10 CSR 60-4.055

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Missouri Code of State Regulations > ***TITLE 10- DEPARTMENT OF NATURAL RESOURCES*** > ***DIVISION 60- SAFE DRINKING WATER COMMISSION*** > ***CHAPTER 4- CONTAMINANT LEVELS AND MONITORING***

60-4.055 Disinfection Requirements

(1) The requirements of this rule apply to primary community and noncommunity public water systems that the department has required to disinfect and to secondary systems with a source of water from a primary water system that the department has required to disinfect, even if the water is obtained through another secondary system.

(A) Water systems using water obtained in whole or in part from a source determined by the department to be surface or ground water under the direct influence of surface water must install or construct facilities to provide conventional filtration treatment as a required treatment technique within eighteen (18) months of the determination.

(B) Any water system that the department determines to be a groundwater system under the direct influence of surface water may appeal the decision by notifying the department in writing. The appeal must be accompanied by a report prepared by an engineer that confirms that the water system's ground-water source is not directly influenced by surface water. The report must be supported by analytical data prepared by a laboratory that is acceptable to the department. Source sampling must be accomplished during the period the source is most susceptible to surface water influence. The department's approval of the report will result in the water system's source being redefined as groundwater not under the direct influence of surface water.

(C) If at any time in the department's opinion, the quality of a water source appears to have changed to be under the direct influence of surface water, the water system must submit, at the department's written request, an engineer-prepared report that describes the current condition of the water source. If a report is not submitted, the source will be reclassified as groundwater supply under the direct influence of surface water.

(D) The department reserves the authority to make the final determination of whether or not a source is defined as groundwater under the direct influence of surface water.

(E) Primary systems which use water obtained from groundwater not under the direct influence of surface water and which the department requires to disinfect and secondary public water systems do not have to meet the requirements of section (2) of this rule but may be required to provide disinfection detention as deemed necessary by the department. These systems also do not have to submit reports to the department as required by *10 CSR 60-7.010(5)* but must maintain the information on file at the system treatment plant or office.

(2) Contact Time and Removal Credit.

(A) Any water system providing required treatment, and existing water systems practicing conventional filtration treatment on February 6, 1992, will be credited with 99.68 percent (2.5 log) Giardia lamblia cyst removal and 99.0 percent (2.0 log) virus removal, excluding the disinfection process, provided that they meet the turbidity maximum contaminant levels in *10 CSR 60-4.050*. A system may request additional credit for treatment process removal or inactivation of Giardia lamblia cysts and viruses by submitting a report prepared by an engineer to the department including studies of

Giardia cyst and virus removal or inactivation. The department reserves the authority to make the final determination of removal credit.

(B) The residual disinfectant concentration (C) disinfectant contact time (T) values in the Missouri Guidance Manual for Surface Water System Treatment Requirements, 1992, must be used for determining the percentage of Giardia lamblia cyst and virus removal or inactivation by disinfection.

(C) The percentage of removal and inactivation of Giardia lamblia cysts and viruses will be determined as the sum of the percent removals and inactivations of the individual treatment and disinfection processes. The percent removal and inactivation of Giardia lamblia cysts must be at least 99.9 percent (3.0 log) and of viruses must be 99.99 percent (4.0 log).

(D) Disinfectant contact time must be determined for each system by evaluations performed as specified in the Missouri Guidance Manual For Surface Water System Treatment Requirements, 1992, which is incorporated by reference. Results of the evaluations, including the determined disinfectant contact times, must be submitted to the department for review. The evaluation must be submitted within one (1) year of the date that the system is covered by the requirements of this rule, except that new water treatment facilities will not be issued a Final Approval of Construction under *10 CSR 60-3.010* until disinfection contact times are determined and submitted to the department.

(3) For any water system adding a disinfectant, only free available chlorine or chloramines will be accepted as the disinfectant entering the distribution system. The residual disinfectant concentration in the water entering the distribution system cannot be less than 0.5 milligrams per liter (mg/l) free available chlorine or 1.0 mg/l chloramines for more than four (4) hours.

(A) Systems using chloramines as the disinfectant residual entering the distribution system must add and mix the chlorine prior to the addition of ammonia.

(B) At the department's discretion, any system may be required to provide breakpoint chlorination or to provide operational test data and other information that the department may require to demonstrate that the system daily meets all of the requirements of section (2) of this rule and all of the other requirements of this section.

(C) At least one (1) application point for chlorine or chloramines must be prior to filtration with a residual maintained through the filters.

