

61-58.13

Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors (Stage 1 Disinfectants and Disinfection Byproducts Rule)

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A. Applicability.

This regulation establishes criteria and requirements for the control of disinfectants, disinfection byproducts and disinfection byproduct precursors for community water systems (CWSs) and non-transient, non-community water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process. In addition, this regulation establishes criteria and requirements for the control of chlorine dioxide for non-community water systems (NCWSs) that use chlorine dioxide as a disinfectant or oxidant in any part of the drinking water treatment process.

B. General Requirements.

(1) The requirements of this regulation constitute national primary drinking water regulations. This regulation establishes criteria under which community water systems (CWSs) and non-transient, non-community water systems (NTNCWSs) which 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 R.61-58.5.P and R.61-58.5.Q, respectively, and must meet the treatment technique requirements for disinfection byproduct precursors in Section F of this regulation.

In addition, this regulation establishes criteria under which transient non-community water systems (NCWSs) that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in R.61-58.5.Q.

(2) Compliance Dates - Unless otherwise noted, systems must comply with the requirements of this regulation as follows:

(a) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve 10,000 or more persons must comply with this regulation beginning January 1, 2002. CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this regulation beginning January 1, 2004.

(b) Transient NCWSs that use a surface water source or a ground water source under the influence of surface water which serve 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide and chlorite in this regulation beginning January 1, 2002. Transient NCWSs that use a surface water source or a ground water source under the influence of surface water which serve fewer than 10,000 persons and use chlorine dioxide as a disinfectant or oxidant and systems that use only ground water not under the direct influence of surface water and use chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide and chlorite in this regulation beginning January 1, 2004.

(3) Each CWSs and NTNCWSs regulated under paragraph (1) of this section must be operated by a certified operator of appropriate grade.

(4) Control of Disinfectant Residuals - Notwithstanding the MRDLs in R.61-58.5.Q, 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.

(5) Analytical Methods - Analyses used to determine compliance under this regulation shall be conducted using EPA-approved methods and adhering to EPA approved procedures and minimum reporting levels listed in 40 CFR 141.131 (1-04-06 edition).

(6) Certified Laboratory - Analyses under this regulation for disinfection byproducts must be conducted by a certified laboratory, except as specified in paragraph (7) of this section.

(7) A party approved by the Department must measure daily chlorite samples at the entrance to the distribution system.

(8) Disinfection Residuals - A party approved by the Department must measure residual disinfectant concentration.

(9) Additional Analyses - A party approved by the Department must measure the following parameters where required for compliance with this regulation:

- (a) Alkalinity
- (b) Bromide
- (c) Total Organic Carbon
- (d) Specific Ultraviolet Absorbance (SUVA)
- (e) pH

C. Monitoring Requirements.

(1) General Requirements

- (a) Systems must take all samples during normal operating conditions.
- (b) 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 Department approval in accordance with criteria developed by the Department and agreed to by the Administrator
- (c) Failure to monitor in accordance with the monitoring plan required under paragraph (6) of this section is a monitoring violation.
- (d) 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.
- (e) Systems may use only data collected under the provisions of this regulation to qualify for reduced monitoring.

(2) Monitoring Requirements for Disinfection Byproducts.

- (a) TTHMs and HAA5 - At least twenty-five (25) percent of all samples collected each quarter shall be at locations representing maximum residence time in the distribution system. Remaining samples shall be collected from locations representative of at least average residence time in the distribution systems and

representing the entire distribution system, taking into account number of persons served, different sources of water and different treatment methods. The minimum number of samples required shall be determined based on the source of supply and the populations served by a public water system.

(i) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve 10,000 or more persons must collect samples as follows:

(A) Routine Monitoring - A minimum of four (4) water samples per treatment plant per quarter in accordance with paragraph (2)(a) of this section.

(B) Reduced Monitoring - If the system has a source water annual average TOC level, before any treatment, less than 4.0 mg/L and a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L, then the minimum number of samples required may be reduced to one (1) sample per treatment plant per quarter at a distribution system location reflecting maximum residence time.

(C) 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 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (2)(a)(i)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

(D) The system may be returned to routine monitoring at any time at the Department's discretion.

(ii) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve from 500 to 9,999 persons must collect samples as follows:

(A) Routine Monitoring - A minimum of one (1) water sample per treatment plant per quarter at a location representing maximum residence time in the distribution system.

