concentration at the POE by grab sampling at the following frequency:

<u>Population Served</u>	<u>*Number of Samples to Collect/Day</u>
<500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

\* the daily grab samples cannot be taken all at the same time; they must be collected at equal intervals throughout the day. Report the lowest value every day the system serves water to the public.

**If at any time the residual concentration falls below 0.2 mg/L**

You must take a grab sample every 4 hours until the residual concentration is equal to or greater than 0.2 mg/L.

**What you must know about violations**

A treatment technique violation results when a system cannot meet the disinfectant criteria outlined above. Public notice is required; the type of notification depends upon the type of treatment technique violation:

For disinfection treatment technique violations, Tier 2 (30 day) public notice is needed. For disinfectant monitoring and testing procedure violations, Tier 3 (within 1 year) public notice is required.

**If at any time the residual falls below 0.2 mg/L in the water entering the distribution system, the system must notify EPA as soon as possible, but no later than by the end of the next business day.** The system must also notify EPA by the end of the next business day whether or not the residual was restored to at least 0.2 mg/L within 4 hours.

**(ii) IN THE DISTRIBUTION SYSTEM**

Disinfectant residual must be monitored at the same frequency and at the same point(s) as where total coliforms are sampled per the Total Coliform Rule. Write your residual value on the lab slip!

Heterotrophic plate count (HPC) measured in the distribution system can be



conducted in lieu of this monitoring, for those systems which cannot maintain disinfectant residual in the distribution pipes.

### **Concentration**

The residual disinfectant concentration in the distribution system cannot be undetectable, or have an HPC of more than 500/mL, in more than 5% of the samples in one month, for 2 consecutive months. The disinfectant levels in the distribution system should ensure compliance with the Maximum Residual Disinfectant Level (MRDL) of 4 mg/L.

### **What you must know about violations**

A treatment technique violation results when a system cannot meet the disinfectant criteria outlined above. Public notice is required; the type of notification depends upon the type of treatment technique violation:

For disinfection treatment technique violations, Tier 2 (30 day) public notice is needed. For disinfectant monitoring and testing procedure violations, Tier 3 (within 1 year) public notice is required.

## **REPORTING**

The daily data log sheets and daily or weekly contact time (CT) calculations must be kept on file for at least 5 years. Results of IFE turbidity monitoring must be kept for at least 3 years, and results of disinfection profiling and benchmarking must be kept indefinitely.

The Monthly SWTR reports must be submitted to the EPA Region 8 office. The monthly report is due no later than the 10<sup>th</sup> day of the month following the month in which the data are obtained. **These reports and instructions can be found at:** <https://www.epa.gov/region8-waterops/reporting-forms-and-instructions-reporting-forms>.

Please note that the report you should use depends upon your type of filtration and population served. They can be submitted by email to: [crosby.jake@epa.gov](mailto:crosby.jake@epa.gov).

If you have any more questions, or need further assistance, please contact EPA Region 8 at 1-800-227-8917 x 6389.

## **MONITORING EQUIPMENT CALIBRATION**

**Turbidimeters** must be calibrated using procedures specified by the manufacturer (typically at least quarterly using a primary standard.) Records should be kept of calibrations, and the date of last calibration reported on the monthly SWTR reports.

**Chlorine analyzers** – continuous (online) analyzers must be calibrated weekly (once every 7 days) with grab samples; see EPA Method 334.0 (see next section)

## **MONITORING TEST METHODS**

For the most recent test methods for the SWTRs, please refer to the following website, and go to the link for the Enhanced Surface Water Treatment Rule:

<https://www.epa.gov/dwanalyticalmethods>

Compliance monitoring test methods are listed by analyte (e.g. turbidity, free chlorine).