PART XI
DISINFECTANT RESIDUALS, DISINFECTION BYPRODUCTS AND DISINFECTION BYPRODUCT PRECURSORS

§ 1101 PURPOSE

A. The requirements of this part constitute NNPDWR and outline the Disinfectant Residuals, Disinfection Byproducts and Disinfection Byproduct Precursors regulations.

1. The regulations in this part establish criteria under which CWSs and NTNCWSs that add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet MCLs and MRDLs in §§ 207 and 208, respectively, and must meet the treatment technique requirements for disinfection byproduct precursors in § 1106.

2. The regulations in this part establish criteria under which TNCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in § 208.

3. EPA has established MCLs for TTHM and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform; bromodichloromethane; dibromochloromethane; bromoform; dichloroacetic acid; and trichloroacetic acid.

§ 1102 COMPLIANCE DATES

Notwithstanding the provisions of § 107, this part applies only to CWSs and NTNCWSs.

A. Compliance dates.

1. CWSs and NTNCWSs. Unless otherwise noted, systems must comply with the requirements of this part. CWSs and NTNCWSs that are subject to Part VIII and that serve 10,000 or more persons must comply with this part upon the effective date of these regulations. CWSs and NTNCWSs that are subject to Part VIII and that serve fewer than 10,000 persons and CWSs and NTNCWSs using only ground water not under the direct influence of surface water must comply with this part beginning January 01, 2004.

2. TNCWSs that are subject to Part VIII, that serve 10,000 or more persons and that use chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide and chlorite in this part. TNCWSs that are subject to Part VIII, that serve fewer than 10,000 persons and that use chlorine dioxide as a disinfectant or oxidant and TNCWSs, using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide and chlorite in this part beginning January 01, 2004.

B. Each CWS and NTNCWS regulated under §1101 of this section must be operated by qualified personnel who meet the requirements specified in § 1400 of these regulations and are included in a NNEPA register of qualified operators.

C. Control of disinfectant residuals. Notwithstanding the MRDLs in § 208, systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

§ 1103 MONITORING REQUIREMENTS

A. General requirements.

1. Systems must take all samples during normal operating conditions.

2. Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required, with Director approval in accordance with criteria developed under 40 CFR § 142.16(h)(5).

3. Failure to monitor in accordance with the monitoring plan required under subsection (F) of this section is a monitoring violation.

4. Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or

quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.

5. Systems may use only data collected under the provisions of this part to qualify for reduced monitoring.

B. Monitoring requirements for disinfection byproducts.

1. TTHMs and HAA5.

a. Routine monitoring. Systems must monitor at the frequency indicated in the following table:

Table 1100.1 Routine Monitoring Frequency for TTHM and HAA5

Type of System	Minimum monitoring frequency	Sample location in the distribution system
Part VIII - Surface Water Treatment system serving at least 10,000 persons.	Four water samples per quarter per treatment plant.	At least 25 percent of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of persons served, different sources of water, and different treatment methods.[1]
Part VIII - Surface Water Treatment system serving from 500 to 9,999 persons.	One water sample per quarter per treatment plant.	Locations representing maximum residence time.[1]
Part VIII - Surface Water Treatment system serving fewer than 500 persons.	One sample per year per treatment plant during month of warmest water temperature.	Locations representing maximum residence time.[1] If the sample (or average of annual samples, if more than one sample is taken) exceeds MCL, system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until system meets reduced monitoring criteria in subsection (B)(1)(d) of this section.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	One water sample per quarter per treatment plant[2].	Locations representing maximum residence time.[1]
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.	One sample per year per treatment plant [2] during month of warmest water temperature.	Locations representing maximum residence time.[1] If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until system meets criteria in subsection (B)(1)(d) of this section for reduced monitoring.