(B) Reduced Monitoring - If the system has a source water annual average TOC level, before any treatment, less than 4.0 mg/L and a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L, then the minimum number of samples required may be reduced to one (1) sample per treatment plant per year during a month of warmest water temperature at a distribution system location reflecting maximum residence time.

(C) 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 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (2)(a)(ii)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

(D) The system may be returned to routine monitoring at any time at the Department's discretion.

(iii) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve less than 500 persons must collect samples as follows:

(A) Routine Monitoring - A minimum of one water sample per treatment plant per year during a month of warmest water temperature at a location representing maximum residence time in the distribution system.

(B) Reduced Monitoring - There is no reduced monitoring allowed for these systems

(C) Increased Monitoring - If the sample (or average of annual samples, if more than one is taken) exceeds the MCL, the 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 the system meets criteria in paragraph (2)(a)(iii)(D) of this section.

(D) Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring their TTHM annual average is less than or equal to 0.060 mg/L and their HAA5 annual average is less than or equal to 0.045 mg/L.

(iv) CWSs and NTNCWSs that use only ground water not under the influence of surface water which serve 10,000 or more persons and use a chemical disinfectant must collect samples as follows:

(A) Routine Monitoring - A minimum of one water sample per treatment plant per quarter at a location representing maximum residence time in the distribution system.

(B) Reduced Monitoring - If the system has a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L, then the minimum number of samples required may be reduced to one (1) sample per treatment plant per year during a month of warmest water temperature at a distribution system location reflecting maximum residence time.

(C) 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 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (2)(a)(iv)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

(D) The system may be returned to routine monitoring at any time at the Department's discretion.

(v) CWSs and NTNCWSs that use only ground water not under the influence of surface water which serve less than 10,000 persons and use a chemical disinfectant must collect samples as follows:

(A) Routine Monitoring - A minimum of one (1) water sample per treatment plant per year during a month of warmest water temperature at a location representing maximum residence time in the distribution system.

(B) Increased Monitoring - If the sample taken, or average of annual samples if more than one (1) sample is taken, exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a location representing the maximum residence time in the distribution system, until the system meets the criteria in paragraph (2)(a)(v)(F) of this section for reduced monitoring.

(C) Reduced Monitoring - If the system has a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L for two (2) consecutive years, or a TTHM annual average less than 0.020 mg/L and HAA5 annual average less than 0.015 mg/L for one (1) year, then the minimum

number of samples required may be reduced to one sample per treatment plant per three (3) year cycle taken during a month of warmest water temperature at a distribution system location reflecting maximum residence time, with the three (3) year cycle beginning on January 1 following the quarter in which the system qualifies for reduced monitoring.

(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 is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (v)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. If either the TTHM annual average is greater than 0.080 mg/L or the HAA5 annual average is greater than 0.060 mg/L, the system must go to the increased monitoring identified in paragraph (v)(B) of this section in the quarter immediately following the monitoring period in which the system exceeds the 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5 respectively.

(E) The system may be returned to routine monitoring at any time at the Department's discretion.

(F) Systems on increased monitoring may return to routine monitoring if, after at least one (1) year of monitoring their TTHM annual average is less than or equal to 0.060 mg/L and their HAA5 annual average is less than or equal to 0.045 mg/L.

(vi) Monitoring requirements for source water TOC.

In order to qualify for reduced monitoring for TTHM and HAA5 under paragraph C(2)(a)(i)(B) or C(2)(a)(ii)(B) of this section, Subpart H systems not monitoring under the provisions of paragraph C(4) 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 Department. In addition to meeting other criteria for reduced monitoring in paragraph C(2)(a)(i)(B) or C(2)(a)(ii)(B) of this section, the source water TOC running annual average must be less than or equal to 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. Once qualified for reduced monitoring for TTHM and HAA5 under paragraph C(2)(a)(i)(B) or C(2)(a)(ii)(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.

(b) Chlorite. Community and non-transient, non-community water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.

(i) Routine Monitoring.

(A) 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 R.61-58.13.C(2)(b)(ii) in addition to the sample required at the entrance to the distribution system.

(B) 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 the 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 R.61-58.13.C(2)(b)(ii) to meet the requirement for this monitoring.

(ii) 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).

(iii) Reduced monitoring.

(A) Chlorite monitoring at the entrance to the distribution system required by R.61-58.13.C(2)(b)(i)(A) may not be reduced.

