

Environmental Protection Agency

§ 141.511

**Subpart T—Enhanced Filtration  
and Disinfection—Systems  
Serving Fewer Than 10,000  
People**

SOURCE: 67 FR 1839, Jan. 14, 2002, unless otherwise noted.

GENERAL REQUIREMENTS

**§ 141.500 General requirements.**

The requirements of this subpart constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under subpart H of this part. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium* and turbidity. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(a) At least 99 percent (2 log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems; and

(b) Compliance with the profiling and benchmark requirements in §§ 141.530 through 141.544.

**§ 141.501 Who is subject to the requirements of subpart T?**

You are subject to these requirements if your system:

- (a) Is a public water system;
- (b) Uses surface water or GWUDI as a source; and
- (c) Serves fewer than 10,000 persons.

**§ 141.503 What does subpart T require?**

There are seven requirements of this subpart, and you must comply with all requirements that are applicable to your system. These requirements are:

(a) You must cover any finished water reservoir that you began to construct on or after March 15, 2002 as described in §§ 141.510 and 141.511;

(b) If your system is an unfiltered system, you must comply with the updated watershed control requirements described in §§ 141.520–141.522;

(c) If your system is a community or non-transient non-community water systems you must develop a disinfection profile as described in §§ 141.530–141.536;

(d) If your system is considering making a significant change to its disinfection practices, you must develop a disinfection benchmark and consult with the State for approval of the change as described in §§ 141.540–141.544;

(e) If your system is a filtered system, you must comply with the combined filter effluent requirements as described in §§ 141.550–141.553;

(f) If your system is a filtered system that uses conventional or direct filtration, you must comply with the individual filter turbidity requirements as described in §§ 141.560–141.564; and

(g) You must comply with the applicable reporting and recordkeeping requirements as described in §§ 141.570 and 141.571.

FINISHED WATER RESERVOIRS

**§ 141.510 Is my system subject to the new finished water reservoir requirements?**

All subpart H systems which serve fewer than 10,000 are subject to this requirement.

**§ 141.511 What is required of new finished water reservoirs?**

If your system begins construction of a finished water reservoir on or after March 15, 2002 the reservoir must be covered. Finished water reservoirs for which your system began construction

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prior to March 15, 2002 are not subject to this requirement.

DISINFECTION PROFILE

**§ 141.530 What is a disinfection profile and who must develop one?**

A disinfection profile is a graphical representation of your system's level of *Giardia lamblia* or virus inactivation measured during the course of a year. If you are a subpart H community or non-transient non-community water system which serves fewer than 10,000 persons, your system must develop a disinfection profile unless your State determines that your system's profile is unnecessary. Your State may approve the use of a more representative data set for disinfection profiling than the data set required under §§ 141.532-141.536.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

**§ 141.532 How does my system develop a disinfection profile and when must it begin?**

A disinfection profile consists of three steps:

(a) First, your system must collect data for several parameters from the plant as discussed in § 141.533 over the course of 12 months. If your system serves between 500 and 9,999 persons you must begin to collect data no later than July 1, 2003. If your system serves fewer than 500 persons you must begin to collect data no later than January 1, 2004.

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(b) Second, your system must use this data to calculate weekly log inactivation as discussed in §§141.534 and 141.535; and

(c) Third, your system must use these weekly log inactivations to develop a disinfection profile as specified in § 141.536.

**§ 141.533 What data must my system collect to calculate a disinfection profile?**

Your system must monitor the following parameters to determine the total log inactivation using the analytical methods in §141.74 (a), once per

week on the same calendar day, over 12 consecutive months:

(a) The temperature of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

(b) If your system uses chlorine, the pH of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

(c) The disinfectant contact time(s) ("T") during peak hourly flow; and

(d) The residual disinfectant concentration(s) ("C") of the water before or at the first customer and prior to each additional point of disinfection during peak hourly flow.