[1] If a system elects to sample more frequently than the minimum required, at least 25 percent of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

[2] Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with Director approval in accordance with criteria developed under 40 CFR § 142.16(h)(5).

b. Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

Table 1100.2 Reduced Monitoring Frequency for TTHM and HAA5

Type of system	Minimum monitoring frequency	Sample location in the distribution system
Part VIII-General Requirements for Surface Water Treatment system serving at least 10,000 persons which has a source water annual average Total Organic Carbon, "TOC", level, before any treatment, ≤4.0 mg/L.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One sample per treatment plant per quarter at distribution system location reflecting maximum residence time.
Part VIII-General Requirements for Surface Water Treatment system serving from 500 to 9,999 persons which has a source water annual average TOC level, before any treatment, ≤4.0 mg/L.	TTHM annual average≤0.040 mg/L and HAA5 annual average≤0.030 mg/L.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. NOTE: Any Part VIII-Surface Water Treatment system serving fewer than 500 persons may not reduce its monitoring to less than one sample per treatment plant per year.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L for two consecutive years OR TTHM annual average ≤0.020 mg/L and HAA5 annual average ≤0.015 mg/L for one year.	One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring.

c. Monitoring requirements for source water TOC. In order to qualify for reduced monitoring in TTHM and HAA5 under paragraph (B)(1)(b) of this section, Part VIII systems not monitoring under the provisions of subsection (D) of this section must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the Director. In addition to meeting other criteria for reduced monitoring in paragraph (B)(1)(b) of this section, the source water TOC running annual average must be ≤4.0mg/L on a continuing basis at each treatment plant. To reduce or remain on reduced monitoring for TTHM and HAA5 under paragraph (B)(1)(b) of this section, a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

d. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more than 0.060mg/L and 0.045mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (B)(1)(a) of this section (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060mg/L or 0.045mg/L for TTHMs and HAA5s, respectively. For systems using only ground water not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHM annual average is >0.080mg/L or the HAA5 annual average is >0.060mg/L, the system must go to the increased monitoring identified in paragraph (B)(1)(a) of this section (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080mg/L or 0.060 mg/L for TTHMs or HAA5 respectively.

e. Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring, their TTHM annual average is ≤0.060 mg/L and their HAA5 annual average is ≤0.045 mg/L.

f. The Director may return a system to routine monitoring at the Director's discretion.

2. Chlorite. CWS and NTNCWS water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.

a. Routine monitoring.

i. Daily monitoring. Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by subsection (B)(2)(b) of this section, in addition to the sample required at the entrance to the distribution system.

ii. Monthly monitoring. Systems must take a three-sample set each month in the distribution system. The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under subsection (B)(2)(b) of this section to meet the requirement for monitoring in this subsection.

b. Additional monitoring. On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

c. Reduced monitoring.

i. Chlorite monitoring at the entrance to the distribution system required by subsection (B)(2)(a)(i) of this section may not be reduced.

ii. Chlorite monitoring in the distribution system required by subsection (B)(2)(a)(ii) of this section may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under subsection (B)(2)(a)(ii) of this section has exceeded the chlorite MCL and the system has not been required to conduct monitoring under subsection (B)(2)(b) of this section. The system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under subsection (B)(2)(a)(ii) of this section exceeds the chlorite MCL or the system is required to conduct monitoring under subsection (B)(2)(b) of this section, at which time the system must revert to routine monitoring.

3. Bromate.

a. Routine monitoring. CWS and NTNCWS systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.

b. Reduced monitoring.

i. Until March 31, 2009, systems required to analyze for bromate may reduce monitoring from monthly to once per quarter, if the system's average source water bromide concentration is less than 0.05 mg/L based upon representative monthly bromide measurements for one year. The system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/L based upon representative monthly measurements. If the running annual average source water bromide concentration is ≥0.05 mg/L, the system must resume routine monitoring required by subsection (B)(3)(a) of this section in the following month.

ii. Beginning April 1, 2009, systems may no longer use the provision of paragraph (B)(3)(b)(i) of this section to qualify for reduced monitoring. A system required to analyze for bromate may reduce monitoring from monthly to quarterly if the system's running annual average bromate concentration is ≤0.0025mg/L based on monthly bromate measurements under paragraph (B)(3)(a) of this section for the most recent four quarters, with samples analyzed using Method 317.0 Revision 2.0, 326.0, or 321.8. If a system has qualified for reduced bromate monitoring under paragraph (B)(3)(b)(i) of

this section, that system may remain on reduced monitoring as long as the running annual average or quarterly bromate samples are ≤0.0025mg/L based on samples analyzed using Method 317.0 Revision 2.0, 326.0, or 321.8. If the running annual average bromate concentration is >0.0025mg/L, the system must resume routine monitoring required by paragraph (B)(3)(a) of this section.

