Part XIII
ENHANCED SURFACE WATER TREATMENT

§ 1301 APPLICABILITY

The requirements of this part constitute a primary drinking water regulation. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under Part VIII - General Requirements for Surface Water Treatment. The requirements of this part are applicable to Part VIII systems serving at least 10,000 people, beginning January 01, 2002 unless otherwise specified in this part.

§ 1302 GENERAL REQUIREMENTS

A. The regulations in this part 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.

B. Each Part VIII systems serving at least 10,000 people must provide treatment of its source water that complies with these treatment technique requirements and is in addition to those requirements identified in §§ 801 and 802.

C. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

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

2. Compliance with the profiling and benchmark requirements under the provisions of § 1304.

D. A public water system subject to the requirements of this part is considered to be in compliance with the requirements of paragraphs (A)-(C) of this section if:

1. It meets the requirements for avoiding filtration in §§ 803 and § 1303 and the disinfection requirements in §§ 804 and 1304; or

2. It meets the applicable filtration requirements in either § 805 or § 1305 and the disinfection requirements in §§ 804 and 1304.

E. Systems will not be permitted to begin construction of uncovered finished water storage facilities. The provisions for the review of the design and construction of public water systems, including the final inspection prior to operation, are addressed in § 1500 of these regulations.

F. Part VIII systems that did not conduct optional monitoring under § 1304 because they served fewer than 10,000 persons when such monitoring was required, but serve more than 10,000 persons prior to January 14, 2005 must comply with §§ 1301, 1302, 1303, 1305, 1306, and 1307. These systems must also consult with the Director to establish a disinfection benchmark. A public water system that decides to make a significant change to its disinfection practice, as described in § 1304 (C)(1)(a) through (d) must consult with the Director prior to making such change.

§ 1303 CRITERIA FOR AVOIDING FILTRATION

In addition to the requirements of § 803, a public water system subject to the requirements of this part that does not provide filtration must meet all of the conditions of paragraphs (A) and (B) of this section.

A. Site-specific conditions. In addition to site-specific conditions in § 803(B), systems must maintain the watershed control program under § 803(B)(2) to minimize the potential for contamination by *Cryptosporidium oocysts* in the source water. The watershed control program must, for *Cryptosporidium:*

1. Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

2. Monitor the occurrence of activities which may have an adverse effect on source water quality.

B. During the onsite inspection conducted under the provisions of § 803(B)(3), the Director must

determine whether the watershed control program established under § 803(B)(2) is adequate to limit potential contamination by *Cryptosporidium oocysts*. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of the water system's program to monitor and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within the watershed.

§ 1304 DISINFECTION PROFILING AND BENCHMARKING

A. Determination of systems required to profile. A public water system subject to the requirements of this part must determine its TTHM annual average using the procedure in subsection (A)(1) of this section and its HAA5 annual average using the procedure in subsection (A)(2) of this section. The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring.

1. The TTHM annual average must be the annual average during the same period as is used for the HAA5 annual average.

   a. Those water systems that collected data under the provisions of the Information Collection Rule must use the results of the samples collected during the last four quarters of required monitoring under 40 CFR § 141.142.

   b. Those systems that use "grandfathered" HAA5 occurrence data that meet the provisions of subsection (A)(2)(b) of this section must use TTHM data collected at the same time under the provisions of §§ 210 and 413.

   c. Those systems that use HAA5 occurrence data that meet the provisions of subsection (A)(2)(c)(i) of this section must use TTHM data collected at the same time under the provisions of §§ 210 and 413.

2. The HAA5 annual average must be the annual average during the same period as is used for the TTHM annual average.

   a. Those systems that collected data under the provisions of the Information Collection Rule must use the results of the samples collected during the last four quarters of required monitoring under 40 CFR § 141.142.

   b. Those systems that have collected four quarters of HAA5 occurrence data that meets the routine monitoring sample number and location requirements for TTHM in §§ 210 and 413 and handling and analytical method requirements of 40 CFR § 141.142(b)(1) may use those data to determine whether the requirements of this section apply.

   c. Those water systems that have not collected four quarters of HAA5 occurrence data that meets the provisions of either subsection (A)(2)(a) or (b) of this section must either:

      i. Conduct monitoring for HAA5 that meets the routine monitoring sample number and location requirements for TTHM in §§ 210 and 413 and handling and analytical method requirements of 40 CFR § 141.142(b)(1) to determine the HAA5 annual average and whether the requirements of subsection (B) of this section apply. This monitoring must be completed so that the applicability determination can be made; or

      ii. Comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with subsection (B) of this section.

3. The system may request that the Director approve a more representative annual data set than the data set determined under subsection (A)(1) or (2) of this section for the purpose of determining applicability of the requirements of this section.