**§ 141.534 How does my system use this data to calculate an inactivation ratio?**

Use the tables in §141.74(b)(3)(v) to determine the appropriate CT99.9 value. Calculate the total inactivation ratio as follows, and multiply the value by 3.0 to determine log inactivation of *Giardia lamblia*:

If your system * * *	Your system must determine * * *
(a) Uses only one point of disinfectant application.	(1) One inactivation ratio (CTcalc/CT99.9) before or at the first customer during peak hourly flow or (2) Successive CTcalc/CT99.9 values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, your system must calculate the total inactivation ratio by determining (CTcalc/CT99.9) for each sequence and then adding the (CTcalc/CT99.9) values together to determine (ΣCTcalc/CT99.9).
(b) Uses more than one point of disinfectant application before the first customer.	The (CTcalc/CT99.9) value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow using the procedure specified in paragraph (a)(2) of this section.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

**§ 141.535 What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?**

If your system uses chloramines, ozone, or chlorine dioxide for primary disinfection, you must also calculate the logs of inactivation for viruses and develop an additional disinfection profile for viruses using methods approved by the State.

**§ 141.536 My system has developed an inactivation ratio; what must we do now?**

Each log inactivation serves as a data point in your disinfection profile. Your system will have obtained 52 measurements (one for every week of the year). This will allow your system and the State the opportunity to evaluate how microbial inactivation varied

over the course of the year by looking at all 52 measurements (your Disinfection Profile). Your system must retain the Disinfection Profile data in graphic form, such as a spreadsheet, which must be available for review by the State as part of a sanitary survey. Your system must use this data to calculate a benchmark if you are considering changes to disinfection practices.

**DISINFECTION BENCHMARK**

**§ 141.540 Who has to develop a disinfection benchmark?**

If you are a subpart H system required to develop a disinfection profile under §§141.530 through 141.536, your system must develop a Disinfection Benchmark if you decide to make a significant change to your disinfection

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practice. Your system must consult with the State for approval before you can implement a significant disinfection practice change.

**§ 141.541 What are significant changes to disinfection practice?**

Significant changes to disinfection practice include:

- (a) Changes to the point of disinfection;
- (b) Changes to the disinfectant(s) used in the treatment plant;
- (c) Changes to the disinfection process; or
- (d) Any other modification identified by the State.

**§ 141.542 What must my system do if we are considering a significant change to disinfection practices?**

If your system is considering a significant change to its disinfection

practice, your system must calculate a disinfection benchmark(s) as described in §§141.543 and 141.544 and provide the benchmark(s) to your State. Your system may only make a significant disinfection practice change after consulting with the State for approval. Your system must submit the following information to the State as part of the consultation and approval process:

- (a) A description of the proposed change;
- (b) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) and disinfection benchmark;
- (c) An analysis of how the proposed change will affect the current levels of disinfection; and
- (d) Any additional information requested by the State.

**§ 141.543 How is the disinfection benchmark calculated?**

If your system is making a significant change to its disinfection practice, it must calculate a disinfection benchmark using the procedure specified in the following table.

To calculate a disinfection benchmark your system must perform the following steps

- Step 1: Using the data your system collected to develop the Disinfection Profile, determine the average *Giardia lamblia* inactivation for each calendar month by dividing the sum of all *Giardia lamblia* inactivations for that month by the number of values calculated for that month.
- Step 2: Determine the lowest monthly average value out of the twelve values. This value becomes the disinfection benchmark.

**§ 141.544 What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?**

If your system uses chloramines, ozone or chlorine dioxide for primary disinfection your system must calculate the disinfection benchmark from the data your system collected for viruses to develop the disinfection profile in addition to the *Giardia lamblia* disinfection benchmark calculated under §141.543. This viral benchmark must be calculated in the same manner used to calculate the *Giardia lamblia* disinfection benchmark in § 141.543.

**COMBINED FILTER EFFLUENT REQUIREMENTS**

**§ 141.550 Is my system required to meet subpart T combined filter effluent turbidity limits?**

All subpart H systems which serve populations fewer than 10,000, are required to filter, and utilize filtration other than slow sand filtration or diatomaceous earth filtration must meet the combined filter effluent turbidity requirements of §§141.551-141.553 . If your system uses slow sand or diatomaceous earth filtration you are not required to meet the combined filter effluent turbidity limits of subpart T, but you must continue to meet the combined filter effluent turbidity limits in § 141.73.

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**§ 141.551 What strengthened combined filter effluent turbidity limits must my system meet?**

Your system must meet two strengthened combined filter effluent turbidity limits.