(B) Chlorite monitoring in the distribution system required by R.61-58.13.C(2)(b)(i)(B) 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 R.61-58.13.C(2)(b)(i)(B) has exceeded the chlorite MCL and the system has not been required to conduct monitoring under R.61-58.13.C(2)(b)(ii). The system may remain on the reduced monitoring schedule until either of the three individual chlorite samples taken quarterly in the distribution system under R.61-58.13.C(2)(b)(i)(B) exceeds the chlorite MCL or the system is required to conduct monitoring under R.61-58.13.C(2)(b)(ii), at which time, the system must revert to routine monitoring.

(c) Bromate

(i) Routine monitoring. Community and non-transient, non-community 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.

(ii) Reduced Monitoring

(A) Until March 31, 2009, Systems required to analyze for bromate may reduce 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 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 greater than or equal to 0.05 mg/L, the system must resume routine monitoring required by R.61-58.13.C(2)(c)(i).

(B) Beginning April 1, 2009, systems may no longer use the provisions of R.61-58.C(2)(c)(ii)(A) 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 less than or equal to 0.0025 mg/L based on monthly bromate measurements under R.61-58.13.C(2)(c)(i) for the most recent four quarters, with samples analyzed using analytical methods identified in 40 CFR 141.132 (b)(3)(ii)(B) (1-04-06 edition). If a system has qualified for reduced bromate monitoring under R.61-58.13.C(2)(c)(ii)(A), that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples is less than or equal to 0.0025 mg/L based on samples analyzed using analytical methods identified in 40 CFR 141.132(b)(3)(ii)(B) (1-04-06 edition). If the running annual average bromate concentration is greater than 0.0025 mg/L, the system must resume routine monitoring required by R.61-58.13.C(2)(c)(i).

(3) Monitoring requirements for disinfectant residuals.

(a) Chlorine and Chloramines.

(i) Routine Monitoring Until March 31, 2016, community and non-transient non community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in R.61 58.5.G. Beginning April 1, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in R.61-58.17.E through R.61-68.17.I. Systems that use a surface water source or a ground water source under the influence of surface water may use the results of residual disinfectant concentration sampling conducted under R.61 58.10.F(2)(f) for unfiltered systems or R.61 58.10.F(3)(c) for systems which filter, in lieu of taking separate samples.

(ii) Reduced Monitoring - Monitoring may not be reduced.

(b) Chlorine Dioxide.

(i) Routine Monitoring - CWSs, NTNCWSs, and TNCWSs 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 paragraph (3)(b)(ii) of this section, in addition to the sample required at the entrance to the distribution system.

(ii) Additional Monitoring - On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three 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 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).

(iii) Reduced Monitoring - Chlorine dioxide monitoring may not be reduced.

(4) Monitoring Requirements for Disinfection Byproduct Precursors (DBPP).

(a) Routine Monitoring - Surface water systems and ground water systems under the influence of surface water which use conventional filtration treatment 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 paragraph 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, 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.

(b) Reduced Monitoring - Surface water systems and ground water systems under the influence of surface water 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 of equal or greater than 2.0 mg/L.

(5) 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.

(6) Monitoring Plans - Each system required to monitor under this regulation must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Department and the general public no later than 30 days following the applicable compliance dates in R.61-58.13.B(2). All surface water systems and ground water systems under the influence of surface water serving more than 3300 people must submit a copy of the monitoring plan to the Department no later than the date of the first report required under R.61-58.13.E. The Department may also require the plan to be submitted by any other system. After review, the Department may require changes in any plan elements. The plan must include at least the following elements.

(a) Specific locations and schedules for collecting samples for any parameters included in this regulation.

(b) How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

(c) If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions of R.61-58.5.X, the sampling plan must reflect the entire distribution system.

D. Compliance Requirements.

(1) General Requirements.

(a) 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 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.

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

(c) If, during the first year of monitoring under R.61-58.13.C, 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.

(2) Disinfection Byproducts.

(a) TTHMs and HAA5.

(i) For systems monitoring quarterly, compliance with MCLs in R.61-58.5.P must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed in Section C(2)(a) above.

(ii) For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of Section C(2)(a) above, does not exceed the MCLs in R.61-58.5.P. 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 result 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.

(iii) 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 R.61-58.6 in addition to reporting to the Department pursuant to Section E above.