4. The Director may require that a system use a more representative annual data set than the data set determined under subsection (A)(1) or (2) of this section for the purpose of determining applicability of the requirements of this section.

5. The system must submit data to the Director on the schedule in subsections (A)(5)(a) through (e) of this section.

   a. Those systems that collected TTHM and HAA5 data under the provisions of the Information Collection Rule, as required by subsections (A)(1)(a) and (A)(2)(a) of this section, must submit the results of the samples collected during the last 12 months of required monitoring under 40 CFR § 141.142.

b. Those systems that have collected four consecutive quarters of HAA5 occurrence data that meets the routine monitoring sample number and location for TTHM in §§ 210 and 413 and handling and analytical method requirements of 40 CFR § 141.142(b)(1), as allowed by subsections (A)(1)(b) and (A)(2)(b) of this section, must submit those data to the Director. Until the Director has approved the data, the water system must conduct monitoring for HAA5 using the monitoring requirements specified under subsection (A)(2)(c) of this section.

c. Those systems that conduct monitoring for HAA5 using the monitoring requirements specified by subsections (A)(1)(c) and (A)(2)(c)(i) of this section, must submit TTHM and HAA5 data not later than March 31, 2000.

d. Those systems that elect to comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with this section, as allowed under subsections (A)(2)(c)(ii) of this section, must notify the Director in writing of their election.

e. If the system elects to request that the Director approve a more representative annual data set than the data set determined under subsection (A)(2)(a) of this section, the water system must submit this request in writing.

6. Any system having either a TTHM annual average ≥0.064 mg/L or an HAA5 annual average ≥0.048 mg/L during the period identified in subsections (A)(1) and (2) of this section must comply with subsection (B) of this section.

B. Disinfection profiling.

1. Any system that meets the criteria in subsection (A)(6) of this section must develop a disinfection profile of its disinfection practice for a period of up to three years.

2. The system must monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the $CT_{99.9}$ values in Appendix D - Tables 800-D-4 to 800-D-11, as appropriate, through the entire treatment plant. This water system must begin this monitoring not later than April 01, 2000, pursuant to 40 CFR §141.172(b)(2). As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring in subsections (B)(2)(a) through (d) of this section. A system with more than one point of disinfectant application must conduct the monitoring in subsections (B)(2)(a) through (d) of this section for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in Appendix D § 801-D(A), as follows:

a. The temperature of the disinfected water must be measured once per day at each residual disinfectant concentration sampling point during peak hourly flow.

b. If the system uses chlorine, the pH of the disinfected water must be measured once per day at each chlorine residual disinfectant concentration sampling point during peak hourly flow.

c. The disinfectant contact time(s) (“T”) must be determined for each day during peak hourly flow.

d. The residual disinfectant concentration(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. In lieu of the monitoring conducted under the provisions of subsection (B)(2) of this section to develop the disinfection profile, the system may elect to meet the requirements of subsection (B)(3)(a) of this section. In addition to the monitoring conducted under the provisions of subsection (B)(2) of this section to develop the disinfection profile, the water system may elect to meet the requirements of subsection (B)(3)(b) of this section.

a. A system that has three years of existing operational data may submit those data, a profile generated using those data, and a request that the Director approve use of those data in lieu of monitoring under the provisions of subsection (B)(2) of this section not later than March 31, 2000. The Director must determine whether these operational data are substantially equivalent to data collected under the provisions of subsection (B)(2) of this section. These data must also be representative of *Giardia lamblia* inactivation through the entire treatment plant and not just of certain treatment segments. Until the Director approves this request, the water system is required to conduct monitoring under the provisions of subsection (B)(2) of this section.

b. In addition to the disinfection profile generated under subsection (B)(2) of this section, a PWS that has existing operational data may use those data to develop a disinfection profile for additional years. Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of subsection (C) of this section. The Director must determine whether these operational data are substantially equivalent to data collected under the provisions of subsection (B)(2) of this section. These data must also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

4. The system must calculate the total inactivation ratio as follows:

a. If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio for the disinfection segment based on either of the methods in subsection (B)(4)(a)(i) or (B)(4)(a)(ii) of this section.

i. Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.

ii. Determine successive $CTcalc/CT_{99.9}$ 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 water system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine ($\Sigma\ (CTcalc/CT_{99.9})$.

b. 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 ($CTcalc/CT_{99.9}$) value of each segment and ($\Sigma(CTcalc/CT_{99.9})$) must be calculated using the method in subsection (B)(4)(a) of this section.

c. The system must determine the total logs of inactivation by multiplying the value calculated in subsection (B)(4)(a) or (b) of this section by 3.0.