(D) If at any time the disinfectant residual entering the distribution system falls below the levels established in this section, the system must notify the department as soon as possible but no later than by the end of the next business day. The system must notify the department by the end of the next business day whether or not the disinfectant residual was restored to the levels established in this section within four (4) hours. The department may require public notice for continuing or persistent violations of this requirements.

(E) A residual disinfectant concentration in the water entering the distribution system of less than 0.2 mg/l for at least four (4) hours is a treatment technique violation which requires public notice pursuant to *10 CSR 60-8.010*.

(F) The frequency of sampling shall be as set forth in *10 CSR 60-4.080(3)*.

(4) The residual disinfectant concentration in the distribution system measured as total chlorine or combined chlorine cannot be less than 0.2 mg/l in more than five percent (5%) of the samples each month for any two (2) consecutive months that the system supplies water to the public.

(A) Heterotrophic plate count may be used in lieu of or as a supplement to residual disinfectant concentration analysis.

(B) Water in the distribution system with a heterotrophic bacteria concentration less than or equal to five hundred (500) colonies per milliliter is deemed to have 0.2 mg/l residual disinfectant concentration for the purpose of determining compliance with this rule.

(C) Water in the distribution system with a heterotrophic bacteria concentration of greater than five hundred (> 500) colonies per milliliter is deemed to have less than 0.2 mg/l residual disinfectant concentration for the purpose of compliance with this rule.

(D) Failure to maintain the minimum residual disinfectant concentration required in this rule is a violation of a treatment technique which requires public notification as specified in *10 CSR 60-8.010*.

(E) The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled as specified in *10 CSR 60-4.020*. Failure to comply with this subsection is a monitoring violation which requires public notification as specified in *10 CSR 60-8.010*.

(5) Maximum Residual Disinfectant Levels.

(A) Maximum residual disinfectant levels (MRDL) are--

Disinfectant Residual	**MRDL (mg/l)**
Chlorine	4.0 (as Cl[2])
Chloramines	4.0 (as Cl[2])
Chlorine dioxide	0.8 (as ClO[2])

(B) Control of Disinfectant Residuals. For chlorine and chloramines, a public water system is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a public water system (PWS) is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two (2) consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels. Notwithstanding the MRDLs, 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.

(C) Compliance Dates.

1. Community water systems and non-transient noncommunity water systems.

A. Systems serving ten thousand (10,000) or more persons and using surface water or groundwater under the direct influence of surface water must comply with the MRDLs beginning January 1, 2002.

B. Systems serving fewer than ten thousand (10,000) persons and using surface water or groundwater under the direct influence of surface water and systems using only groundwater not under the direct influence of surface water must comply with the MRDLs beginning January 1, 2004.

2. Transient noncommunity water systems.

A. Systems serving ten thousand (10,000) or more persons and using surface water or groundwater under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002.

B. Systems serving less than ten thousand (10,000) persons, using surface water or groundwater under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant, and systems using only groundwater not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant, must comply with the chlorine dioxide MRDL beginning January 1, 2004.

(6) Enhanced Disinfection Requirements. Enhanced disinfection requirements and compliance dates vary depending on system size.

(A) Compliance Dates. In addition to the requirements in sections (1)-(4) of this rule, surface water and groundwater under the direct influence of surface water systems serving at least ten thousand (10,000) people also must comply with the requirements in this section beginning January 1, 2002 unless otherwise specified. Those systems serving less than ten thousand (10,000) people must comply with the requirements in this section beginning January 14, 2005 unless otherwise specified.

(B) General Requirements.

1. This section (6) establishes or extends treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: Giardia lamblia, viruses, heterotrophic plate count bacteria, Legionella, Cryptosporidium, and turbidity. Each surface water and groundwater under the direct influence of surface water system, including those serving less than ten thousand (10,000) people beginning January 14, 2005, must provide treatment of its source water that complies with these treatment technique requirements and are in addition to those identified in sections (1)-(4) of this rule. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

A. At least ninety-nine percent (99%) (2-log) removal of Cryptosporidium between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and

B. Compliance with the profiling and benchmark requirements under the provisions of subsection (6)(C) of this rule.

2. A public water system subject to the requirements of this section (6) is in compliance with the requirements of paragraph (6)(B)1. of this rule if it meets the applicable filtration requirements in *10 CSR 60-4.050* and the disinfection requirements in sections (2)-(4) and subsection (6)(C) of this rule.

(C) Disinfection Profiling and Benchmarking.