(iv) If a PWS fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(b) 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 R.61-58.13.C(2)(c). 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 R.61-58.6, in addition to reporting to the Department pursuant to R.61-58.13.E. If a PWS 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.

(c) Chlorite. Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by R.61-58.13.C(2)(b)(i)(B) and R.61-58.13.C(2)(b)(ii). 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 R.61-58.6, in addition to reporting to the Department pursuant to R.61-58.13.E.

(3) Disinfectant Residuals.

(a) Chlorine and Chloramines.

(i) Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under Section C(3)(a) above. If the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to R.61-58.6, in addition to reporting to the Department pursuant to Section E below.

(ii) 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 Section E below must clearly indicate which residual disinfectant was analyzed for each sample.

(b) Chlorine Dioxide.

(i) Acute Violations - Compliance must be based on consecutive daily samples collected by the system under Section C(3)(b) above. 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 (3) 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 R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below. 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 R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below.

(ii) Non-acute Violations - Compliance must be based on consecutive daily samples collected by the system under Section C(3)(b) above. If any two (2) 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 Non-acute health risks in R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below. 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 Non-acute violations under R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below.

(4) Disinfection Byproduct Precursors - Compliance must be determined as specified by Section F(3) below. Systems may begin monitoring to determine whether Step 1 TOC removals can be met twelve (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 twelve (12) months after the compliance date that it is not able to meet the Step 1 requirements in Section F(2)(b) below 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 Section F(2)(c) below 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 Section F(3)(a)(iv) below, is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to R.61-58.6.E, in addition to reporting to the Department pursuant to R.61-58.13.E(4).

E. Reporting and Recordkeeping Requirements.

(1) Systems required to sample quarterly or more frequently must report to the Department within 10 days after the end of each quarter in which samples were collected, notwithstanding the provisions of R.61-58.6. Systems required to sample less frequently than quarterly must report to the Department within 10 days after the end of each monitoring period in which samples were collected.

(2) Disinfection Byproducts - Systems must report the following information:

(a) Systems monitoring for TTHM and HAA5 under the requirements of R.61-58.13.C(2) on a quarterly or more frequent basis must report:

(i) The number of samples taken during the last quarter.

(ii) The location, date, and result of each sample taken during the last quarter.

- (iii) The arithmetic average of all samples taken in the last quarter.
 - (iv) The annual arithmetic average of the quarterly arithmetic averages of this section for the last four (4) quarters.
 - (v) Whether, based on Section D(2)(a) above, the MCL was violated.
- (b) Systems monitoring for TTHMs and HAA5 under the requirements of R.61- 58.13.C(2) less frequently than quarterly (but at least annually) must report
- (i) The number of samples taken during the last year.
 - (ii) The location, date, and result of each sample taken during the last monitoring period.
 - (iii) The arithmetic average of all samples taken over the last year.
 - (iv) Whether, based on Section D(2)(a) above, the MCL was violated.
- (c) Systems monitoring for TTHMs and HAA5 under the requirements of R.61- 58.13.C(2) less frequently than annually must report:
- (i) The location, date, and result of each sample taken.
 - (ii) Whether, based on Section D(2)(a) above, the MCL was violated.
- (d) Systems monitoring for chlorite under the requirements of R.61-58.13.C(2) must report:
- (i) The number of entry point samples taken each month for the last three (3) months.
 - (ii) The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter.
 - (iii) For each month in the reporting period, the arithmetic average of all samples taken in each three (3) sample sets taken in the distribution system.
 - (iv) Whether, based on Section D(2)(c) above, the MCL was violated, and in which month, and how many times it was violated each month.
- (e) System monitoring for bromate under the requirements of R.61-58.13.C(2) must report:
- (i) The number of samples taken during the last quarter.
 - (ii) The location, date, and result of each sample taken during the last quarter.
 - (iii) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year.
 - (iv) Whether, based on Section D(2)(b) above, the MCL was violated.
- (3) Disinfectants - Systems must report the following information:

(a) Systems monitoring for chlorine or chloramines under the requirements of R.61- 58.13.C(3) must report:

(i) The number of samples taken during each month of the last quarter.

(ii) The monthly arithmetic average of all samples taken in each month for the last twelve (12) months.

(iii) The arithmetic average of all monthly averages for the last twelve (12) months.

(iv) Whether, based on Section D(3)(a) above, the MRDL was violated.