5. A system that uses either chloramines or ozone for primary disinfection must also calculate the logs of inactivation for viruses using a method approved by the Director.

6. The system must retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the Director for review as part of sanitary surveys conducted by the Director.

C. Disinfection benchmarking.

1. Any system required to develop a disinfection profile under the provisions of subsections (A) and (B) of this section and that decides to make a significant change to its disinfection practice must consult with the Director prior to making such change. Significant changes to disinfection practice are:

a. Changes to the point of disinfection;

b. Changes to the disinfectant(s) used in the treatment plant;

c. Changes to the disinfection process; and

d. Any other modification identified by the Director.

2. Any system that is modifying its disinfection practice must calculate its disinfection benchmark using the procedure specified in subsections (C)(2)(a) through (b) of this section.

a. For each year of profiling data collected and calculated under subsection (B) of this section, 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* of inactivation by the number of values calculated for that month.

b. The disinfection benchmark is the lowest monthly average value (for water 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 logs of *Giardia lamblia* inactivation 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 method approved by the Director.

4. The system must submit information in subsections (C)(4)(a) through (c) of this section to the Director as part of its consultation process.

   a. A description of the proposed change;

   b. The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) under subsection (B) of this section and benchmark as required by subsection (C)(2) of this section; and

   c. An analysis of how the proposed change will affect the current levels of disinfection.

§ 1305 FILTRATION

A public water system subject to the requirements of this part that does not meet all of the criteria in this part and Part VIII for avoiding filtration must provide treatment consisting of both disinfection, as specified in § 804(B), and filtration treatment which complies with the requirements of subsection (A) or (B) of this section or § 805 (B) or (C) by December 31, 2001.

A. Conventional filtration treatment or direct filtration.

1. For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system’s filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in Appendix D § 801-D(A) and (C).

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU, measured as specified in Appendix D §801-D (A) and (C).

3. A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the Director.

B. Filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration. A system may use a filtration technology not listed in subsection (A) of this section or in § 805(B) or (C) if it demonstrates to the Director, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of § 804(B), consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium oocysts*, and the Director approves the use of the filtration technology. For each approval, the Director will set turbidity performance requirements that the system must meet at least 95 percent of the time and that the system may not exceed at any time at a level that consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium oocysts.*

§ 1306 FILTRATION SAMPLING REQUIREMENTS

A. Monitoring requirements for systems using filtration treatment. In addition to monitoring required by Appendix D, a system subject to the requirements of this part that provides conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in Appendix D §801-D (A) and must calibrate turbidimeters using the procedure specified by the manufacturer. Systems must record the results of individual filter monitoring every 15 minutes.

B. If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment.

§ 1307 REPORTING AND RECORDKEEPING REQUIREMENTS

In addition to the reporting and recordkeeping requirements in § 806, a system subject to the requirements of this part that provides conventional filtration treatment or direct filtration must report monthly to the Director the information specified in subsections (A) and (B) of this section beginning the first of the month following the month that these regulations become effective. In addition to the reporting and recordkeeping requirements in § 806, a water system subject to the requirements of this part that provides filtration approved under § 1305(B) must report monthly to the

Director the information specified in subsection (A) of this section beginning the first of the month following the month that these regulations become effective. The reporting in subsection (A) of this section is in lieu of the reporting specified in § 806(B)(1).

A. Turbidity measurements as required by § 1305 must be reported within 10 days after the end of each month that the system serves water to the public. Information that must be reported includes:

1. The total number of filtered water turbidity measurements taken during the month.

2. The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in § 1305(A) or (B).

3. The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the Director under § 1305(B).

B. Systems must maintain the results of individual filter monitoring taken under § 1306 for at least three years. Water systems must report that they have conducted individual filter turbidity monitoring under § 1306 within 10 days after the end of each month the system serves water to the public. Systems must report individual filter turbidity measurement results taken under § 1306 within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions in subsections (B)(1) through (4) of this section. Systems that use lime softening may apply to the Director for alternative exceedance levels for the levels specified in subsections (B)(1) through (4) of this section if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

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, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 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 at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 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 of three consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. 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 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.

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 of two consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must arrange for the conduct of a comprehensive performance evaluation by the Director or a third party approved by the Director no later than 30 days following the exceedance and have the evaluation completed and submitted to the Director no later than 90 days following the exceedance.

C. Additional Reporting Requirements.

1. If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system must inform the Director as soon as possible, but no later than the end of the next business day.

2. If at any time the turbidity in representative samples of filtered water exceeds the maximum level set by the Director under § 1305 (B) for filtration technologies other than

conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system must inform the Director as soon as possible, but no later than the end of the next business day.