1. Disinfection profile. A disinfection profile is a summary of Giardia lamblia inactivation through the treatment plant measured through the course of a year. A public water system subject to the requirements of this section (6) must determine its total trihalomethanes (TTHM) annual average and its HAA5 annual average. The annual average is the arithmetic average of the quarterly averages of four (4) consecutive quarters of monitoring. Surface water systems serving fewer than ten thousand (10,000) people must determine the arithmetic average based on samples collected after January 1, 1998. If the annual average exceeds the levels in subparagraph (6)(C)1.D. then the requirements in paragraph (6)(C)2. apply.

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

(I) Those systems that use "grandfathered" HAA5 occurrence data that meet the provisions of part (5)(C)1.B.(I) of this rule must use TTHM data collected at the same time under the provisions of *10 CSR 60-4.090*.

(II) Those systems that use HAA5 occurrence data that meet the provisions of subpart (6)(C)1.B.(II)(a) of this rule must use TTHM data collected at the same time under the provisions of *10 CSR 60-4.090*.

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

(I) Those systems that have collected four (4) quarters of HAA5 occurrence data that meets the routine monitoring sample number and location requirements for TTHM in *10 CSR 60-4.090* and handling and analytical method requirements of 40 CFR 141.142 may use those data to determine whether the requirements of this section apply.

(II) Those systems that did not collect four (4) quarters of HAA5 occurrence data that meets the provisions of part (6)(C)1.B.(I) of this rule by March 31, 2000 must either:

(a) Conduct monitoring for HAA5 that meets the routine monitoring sample number and location requirements for TTHM in *10 CSR 60-4.090(2)* and handling and analytical method requirements of 40 CFR 141.142(b)(1) to determine the HAA5 annual average and whether the requirements of paragraph (6)(C)2. of this rule apply; or

(b) Comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with paragraph (6)(C)2. of this rule.

C. The system must submit data to the department on the schedule required by the department.

D. Any system having either a TTHM annual average greater than or equal to 0.064 mg/l or an HAA5 annual average greater than or equal to 0.048 mg/l during the period identified in subparagraphs (6)(C)1.A. and B. of this rule must comply with paragraph (6)(C)2. of this rule.

2. Disinfection profiling requirements and compliance dates vary depending on system size. Surface water systems serving a population of less than ten thousand (10,000) must monitor profiling data according to subparagraph (6)(C)2.D. beginning July 1, 2003. Surface water and groundwater under the direct influence of surface water (GWUDISW) systems serving a population of less than five hundred (500) must monitor profiling data according to subparagraph (6)(C)2.D. beginning January 1, 2004.

A. Any system that meets the criteria in subparagraph (6)(C)1.D. of this rule must develop a disinfection profile of its disinfection practice for a period of up to three (3) years.

B. The system must monitor daily for a period of twelve (12) consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the CT[99.9] values in Tables 1 through 8 of the Missouri "Guidance Manual for Surface Water System Treatment Requirements," as appropriate, through the entire treatment plant. This system must begin this monitoring when requested by the department. As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring set forth in this subparagraph (6)(C)2.B. A system with more than one (1) point of disinfectant application must conduct this monitoring for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in *10 CSR 60-5.010*, as follows:

(I) The temperature of the disinfected water must be measured once per day at each residual disinfectant concentration sampling point during peak hourly flow;

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

(III) The disinfectant contact time(s) must be determined for each day during peak hourly flow; and

(IV) The residual disinfectant concentration(s) of the water before or at the first customer and prior to each additional point of disinfection must be measured each day during peak hourly flow.

C. In lieu of the monitoring conducted under the provisions of subparagraph (6)(C)2.B. of this rule to develop the disinfection profile the system may elect to meet the requirements of part (6)(C)2.C.(I) of this rule. In addition to the monitoring conducted under the provisions of subparagraph (6)(C)2.B. of this rule to develop the disinfection profile, the system may elect to meet the requirements of part (6)(C)2.C.(II) of this rule.

(I) A PWS that has three (3) years of existing operational data may submit those data, a profile generated using those data, and a request that the department approve use of those data in lieu of monitoring under the provisions of paragraph (6)(C)2. of this rule. The department must determine whether these operational data are substantially equivalent to data collected under the provisions of subparagraph (6)(C)2.B. of this rule. These data must also be representative of Giardia lamblia inactivation through the entire treatment plant and not just of certain treatment segments. Until the department approves this request, the system is required to conduct monitoring under the provisions of subparagraph (6)(C)2.B. of this rule.

