

567—43.9(455B) Enhanced filtration and disinfection requirements for SW and IGW systems serving at least 10,000 people.**43.9(1) General requirements.**

a. Applicability. The requirements of this rule constitute national primary drinking water regulations. This rule establishes the filtration and disinfection requirements in addition to the filtration and disinfection requirements in 567—43.5(455B). This rule is applicable to all PWSs using SW or IGW, in whole or in part, and that serve at least 10,000 people. This rule establishes or extends TT requirements in lieu of MCLs for the following contaminants: *Giardia lamblia*, viruses, HPC bacteria, *Legionella*, *Cryptosporidium*, and turbidity. Each SW or IGW system serving at least 10,000 people must provide treatment of its source water that complies with these TT requirements. The TT requirements consist of installing and properly operating water treatment processes that reliably achieve:

(1) At least 99 percent (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by SW runoff and a point downstream before or at the first customer for filtered systems.

(2) Compliance with the profiling and benchmark requirements under 43.9(2).

(3) The department may require other SW or IGW systems to comply with this rule, through an operation permit.

b. Compliance determination. A PWS subject to this rule is considered in compliance with 43.9(1)“a” if it meets the applicable filtration requirements in either 43.5(3) or 43.9(3) and the disinfection requirements in 43.5(2) and 43.6(2).

c. Prohibition of new construction of uncovered intermediate or finished water storage facilities. Systems required to comply with this rule may construct only covered intermediate or finished water storage facilities. For the purposes of this rule, an intermediate storage facility is defined as a storage facility or reservoir after the clarification treatment process.

d. Systems with populations that increased after January 1, 2002, to more than 10,000 people served. Systems using SW or IGW sources that did not conduct optional monitoring under 43.9(2) because they served fewer than 10,000 persons when such monitoring was required, but serve more than 10,000 persons prior to January 1, 2005, must comply with 43.9(1), 43.9(3), 43.9(4), and 43.9(5). These systems must also consult with the department to establish a disinfection benchmark. A system that decides to make a significant change to its disinfection practice as described in 43.9(2)“c”(1)“1” through “4” must consult with the department prior to making such a change.

43.9(2) Disinfection profiling and benchmarking.

a. Determination of systems required to profile. A PWS subject to this rule must determine its total trihalomethane (TTHM) and haloacetic acid (HAA5) annual averages using the procedures listed below. The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring. Both TTHM and HAA5 samples must be collected as paired samples during the same time period in order for each parameter to have the same annual average period for result comparison. A paired sample is one that is collected at the same location and time and is analyzed for both TTHM and HAA5 parameters.

(1) Allowance of information collection rule data. Those systems that collected data under the federal Information Collection Rule in 40 CFR Part 141 must use the results of the TTHM and HAA5 samples collected during the last four quarters of monitoring required under 40 CFR §141.142. The system must have submitted the results of the samples collected during the last 12 months of required monitoring.

(2) Systems that have not collected TTHM and HAA5 data. Those systems that have not collected four consecutive quarters of paired TTHM and HAA5 samples as described above in 43.9(2)“a”(1) must comply with all other provisions of this subrule as if the HAA5 monitoring had been conducted and the results of that monitoring required compliance with 43.9(2)“b.” The system that elects this option must notify the department in writing of its decision.

(3) The department may require that a system use a more representative annual data set than the data set determined under 43.9(2)“a”(1) to determine the applicability of this subrule.

(4) Profiling determination criteria. Any system having either a TTHM annual average greater than 0.064 mg/L or an HAA5 annual average greater than 0.048 mg/L during the period identified in 43.9(2) "a"(1) through "a"(3) must comply with 43.9(2) "b."

b. Disinfection profiling.

(1) Applicability. Any system that meet the criteria in 43.9(2) "a"(4) must develop a disinfection profile of its disinfection practice for a period of up to three years.

(2) Monitoring requirements. A system must monitor daily for a period of 12 consecutive calendar months to determine the total log inactivation for each day of operation, based on the CT_{99,9} values in Tables 1 through 8 in Appendix A, as appropriate, through the entire treatment plant. A system must begin this monitoring as directed by the department. As a minimum, a system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring in "1" through "4" below. A system with more than one point of disinfectant application must conduct the monitoring in "1" through "4" below for each disinfection segment. A system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in 43.5(4) "a," as follows:

1. The temperature of the disinfected water must be measured once per day at each RDC sampling point during peak hourly flow.
2. If the system uses chlorine, the pH of the disinfected water must be measured once per day at each chlorine RDC sampling point during peak hourly flow.
3. The disinfectant contact time(s) ("T") must be determined for each day during peak hourly flow.
4. The RDC(s) ("C") of the water before or at the first customer and prior to each additional point of disinfection must be measured each day during peak hourly flow.