C. Monitoring requirements for disinfectant residuals.

1. Chlorine and chloramines.

a. Routine monitoring. CWS and NTNCWS systems that use chlorine or chloramines must measure the residual disinfectant level at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in § 404. Part VIII systems may use the results of residual disinfectant concentration sampling conducted under Appendix D § 801-D (B) for unfiltered systems or Appendix D § 801-D(C) for systems which filter, in lieu of taking separate samples.

b. Reduced monitoring. Monitoring may not be reduced.

2. Chlorine dioxide.

a. Routine monitoring. CWS, NTNCWS, and TNCWS systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by subsection (C)(2)(b) of this section, in addition to the sample required at the entrance to the distribution system.

b. Additional monitoring. On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three (3) chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three (3) samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the system must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

c. Reduced monitoring. Chlorine dioxide monitoring may not be reduced.

D. Monitoring requirements for disinfection byproduct precursors (DBPP).

1. Routine monitoring. Part VIII systems which use conventional filtration treatment (as defined in § 104) must monitor each treatment plant for Total Organic Carbon, "TOC", no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this subsection (D)(1) must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

2. Reduced monitoring. Part VIII systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC ≥2.0 mg/L.

E. Bromide. Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

F. Monitoring plans. Each system required to monitor under this part must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Director and the general public no later than 30 days following the applicable compliance

dates in §1102 (A). All Part VIII systems serving more than 3,300 people must submit a copy of the monitoring plan to the Director no later than the date of the first report required under §1105. The Director may also require the plan to be submitted by any other system. After review, the Director may require changes in any plan elements. The plan must include at least the following elements.

1. Specific locations and schedules for collecting samples for any parameters included in this part.

2. How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

3. If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions Part XIX, the sampling plan must reflect the entire distribution system.

§ 1104 COMPLIANCE REQUIREMENTS

A. General requirements.

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHM, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's ~~fails~~ failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.

2. All samples taken and analyzed under the provisions of this part must be included in determining compliance, even if that number is greater than the minimum required.

3. If, during the first year of monitoring under § 1103, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

B. Disinfection byproducts

1. TTHMs and HAA5

a. For systems monitoring quarterly, compliance with MCLs in § 207 must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by § 1103(B)(1).

b. For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of § 1103(B)(1) does not exceed the MCLs in § 207. If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant and such a system is not in violation of the MCL until it has completed one year of quarterly monitoring, unless the results of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring.

c. If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to § 603, in addition to reporting to the Director pursuant to § 1105.

d. If a public water system fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter period must be based on an average of the available data.

2. Bromate. Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average of all samples taken during the month) collected by the system as prescribed by § 1103(B)(3). If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to § 603, in addition to reporting to the Director pursuant to § 1105. If a public water system fails to complete 12 consecutive months' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

3. Chlorite. Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by § 1103(B)(2)(a)(ii) and § 1103(B)(2)(b). If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to § 603, in addition to reporting to the Director pursuant to § 1105.

C. Disinfectant residuals.

1. Chlorine and chloramines.

a. Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under § 1103(C)(1). If the average of quarterly averages covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to § 603, in addition to reporting to the Director pursuant to § 1105.

b. In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to § 1105 must clearly indicate which residual disinfectant was analyzed for each sample.