(a) The first combined filter effluent turbidity limit is a "95th percentile" turbidity limit that your system must meet in at least 95 percent of the turbidity measurements taken each month. Measurements must continue to be taken as described in §141.74(a) and (c). Monthly reporting must be completed according to §141.570. The following table describes the required limits for specific filtration technologies.

If your system consists of * * *	Your 95th percentile turbidity value is * * *
(1) Conventional Filtration or Direct Filtration.	0.3 NTU.
(2) All other "Alternative" Filtration .....	A value determined by the State (not to exceed 1 NTU) based on the demonstration described in §141.552.

(b) The second combined filter effluent turbidity limit is a "maximum" turbidity limit which your system may at no time exceed during the month. Measurements must continue to be taken as described in §141.74(a) and (c). Monthly reporting must be completed according to §141.570. The following table describes the required limits for specific filtration technologies.

If your system consists of * * *	Your maximum turbidity value is * * *
(1) Conventional Filtration or Direct Filtration.	1 NTU.
(2) All other "Alternative Filtration" .....	A value determined by the State (not to exceed 5 NTU) based on the demonstration as described in §141.552.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

**§ 141.552 My system consists of "alternative filtration" and is required to conduct a demonstration—what is required of my system and how does the State establish my turbidity limits?**

(a) If your system consists of alternative filtration (filtration other than slow sand filtration, diatomaceous earth filtration, conventional filtration, or direct filtration) you are required to conduct a demonstration (see tables in §141.551). Your system must demonstrate to the State, using pilot plant studies or other means, that your system's filtration, in combination with disinfection treatment, consistently achieves:

- (1) 99 percent removal of *Cryptosporidium* oocysts;
- (2) 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts; and
- (3) 99.99 percent removal and/or inactivation of viruses.

(b) [Reserved]

**§ 141.553 My system practices lime softening—is there any special provision regarding my combined filter effluent?**

If your system practices lime softening, you may acidify representative combined filter effluent turbidity samples prior to analysis using a protocol approved by the State.

INDIVIDUAL FILTER TURBIDITY REQUIREMENTS

**§ 141.560 Is my system subject to individual filter turbidity requirements?**

If your system is a subpart H system serving fewer than 10,000 people and utilizing conventional filtration or direct filtration, you must conduct continuous monitoring of turbidity for each individual filter at your system. The following requirements apply to continuous turbidity monitoring:

- (a) Monitoring must be conducted using an approved method in §141.74(a);
- (b) Calibration of turbidimeters must be conducted using procedures specified by the manufacturer;
- (c) Results of turbidity monitoring must be recorded at least every 15 minutes;
- (d) Monthly reporting must be completed according to §141.570; and

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(e) Records must be maintained according to § 141.571.

**§ 141.561 What happens if my system's turbidity monitoring equipment fails?**

If there is a failure in the continuous turbidity monitoring equipment, your system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is back on-line. Your system has 14 days to resume continuous monitoring before a violation is incurred.

**§ 141.562 My system only has two or fewer filters—is there any special provision regarding individual filter turbidity monitoring?**

Yes, if your system only consists of two or fewer filters, you may conduct continuous monitoring of combined filter effluent turbidity in lieu of individual filter effluent turbidity monitoring. Continuous monitoring must meet the same requirements set forth in § 141.560(a) through (d) and § 141.561.

**§ 141.563 What follow-up action is my system required to take based on continuous turbidity monitoring?**

Follow-up action is required according to the following tables:

If * * *	Your system must * * *
(a) The turbidity of an individual filter (or the turbidity of combined filter effluent (CFE) for systems with 2 filters that monitor CFE in lieu of individual filters) exceeds 1.0 NTU in two consecutive recordings 15 minutes apart.	Report to the State by the 10th of the following month and include the filter number(s), corresponding date(s), turbidity value(s) which exceeded 1.0 NTU, and the cause (if known) for the exceedance(s).