(3) Use of existing data. A system that has existing operational data may use that data to develop a disinfection profile for additional years, in addition to the disinfection profile generated under 43.9(2) "b"(2). Such systems may use these additional yearly disinfection profiles to develop a benchmark under 43.9(2) "c." The department must determine whether these operational data are substantially equivalent to data collected under 43.9(2) "b"(2). These data must be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

(4) Calculation of the total inactivation ratio. The system must calculate the total inactivation ratio as follows, using the CT_{99,9} values from Tables 1 through 8 listed in Appendix A:

1. If the system uses only one point of disinfectant application, it may determine the total inactivation ratio for the disinfection segment using either of the following methods:

- Determine one inactivation ratio ($CT_{\text{calc}}/CT_{99,9}$) before or at the first customer during peak hourly flow; or
- Determine successive $CT_{\text{calc}}/CT_{99,9}$ 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, the system must calculate the total inactivation ratio by determining ($CT_{\text{calc}}/CT_{99,9}$) for each sequence and then adding the ($CT_{\text{calc}}/CT_{99,9}$) values together to determine $\Sigma(CT_{\text{calc}}/CT_{99,9})$.

2. If the system uses more than one point of disinfectant application before the first customer, the system must determine the CT 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. The $CT_{\text{calc}}/CT_{99,9}$ value of each segment and $\Sigma(CT_{\text{calc}}/CT_{99,9})$ must be calculated using a method above in 43.9(2) "b"(4) "1."

3. The system must determine the total log inactivation by multiplying the value calculated above in 43.9(2) "b"(4) "1" or "2" by 3.0.

(5) Systems using chloramines or ozone. A system that uses either chloramines or ozone for primary disinfection must also calculate the log inactivation for viruses using a department-approved method.

(6) Profile retention. The system must retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the department for review as part of sanitary surveys conducted by the department. The department may require the system to submit the data directly or as part of a MOR.

c. Disinfection benchmarking.

(1) Significant change to disinfection practice. Any system required to develop a disinfection profile under 43.9(2) “a” or “b” that decides to make a significant change to its disinfection practice must obtain department approval prior to making such change. Significant changes to disinfection practice are:

1. Changes to the point of disinfection;
2. Changes to the disinfectant(s) used in the treatment plant;
3. Changes to the disinfection process; and
4. Any other modification identified by the department.

(2) Calculation of the disinfection benchmark. Any system that is modifying its disinfection practice must calculate its disinfection benchmark using the procedure specified below:

1. For each year of profiling data collected and calculated under 43.9(2) “b,” the system must determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The system must determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* inactivation by the number of values calculated for that month.

2. The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of the monthly log inactivation of *Giardia lamblia* in each year of profiling data.

(3) A system that uses either chloramines or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a department-approved method.

(4) The system must submit the following information to the department as part of its consultation process:

1. A description of the proposed change;
2. The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) under 43.9(2) “b” and the disinfection benchmark as required by 43.9(2) “c”(2); and
3. An analysis of how the proposed change will affect the current levels of disinfection.

43.9(3) Filtration.

a. Conventional filtration treatment or direct filtration. Turbidity measurements required by this paragraph shall be made in accordance with 43.5(4) “a”(1) and 43.5(4) “b”(1).

(1) Turbidity requirement in 95 percent of samples. For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system’s filtered water (CFE) must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month.

(2) Maximum turbidity level. The turbidity level of representative samples of a system’s filtered water (CFE) must at no time exceed 1 NTU in two consecutive 15 minute recordings. If at any time the CFE turbidity exceeds 1 NTU in two consecutive 15 minute recordings, the system must inform the department as soon as possible, but no later than 24 hours after the exceedance is known, in accordance with the PN requirements in 567—subparagraph 40.5(3) “b”(3).

b. Filtration technologies other than conventional, direct, slow sand, or diatomaceous earth. The department may allow a PWS to use a filtration technology not listed in 43.9(3) “a” or 43.5(3) “c” or “d” if it demonstrates to the department, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of 43.5(2), consistently achieves 99.9 percent removal or inactivation of *Giardia lamblia* cysts, 99.99 percent removal or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts, and the department approves the use of the filtration technology. For each approval, the department will set turbidity performance requirements that the system must meet at least 95 percent of the time and will require that the system not exceed at any time a level that consistently achieves 99.9 percent removal or inactivation of *Giardia lamblia* cysts, 99.99 percent removal or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts.