2. Chlorine dioxide.

a. Acute violations. Compliance must be based on consecutive daily samples collected by the system under § 1103(C)(2). If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and must notify the public pursuant to the procedures for acute health risks in § 603 in addition to reporting to the Director pursuant to § 1105. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under § 603 in addition to reporting to the Director pursuant to § 1105.

b. Nonacute violations. Compliance must be based on consecutive daily samples collected by the system under §1103(C)(2). If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in § 603 in addition to reporting to the Director pursuant to §1105. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under § 603 in addition to reporting to the Director pursuant to §1105.

D. Disinfection byproduct precursors (DBPP). Compliance must be determined as specified by § 1106(C). Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in §1106(B)(2) and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to §1106(B)(3) and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under §1106(C)(1)(d) is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to Part VI of these regulations, in addition to reporting to the Director pursuant to § 1105.

§ 1105 REPORTING AND RECORDKEEPING REQUIREMENTS

A. Systems required to sample quarterly or more frequently must report to the Director within 10 days after the end of each quarter in which samples were collected, notwithstanding the provisions of § 502. Systems required to sample less frequently than quarterly must report to the Director within 10 days after the end of each monitoring period in which samples were collected.

B. Disinfection byproducts. Systems must report the information specified in the following table:

Type of system	Report requirements[1]
System monitoring for TTHM and HAA5 under the requirements of § 1103(B) on a quarterly or more frequent basis.	1. The number of samples taken during the last quarter. 2. The location, date, and result of each sample taken during the last monitoring period. 3. The arithmetic average of all samples taken in the last quarter. 4. The annual arithmetic average of the quarterly arithmetic averages of this section for the last four quarters. 5. Whether, based on § 1104 (B)(1), the MCL was violated.
System monitoring for TTHMs and HAA5 under the requirements of § 1103(B) less frequently than quarterly (but at least annually).	1. The number of samples taken during the last year. 2. The location, date, and result of each sample taken during the last monitoring period. 3. The arithmetic average of all samples taken over the last year. 4. Whether, based on § 1104 (B)(1), the MCL was violated.
System monitoring for TTHMs and HAA5 under the requirements of § 1103(B) less frequently than annually.	1. The location, date, and result of each sample taken. 2. Whether, based on § 1104 (B)(1), the MCL was violated.
System monitoring for chlorite under the requirements of § 1103(B).	1. The number of entry point samples taken each month for the last 3months. 2. The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. 3. For each month in the reporting period, the arithmetic average of all samples taken in each three samples set taken in the distribution system. 4. Whether, based on § 1104 (B)(3), the MCL was violated, and in which month, and how may times it was violated each month.
System monitoring for bromate under the requirements of § 1103(B)	1. The number of samples taken during the last quarter. 2. The location, date, and result of each sample taken during the last quarter. 3. The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. 4. Whether, based on § 1104 (B)(2), the MCL was violated.

[1] The Director may choose to perform calculations and determine whether the MCL was exceeded, in lieu of having the system report that information.

C. Disinfectants. Systems must report the information specified in the following table:

Type of system	Report requirements[1]
System monitoring for chlorine or chloramines under the requirements of § 1103(C).	1. The number of samples taken during each month of the last quarter. 2. The monthly arithmetic average of all samples taken in each month for the last 12 months. 3. The arithmetic average of the monthly averages for the last 12 months. 4. Whether, based on § 1104 (C)(1), the MRDL was violated.

System monitoring for chlorine dioxide under the requirements of § 1103(C).	1. The dates, results, and locations of samples taken during the last quarter. 2. Whether, based on § 1104 (C)(2), the MRDL was violated. 3. Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

[1] The Director may choose to perform calculations and determine whether the MRDL was exceeded, in lieu of having the system report that information.