(b) Systems monitoring for chlorine dioxide under the requirements of R.61- 58.13.C(3) must report:

(i) The dates, results, and locations of samples taken during the last quarter.

(ii) Whether, based on Section D(3)(b) above, the MRDL was violated.

(iii) Whether the MRDL was exceeded in any two (2) consecutive daily samples and whether the resulting violation was acute or Non-acute.

(4) Disinfection byproduct precursors and enhanced coagulation or enhanced softening - Systems must report the following information:

(a) System monitoring monthly or quarterly for TOC under the requirements of R.61-58.13.C(4) and required to meet the enhanced coagulation or enhanced softening requirements in R.61-58.13.F(2)(b) or (c) must report:

(i) The number of paired (source water and treated water) samples taken during the last quarter.

(ii) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.

(iii) 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.

(iv) Calculations for determining compliance with the TOC percent removal requirements, as provided in R.61-58.13(F)(3)(a).

(v) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in R.61-58.13(F)(2) for the last four (4) quarters.

(b) System monitoring monthly or quarterly for TOC under the requirements of R.61-58.13.C(4) and meeting one or more of the alternative compliance criteria in R.61- 58.13.F(1)(a) or (b) must report:

(i) The alternative compliance criterion that the system is using.

(ii) The number of paired samples taken during the last quarter.

(iii) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.

(iv) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in R.61-58.13.F(1)(a)(i) or (iii) or of treated water TOC for systems meeting the criterion in R.61-58.13.F(1)(a)(ii).

(v) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in R.61-58.13.F(1)(a)(v) or of treated water SUVA for systems meeting the criterion in R.61-58.13.F(1)(a)(vi).

(vi) The running annual average of source water alkalinity for systems meeting the criterion in R.61-58.13.F(1)(a)(iii) and of treated water alkalinity for systems meeting the criterion in R.61-58.13.F(1)(b)(i).

(vii) The running annual average for both TTHM and HAA5 for systems meeting the criterion in R.61-58.13.F(1)(a)(iii) or (iv).

(viii) The running annual average of the amount of magnesium hardness removal (as CaCO₃, in mg/L) for systems meeting the criterion in R.61-58.13.F(1)(b)(ii).

(ix) Whether the system is in compliance with the particular alternative compliance criterion in R.61-58.13.F(1)(a) or (b).

(5) The Department may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

F. Treatment Technique for Control of Disinfection Byproduct (DBP) Precursors.

(1) Systems using surface water or a ground water under the influence of surface water which utilize conventional filtration treatment must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in paragraph (2) of this section unless the system meets at least one of the alternative compliance criteria listed in paragraph (1)(a) or (1)(b) of this section.

(a) Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems - Systems using surface water or a ground water under the influence of surface water which utilize conventional filtration treatment may use the alternative compliance criteria in paragraphs (1)(a)(i) through (vi) of this section to comply with this section in lieu of complying with paragraph (2) of this section. Systems must still comply with monitoring requirements in R.61-58.13.C(4).

(i) The system's source water TOC level, measured according to EPA approved methods specified in 40 CFR 141.131(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(ii) The system's treated water TOC level, measured according to EPA approved methods specified in 40 CFR 141.131(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(iii) The system's source water TOC level, measured as according to EPA approved methods specified in 40 CFR 141.131(d)(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to EPA approved methods specified in 40 CFR 141.131(d)(1), is greater than 60 mg/L (as CaCO₃), 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 Section B(2) above, the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in Section B(2)

above, 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 Department for approval not later than the effective date for compliance in R.61-58.13.B(2). 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 of National Primary Drinking Water Regulations.

(iv) 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.

(v) The system's source water SUVA, prior to any treatment and measured monthly according to EPA approved methods specified in 40 CFR 141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(vi) The system's finished water SUVA, measured monthly according to EPA approved methods specified in 40 CFR 141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(b) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (2)(b) of this section may use the alternative compliance criteria in paragraphs (1)(b)(i) and (ii) of this section in lieu of complying with paragraph (2) of this section. Systems must still comply with monitoring requirements in R.61-58.13.C(4).

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO₃), measured monthly according to EPA approved methods specified in 40 CFR 141.131(d)(1) and calculated quarterly as a running annual average.

(ii) Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO₃), measured monthly according to 40 CFR 141.131(d)(6) (1- 04-06 edition) and calculated quarterly as a running annual average.