(II) In addition to the disinfection profile generated under subparagraph (6)(C)2.B. of this rule, a PWS that has existing operational data may use those data to develop a disinfection profile for additional years. Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of paragraph (6)(C)3. of this rule. The department will determine whether these operational data are substantially equivalent to data collected under the provisions of subparagraph (6)(C)2.B. of this rule. These data must also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

D. The system must monitor once per week on the same calendar day, for a period of twelve (12) consecutive calendar months, to determine the total logs of inactivation for each week of operation, based on the CT[99.9] values in Tables 1 through 8 of the Missouri "Guidance Manual for Surface Water System Treatment Requirements," as appropriate, through the entire treatment plant. As a minimum, the system with a single point

of disinfectant application prior to entrance to the distribution system must conduct the monitoring set forth in this subparagraph. A system with more than one (1) point of disinfectant application must conduct this monitoring for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in *10 CSR 60-5.010*, as follows:

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

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

(III) The disinfectant contact time(s) must be determined during peak hourly flow; and

(IV) The residual disinfectant concentration(s) of the water before or at the first customer and prior to each additional point of disinfection must be measured during peak hourly flow.

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

(I) The system may determine the total inactivation ratio for the disinfection segment based on either of the following methods:

(a) Determine one (1) inactivation ratio (CTcalc/CT[99.9]) before or at the first customer during peak hourly flow; or

(b) Determine successive (CTcalc/CT[99.9]) values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the system must calculate the total inactivation ratio by determining (CTcalc/CT[99.9]) for each sequence and then adding the (CTcalc/CT[99.9]) values together to determine ([SIGMA] (CTcalc/CT[99.9]); and

(II) The system must determine the total logs of inactivation by multiplying the value calculated in part (6)(C)2.D.(I) of this rule by three (3.0).

F. A system that uses either chloramines or ozone for primary disinfection must also calculate the logs of inactivation for viruses using a method identified in EPA's "Alternative Disinfectants and Oxidants Guidance Manual."

G. The system must retain disinfection profile data in graphic form, as a spread-sheet, or in some other format acceptable to the department for review as part of sanitary surveys conducted by the department.

3. Disinfection benchmarking.

A. Any system required to develop a disinfection profile under the provisions of paragraphs (6)(C)1. and 2. of this rule and that decides to make a significant change to its disinfection practice must consult with the department in writing prior to making such change. Significant changes to disinfection practice are:

(I) Changes to the point of disinfection;

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

(III) Changes to the disinfection process; and

(IV) Any other modification identified by the department.

B. Any system that is modifying its disinfection practice must calculate its disinfection benchmark using one of the following procedures:

(I) For each year of profiling data collected and calculated under paragraph (6)(C)2. of this rule, the system must determine the lowest average monthly Giardia lamblia inactivation in each year of profiling data. The system must determine the average Giardia lamblia inactivation for each calendar month for each year of profiling data by dividing the sum of Giardia lamblia inactivation by the number of values calculated for that month; or

(II) The disinfection benchmark is the lowest monthly average value (for systems with one (1) year of profiling data) or average of lowest monthly average values (for systems with more than one (1) year of profiling data) of the monthly logs of Giardia lamblia inactivation in each year of profiling data.

C. A system that uses either chloramines or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a method approved by the department.

D. The system must submit the following information to the department as part of its consultation process:

(I) A description of the proposed change;

(II) The disinfection profile for Giardia lamblia (and, if necessary, viruses) under paragraph (6)(C)2. of this rule and benchmark as required by subparagraph (6)(C)3.B. of this rule; and

(III) An analysis of how the proposed change will affect the current levels of disinfection.

D. Filtration Sampling Requirements. A public water system subject to the requirements of this section (6) that provides conventional filtration treatment must conduct continuous monitoring of turbidity for each individual filter as indicated in *10 CSR 60-4.050(3)(E)*.

Statutory Authority

AUTHORITY:

section 640.100, RSMo Supp. 2002.*
*Original authority: *640.100, RSMo* 1939, amended 1978, 1981, 1982, 1988, 1989, 1992, 1993, 1995, 1996, 1998, 1999, 2002.

History

Original rule filed July 12, 1991, effective Feb. 6, 1992. Amended: Filed Feb. 1, 1996, effective Oct. 30, 1996. Amended: Filed Dec. 15, 1999, effective Sept. 1, 2000. Amended: Filed March 17, 2003, effective Nov. 30, 2003.

Annotations

Notes

PUBLISHER'S NOTE:

The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. Therefore, the material which is so incorporated is on file with the agency who filed this rule, and with the Office of the Secretary of State. Any interested person may view this material at either agency's headquarters or the same will be made available at the Office of the Secretary of State at a cost not to exceed actual cost of copy reproduction. The entire text of the rule is printed here. This note refers only to the incorporated by reference material.

Commentary

PURPOSE:

This rule establishes, minimum disinfectant levels and treatment requirements to assure the inactivation and removal of pathogenic organisms.