D. Disinfection byproduct precursors and enhanced coagulation or enhanced softening. Systems must report the information specified in the following table:

Type of system	Report requirements[1]
System monitoring monthly or quarterly for TOC under the requirements of § 1103(D) and required to meet the softening requirements in § 1106(B)(2) or (3).	1. The number of paired (source water and treated water, prior to continuous enhanced coagulation or enhanced disinfection) samples taken during the last quarter. 2. The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. 3. For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal. 4. Calculations for determining compliance with the TOC percent removal requirements, as provided in § 1106(C)(1). 5. Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in § 1106(B) for the last four quarters.
System monitoring monthly or quarterly for TOC under the requirements of §1103(D) and meeting one or more of the alternative compliance criteria in §1106(A)(2) or (3).	1. The alternative compliance criterion that the system is using. 2. The number of paired samples taken during the last quarter. 3. The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. 4. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in § 1106(A)(2)(a) or (c) or of treated water TOC for systems meeting the criterion in §1106(A)(2)(b). 5. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in § 1106(A)(2)(e) or of treated water SUVA for systems meeting the criterion in §1106(A)(2)(f). 6. The running annual average of source water alkalinity for systems meeting the criterion in § 1106(A)(2)(c) and of treated water alkalinity for systems meeting the criterion in §1106(A)(3)(a). 7. The running annual average for both TTHM and HAA5 for systems meeting the criterion in § 1106(A)(2)(c) or (d). 8. The running annual average of the amount of magnesium hardness removal (as $CaCO_3$, in mg/L) for systems meeting the criterion in § 1106(A)(3)(b). 9. Whether the system is in compliance with the particular alternative compliance criterion in § 1106(A)(2) or (3).

[1] The Director may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

§ 1106 TREATMENT TECHNIQUE FOR CONTROL OF DISINFECTION BYPRODUCT (DBP) PRECURSORS

A. Applicability

1. Part VIII systems using conventional filtration treatment (as defined in § 104) must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal

levels specified in subsection (B) of this section unless the system meets at least one of the alternative compliance criteria listed in subsection (A)(2) or (A)(3) of this section.

2. Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Part VIII systems using conventional filtration treatment may use the alternative compliance criteria in subsections (A)(2)(a) through (f) of this section to comply with this section in lieu of complying with subsection (B) of this section. Systems must still comply with monitoring requirements in § 1103(D).

   a. The system's source water TOC level, measured according to Appendix E § 1101-E (D)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

   b. The system's treated water TOC level, measured according to Appendix E § 1101-E (D)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

   c. The system's source water TOC level, measured as required by Appendix E § 1101-E (D)(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to Appendix E § 1101-E (D)(1), is greater than 60 mg/L (as $CaCO_3$), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in § 1101(B), the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in § 1101(B) to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Director for approval not later than the effective date for compliance in § 1101(B). These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation NNPDWR.

   d. The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

   e. The system's source water SUVA, prior to any treatment and measured monthly according to Appendix E § 1101-E (D)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

   f. The system's finished water SUVA, measured monthly according to Appendix E § 1101-E (D)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

3. Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by subsection (B)(2) of this section may use the alternative compliance criteria in subsections (A)(3)(a) and (b) of this section in lieu of complying with subsection (B) of this section. Systems must still comply with monitoring requirements in § 1103(D).

   a. Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as $CaCO_3$), measured monthly according to Appendix E § 1101-E(D)(1) and calculated quarterly as a running annual average.

   b. Softening that results in removing at least 10 mg/L of magnesium hardness (as $CaCO_3$), measured monthly according to Appendix E-1103-E (D)(6) and calculated quarterly as an annual running average.

B. Enhanced coagulation and enhanced softening performance requirements.

1. Systems must achieve the percent reduction of TOC specified in subsection (B)(2) of this section between the source water and the combined filter effluent, unless the Director approves a system's request for alternate minimum TOC removal (Step 2) requirements under subsection (B)(3) of this section.

2. Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with Appendix E § 1101-E (D). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening for Part VIII

General Requirements for Surface Water Treatment Systems Using Conventional Treatment [1,2]

Source-water TOC, mg/L	Source water alkalinity, mg/L as $CaCO_3$		
	0-60 (%)	≤60-120 (%)	>120[3] (%)
>2.0-4.0	35.0	25.0	15.0
>4.0-8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

[1] Systems meeting at least one of the conditions in subsection (A)(2)(a)-(f) of this section are not required to operate with enhanced coagulation.
[2] Softening systems meeting one of the alternative compliance criteria in subsection (A)(3) of this section are not required to operate with enhanced softening.
[3] Systems practicing softening must meet the TOC removal requirements in this column.