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If a system was required to report to the State * * *	Your system must * * *
(b) For three months in a row and turbidity exceeded 1.0 NTU in two consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters).	Conduct a self-assessment of the filter(s) within 14 days of the day the filter exceeded 1.0 NTU in two consecutive measurements for the third straight month unless a CPE as specified in paragraph (c) of this section was required. Systems with 2 filters that monitor CFE in lieu of individual filters must conduct a self assessment on both filters. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.
(c) For two months in a row and turbidity exceeded 2.0 NTU in 2 consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters).	Arrange to have a comprehensive performance evaluation (CPE) conducted by the State or a third party approved by the State not later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. If a CPE has been completed by the State or a third party approved by the State within the 12 prior months or the system and State are jointly participating in an ongoing Comprehensive Technical Assistance (CTA) project at the system, a new CPE is not required. If conducted, a 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.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

**§ 141.564 My system practices lime softening—is there any special provision regarding my individual filter turbidity monitoring?**

If your system utilizes lime softening, you may apply to the State for alternative turbidity exceedance levels for the levels specified in the table in § 141.563. You must be able to demonstrate to the State that higher turbidity levels are due to lime carryover only, and not due to degraded filter performance.

**REPORTING AND RECORDKEEPING REQUIREMENTS**

**§ 141.570 What does subpart T require that my system report to the State?**

This subpart T requires your system to report several items to the State. The following table describes the items which must be reported and the frequency of

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reporting. Your system is required to report the information described in the following table, if it is subject to the specific requirement shown in the first column.

Corresponding requirement	Description of information to report	Frequency
(a) Combined Filter Effluent Requirements. (§§ 141.550–141.553)	(1) The total number of filtered water turbidity measurements taken during the month.	By the 10th of the following month.
	(2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to your system's required 95th percentile limit.	By the 10th of the following month.
	(3) The date and value of any turbidity measurements taken during the month which exceed the maximum turbidity value for your filtration system.	By the 10th of the following month.
(b) Individual Turbidity Requirements. (§§ 141.560–141.564)	(1) That your system conducted individual filter turbidity monitoring during the month.	By the 10th of the following month.
	(2) The filter number(s), corresponding date(s), and the turbidity value(s) which exceeded 1.0 NTU during the month, and the cause (if known) for the exceedance(s), but only if 2 consecutive measurements exceeded 1.0 NTU.	By the 10th of the following month.
	(3) If a self-assessment is required, the date that it was triggered and the date that it was completed.	By the 10th of the following month (or 14 days after the self-assessment was triggered only if the self-assessment was triggered during the last four days of the month)
	(4) If a CPE is required, that the CPE is required and the date that it was triggered.	By the 10th of the following month.
	(5) Copy of completed CPE report .....	Within 120 days after the CPE was triggered.
(c) Disinfection Profiling ..... (§§ 141.530–141.536)	(1) Results of optional monitoring which show TTHM levels <0.064 mg/l and HAA5 levels <0.048 mg/l (Only if your system wishes to forgo profiling) or that your system has begun disinfection profiling.	(i) For systems serving 500–9,999 by July 1, 2003; (ii) For systems serving fewer than 500 by January 1, 2004.
(d) Disinfection Benchmarking. (§§ 141.540–141.544)	(1) A description of the proposed change in disinfection, your system's disinfection profile for <i>Giardia lamblia</i> (and, if necessary, viruses) and disinfection benchmark, and an analysis of how the proposed change will affect the current levels of disinfection.	Anytime your system is considering a significant change to its disinfection practice.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38857, June 29, 2004]

**§ 141.571 What records does subpart T require my system to keep?**

Your system must keep several types of records based on the requirements of subpart T, in addition to recordkeeping requirements under § 141.75. The following table describes the necessary

records, the length of time these records must be kept, and for which requirement the records pertain. Your system is required to maintain records described in this table, if it is subject to the specific requirement shown in the first column.

Corresponding requirement	Description of necessary records	Duration of time records must be kept
(a) Individual Filter Turbidity Requirements ..... (§§ 141.560–141.564)	Results of individual filter monitoring .....	At least 3 years.
(b) Disinfection Profiling ..... (§§ 141.530–141.536)	Results of Profile (including raw data and analysis) ....	Indefinitely.
(c) Disinfection Benchmarking ..... (§§ 141.540–141.544)	Benchmark (including raw data and analysis) .....	Indefinitely.