(2) Enhanced coagulation and enhanced softening performance requirements.

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

(b) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with EPA approved methods specified in 40 CFR 141.131(d). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity greater than 120 mg/L) for the specified source water TOC:

STEP 1 REQUIRED REMOVAL OF TOC BY ENHANCED COAGULATION AND ENHANCED SOFTENING FOR SURFACE WATER SYSTEMS OR GROUND WATER SYSTEMS UNDER THE INFLUENCE OF SURFACE WATER USING CONVENTIONAL TREATMENT^{A,B}

Source-Water TOC, mg/L	Source-Water Alkalinity, mg/L as CaCO ₃		
	0-60	>60-120	>120 ^c
>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%

- ^a Systems meeting at least one of the conditions in paragraphs (1)(a)(i) through (vi) of this section are not required to operate with enhanced coagulation.
- ^b Softening systems meeting one of the alternative compliance criteria in paragraph (1)(b) of this section are not required to operate with enhanced softening.
- ^c Systems practicing softening must meet the TOC removal requirements in this column.

(c) Systems using surface water or a ground water under the influence of surface water which utilize conventional filtration treatment that cannot achieve the Step 1 TOC removals required by paragraph (2)(b) of this section due to water quality parameters or operational constraints must apply to the Department, within three (3) months of failure to achieve the TOC removals required by paragraph (2)(b) of this section, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Department approves the alternative minimum TOC removal (Step 2) requirements, the Department may make those requirements retroactive for the purposes of determining compliance. Until the Department approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in paragraph (2)(b) of this section.

(d) Alternate minimum TOC removal (Step 2) requirements. Applications made to the Department by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under paragraph (2)(c) of this section must include, as a minimum, results of bench- or pilot-scale testing conducted under paragraph (2)(d)(i) of this section. The submitted bench-or-pilot scale testing must be used to determine the alternate enhanced coagulation level.

(i) Alternate enhanced coagulation level is defined as: Coagulation at a coagulant dose and pH as determined by the method described in paragraphs (2)(d)(i) through (v) of this section such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of greater than or equal to 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 Department, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (2)(b) of this section. This requirement will be effective until such time as the Department approves a new value based on the results of a new bench- or pilot-scale test. Failure to achieve Department-set alternative minimum TOC removal levels is a violation of National Primary Drinking Water Regulations.

(ii) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (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

(iii) 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 (or equivalent addition of iron coagulant) is reached.

(iv) The system may operate at any coagulant dose or pH necessary (consistent with other NPDWRs) to achieve the minimum TOC percent removal approved under paragraph (2)(c) of this section.

(v) 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 Department for a waiver of enhanced coagulation requirements.

(3) Compliance Calculations.

(a) Systems using surface water or a ground water under the influence of surface water other than those identified in paragraph (1)(a) or (1)(b) of this section must comply with requirements contained in R.61-58.13.F(2)(b) or (c). Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) Determine actual monthly TOC percent removal, equal to: $(1 - (\text{treated water TOC} / \text{source water TOC})) \times 100$.

(ii) Determine the required monthly TOC percent removal (from either the table in paragraph (2)(b) or from paragraph (2)(c) of this section).

(iii) Divide the value in paragraph (3)(a)(i) of this section by the value in paragraph (3)(a)(ii) of this section.

(iv) Add together the results of paragraph (3)(a)(iii) of this section for the last twelve (12) months and divide by twelve (12).

(v) If the value calculated in paragraph (3)(a)(iv) of this section is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(b) Systems may use the provisions in paragraphs (3)(b)(i) through (v) of this section in lieu of the calculations in paragraph (3)(a)(i) through (v) of this section to determine compliance with TOC percent removal requirements.

(i) In any month that the system's treated or source water TOC level, measured according to EPA approved methods specified in 40 CFR 141.131(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 paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(iii) In any month that the system's source water SUVA, prior to any treatment and measured according to EPA approved methods specified in 40 CFR 141.131(d)(4), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(iv) In any month that the system's finished water SUVA, measured according to EPA approved methods specified in 40 CFR 141.131(d)(4) (11-8- 2006 edition), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(c) Systems using surface water or a ground water under the influence of surface water which utilize conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (1)(a) or (1)(b) of this section.

(4) 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 Systems using surface water or a ground water under the influence of surface water which utilize conventional treatment, enhanced coagulation or enhanced softening.