3. Part VIII conventional treatment systems that cannot achieve the Step 1 TOC removals required by subsection (B)(2) of this section due to water quality parameters or operational constraints must apply to the Director, within three months of failure to achieve the TOC removals required by subsection (B)(2) of this section, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Director approves the alternative minimum TOC removal (Step 2) requirements, the Director may make those requirements retroactive for the purposes of determining compliance. Until the Director approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in subsection (B)(2) of this section.

4. Alternate minimum TOC removal (Step 2) requirements. Applications made to the Director by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under subsection (B)(3) of this section must include, as a minimum, results of bench- or pilot-scale testing conducted under subsection (B)(4)(a) of this section and used to determine the alternate enhanced coagulation level.

a. Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in subsections (B)(4)(a) through (e) of this section such that an incremental addition of 10 mg/L of alum (as aluminum or equivalent amount of ferric salt) results in a TOC removal of <0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Director, this minimum requirement supersedes the minimum TOC removal required by the table in subsection (B)(2) of this section. This requirement will be effective until such time as the Director approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve Director-set alternative minimum TOC removal levels is a violation of NNPDWR.

b. Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (as aluminum or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

Enhanced Coagulation Step 2 target pH

Alkalinity (mg/L as $CaCO_3$)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

c. For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (as aluminum or equivalent addition of iron coagulant) is reached.

d. The system may operate at any coagulant dose or pH necessary (consistent with other NNPDWRs) to achieve the minimum TOC percent removal approved under subsection (B)(3) of this section.

e. If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced

coagulation. The system may then apply to the Director for a waiver of enhanced coagulation requirements.

C. Compliance calculations.

1. Part VIII systems other than those identified in subsection (A)(2) or (A)(3) of this section must comply with requirements contained in subsection (B)(2) or (B)(3) of this section. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

a. Determine actual monthly TOC percent removal, equal to:

(1- (treated water TOC/source water TOC)) x 100

b. Determine the required monthly TOC percent removal (from either the table in subsection (B)(2) or (B)(3) of this section).

c. Divide the value in subsection (C)(1)(a) of this section by the value in subsection (C)(1)(b) of this section.

d. Add together the results of subsection (C)(1)(c) of this section for the last 12 months and divide by 12.

e. If the value calculated in subsection (C)(1)(d) of this section is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

2. Systems may use the provisions in subsections (C)(2)(a) through (e) of this section in lieu of the calculations in subsection (C)(1)(a) through (e) of this section to determine compliance with TOC percent removal requirements.

a. In any month that the system's treated or source water TOC level, measured according to Appendix E § 1101-E (D)(3), is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subsection (C)(1)(c) of this section) when calculating compliance under the provisions of subsection (C)(1) of this section.

b. In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in subsection (C)(1)(c) of this section) when calculating compliance under the provisions of subsection (C)(1) of this section.

c. In any month that the system's source water SUVA, prior to any treatment and measured according to Appendix E § 1101-E (D)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subsection (C)(1)(c) of this section) when calculating compliance under the provisions of subsection (C)(1) of this section.

d. In any month that the system's finished water SUVA, measured according to Appendix E § 1101-E (D)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subsection (C)(1)(c) of this section) when calculating compliance under the provisions of subsection (C)(1) of this section.

e. In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in subsection (C)(1)(c) of this section) when calculating compliance under the provisions of subsection (C)(1) of this section.

3. Part VIII systems using conventional treatment may also comply with the requirements of this section by meeting the criteria in subsection (A)(2) or (3) of this section.

D. Treatment technique requirements for DBP precursors. The Administrator identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For Part VIII systems using conventional treatment, enhanced coagulation or enhanced softening.