43.9(4) Filtration sampling.

a. Monitoring requirements for systems using filtration treatment. In addition to monitoring required by 43.5(4), a PWS subject to this rule that provides conventional filtration treatment or direct filtration must conduct continuous turbidity monitoring for each individual filter using an approved method in 43.5(4) “a”(1). Turbidity must be monitored according to a written turbidity protocol approved by the

department and audited for compliance during sanitary surveys. Major elements of the protocol shall include, but are not limited to: sample measurement location; calibration method, frequency, standards, method of verification, and verification frequency; and data collection, recording frequency, and reporting. PWSs must calibrate turbidimeters at least every 90 days with a primary standard. The calibration of each turbidimeter used for compliance must be verified at least once per week with a primary standard, secondary standard, the manufacturer's proprietary calibration confirmation device, or by a department-approved method. If the verification is not within plus or minus 0.05 NTU for measurements of less than or equal to 0.5 NTU, or within plus or minus 10 percent of measurements greater than 0.5 NTU, then the turbidimeter must be recalibrated. Systems must record the results of individual filter monitoring every 15 minutes.

b. Failure of the continuous turbidity monitoring equipment. If there is a failure in the continuous turbidity monitoring equipment, a system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is repaired and back online. A system has a maximum of five working days after failure to repair the equipment, or else it is in violation.

43.9(5) Reporting and recordkeeping.

a. Additional requirements. In addition to the reporting and recordkeeping requirements in 567—paragraph 40.8(3) “c”:

(1) A system subject to this rule that provides conventional filtration treatment or direct filtration must report monthly to the department the information in 43.9(5) “b” and “c”; and

(2) A system subject to this rule that provides filtration approved under 43.9(3) “b” must report monthly to the department the information in 43.9(5) “b.”

b. Turbidity. Turbidity measurements required by 43.9(3) must be reported in a format acceptable to the department and within ten days after the end of each month that the system serves water to the public. This reporting is in lieu of the reporting specified in 567—subparagraph 40.8(3) “c”(1). Information that must be reported includes:

(1) The total number of filtered water (CFE) turbidity measurements taken during the month;

(2) The number and percentage of filtered water (CFE) turbidity measurements taken during the month that are less than or equal to the turbidity limits in 43.9(3) “a” or “b”; and

(3) The date and value of any CFE turbidity measurements taken during the month that exceed 1 NTU in two consecutive recordings taken 15 minutes apart for systems using conventional filtration treatment or direct filtration or that exceed the maximum level set in 43.9(3) “b.”

(4) The dates and summary of calibration and verification of all compliance turbidimeters.

c. Individual filter turbidity monitoring.

(1) Systems must maintain the results of individual filter turbidity per monitoring taken under 43.9(4) for at least three years.

(2) Systems must report to the department that they have conducted individual filter turbidity monitoring under 43.9(4) within ten days after the end of each month that the system serves water to the public.

(3) Systems must report to the department individual filter turbidity measurement results taken under 43.9(4) within ten days after the end of each month that the system serves water to the public only if measurements demonstrate one or more of the conditions in 43.9(5) “c”(5).

(4) Systems that use lime softening may apply to the department for alternative exceedance levels for the levels specified in 43.9(5) “c”(5) if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(5) In all of the following instances, the system must report the filter number, the turbidity measurement, and the date(s) when the exceedance occurred:

1. For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart. In addition, the system must either produce a filter profile for the filter within seven days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced, or report the obvious reason for the exceedance.

2. For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart anytime following the first four hours of continuous filter operation, after the filter has been backwashed or otherwise taken offline. In addition, the system must either produce a filter profile for the filter within seven days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced, or report the obvious reason for the exceedance.

3. For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each month of three consecutive months. In addition, the system must conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self-assessment must consist of an 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.

4. For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each month of two consecutive months. In addition, the system must arrange for a comprehensive performance evaluation to be conducted by the department or a department-approved third party no later than 30 days following the exceedance and have the evaluation completed and submitted to the department no later than 90 days following the exceedance.

d. Additional reporting requirement for turbidity combined filter effluent (CFE). In the following situations, the system must consult with the department as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the PN requirements under 567—subparagraph 40.5(3) “b”(3).

(1) In a system using conventional filtration treatment or direct filtration, if the turbidity exceeds 1 NTU in the CFE in two consecutive recordings taken 15 minutes apart.

(2) If at any time the turbidity in representative samples of filtered water (CFE) exceeds the maximum level in 43.9(3) “b” for filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration.

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