

ENVIRONMENTAL PROTECTION COMMISSION[567]

Notice of Intended Action

Twenty-five interested persons, a governmental subdivision, an agency or association of 25 or more persons may demand an oral presentation hereon as provided in Iowa Code section 17A.4(1)“b.”

Notice is also given to the public that the Administrative Rules Review Committee may, on its own motion or on written request by any individual or group, review this proposed action under section 17A.8(6) at a regular or special meeting where the public or interested persons may be heard.

Pursuant to the authority of Iowa Code sections 455B.105, 455B.113 and 455B.173, the Environmental Protection Commission hereby gives Notice of Intended Action to amend Chapter 40, “Scope of Division—Definitions—Forms—Rules of Practice,” Chapter 41, “Water Supplies,” Chapter 42, “Public Notification, Public Education, Consumer Confidence Reports, Reporting, and Record Maintenance,” Chapter 43, “Water Supplies—Design and Operation,” and Chapter 83, “Laboratory Certification,” Iowa Administrative Code.

In January 2006, the U.S. Environmental Protection Agency (EPA) promulgated two new significant federal rules pertaining to drinking water: the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) and the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2 ESWTR). In addition, other changes, primarily in analytical methods, were made between January 2004 and March 2007 to existing federal drinking water rules. States are expected to incorporate these federal rule provisions into state program rules in order to maintain primacy in the drinking water program. These proposed amendments, if adopted, will accomplish that end. In addition, other changes to the Department’s drinking water rules are being proposed.

Proposed changes are summarized below by chapter.

Chapter 40: The amendments add a reference to Chapter 38 and remove a reference to Chapter 47 from the rule pertaining to the scope of the division (Chapters 38 and 40 contain private and public drinking water supply rules); add definitions for the following: bag filters, bank filtration, cartridge filters, combined distribution system, finished water, flowing stream, GAC20, lake/reservoir, locational running annual average (LRAA), membrane filtration, plant intake, presedimentation, significant deficiency, two-stage lime softening, uncovered finished water storage facility, and wholesale system; amend definitions of consecutive public water supply, GAC10, nontransient noncommunity water system, and Ten States Standards; correct the name of the University Hygienic Laboratory to State Hygienic Laboratory; and correct a typographic error.

Chapter 41: The amendments require systems collecting at least six routine total coliform samples to do so on separate days to meet the federal rule; amend analytical methods; adopt Stage 2 DBPR and rescind parts of the existing Stage 1 disinfectants/disinfection byproducts rule that are no longer applicable; update the uranium detection limit; and make other minor corrections.

Chapter 42: The amendments include the public notification and consumer confidence report requirements for the new LT2 ESWTR and Stage 2 DBPR.

Chapter 43: The amendments include the requirement of the Department to maintain a list of certified operators; update the construction standards to the 2007 edition of Ten States Standards and 2010 American Water Works Standards; clarify the duration of a construction permit; update the best available technology for disinfection byproducts; require at least 0.5 log inactivation of *Giardia lamblia* cysts in treatment of surface or influenced groundwater sources; clarify CT ratio requirements; include the requirements for the new LT2 ESWTR and Stage 2 DBPR; remove outdated Stage 1 DBPR requirements; adopt the optimization goals for turbidity; adopt new CT tables for *Cryptosporidium* treatment; and correct rule citations.

Chapter 83: The amendments rescind a reference to Chapter 47; correct the name of the University Hygienic Laboratory to State Hygienic Laboratory; correct certification of SHL to be acceptable to EPA;

update the drinking water disinfection byproduct certification requirements from Stage 1 DBPR to Stage 2 DBPR.

These chapters and their amendments were reviewed by the water supply technical advisory group at a meeting held on January 27, 2011. The group is comprised of individuals representing a wide variety of water supply stakeholders, including professional drinking water organizations, certified operators, certified environmental laboratories, environmental interests, public water supplies, consulting engineers, and other state agencies. A second meeting with the group was held on June 21, 2011, to review the jobs impact statement, fiscal impact statement, and Governor's preclearance form.

Any interested person may make written suggestions or comments on these proposed amendments on or before September 29, 2011. Such written materials should be directed to Diane Moles, Water Supply Engineering Section, Department of Natural Resources, 401 SW 7th Street, Suite M, Des Moines, Iowa 50309-4611; telephone (515)725-0281; fax (515)725-0348; or E-mail diane.moles@dnr.iowa.gov. Persons who wish to convey their views orally should contact the Water Supply Section at (515)725-0281 or at the Water Supply Section offices at 401 SW 7th Street, Suite M, Des Moines, Iowa.

Oral or written comments will also be accepted at a public hearing that will be held September 28, 2011, at 11 a.m. in the conference rooms of the Water Supply Section office at 401 SW 7th Street, Suite I, Des Moines, Iowa. At the hearing, persons will be asked to give their names and addresses for the record and to confine their remarks to the subject of the amendments. All comments must be received no later than 4:30 p.m. on September 29, 2011.

Any person who intends to attend the public hearing and has special requirements, such as those related to hearing or mobility impairments, should contact the Department of Natural Resources and advise of specific needs.

After analysis and review of this rule making, no impact on jobs has been found.

These amendments are intended to implement Iowa Code sections 17A.3(1)“b,” 455B.113 to 455B.115, 455B.171 to 455B.188, and 455B.190 to 455B.192.

The following amendments are proposed.

ITEM 1. Amend rule 567—40.1(455B) as follows:

567—40.1(455B) Scope of division. The department conducts the public water supply program; ~~provides grants to counties,~~ and establishes minimum standards for the construction of private water supply systems. The public water supply program includes the following: the establishment of drinking water standards, including maximum contaminant levels, treatment techniques, maximum residual disinfectant levels, action levels, monitoring, viability assessment, consumer confidence reporting, public notice requirements, public water supply system operator certification standards, environmental drinking water laboratory certification program, and a state revolving loan program consistent with the federal Safe Drinking Water Act, and the establishment of construction standards. The construction, modification and operation of any public water supply system requires a specific permit from the department. Certain construction permits are issued upon certification by a licensed professional engineer that a project meets standards, and, in certain instances, permits are issued by local authorities pursuant to 567—Chapter 9. Private water supplies are regulated by local boards of health.

Chapter 38 contains requirements for private water well construction permits, including test wells and monitoring wells.

Chapter 39 contains requirements for the proper closure or abandonment of wells.

Chapter 40 includes rules of practice, including designation of forms, applicable to the public in the department's administration of the subject matter of this division.

Chapter 41 contains the drinking water standards and specific monitoring requirements for the public water supply program.

Chapter 42 contains the public notification, public education, consumer confidence reporting, and record-keeping requirements for the public water supply program.

Chapter 43 contains specific design, construction, fee, operating, and operation permit requirements for the public water supply program.

Chapter 44 contains the drinking water state revolving fund program for the public water supply program.

~~Chapter 47 contains provisions for county grants for creating programs for (1) the testing of private water supply wells, (2) rehabilitation of private wells, and (3) the proper closure of private, abandoned wells within the jurisdiction of the county.~~

Chapter 49 contains the nonpublic water supply well requirements.

Chapters 50 to 52 contain the provisions for water withdrawal and allocation.

Chapter 55 contains the provisions for public water supply aquifer storage and recovery.

Chapter 81 contains the provisions for the certification of public water supply system operators.

Chapter 82 contains the provisions for the certification of water well contractors.

Chapter 83 contains the provisions for the certification of laboratories to provide environmental testing of drinking water supplies.

ITEM 2. Amend rule **567—40.2(455B)**, definitions of “Consecutive public water supply,” “GAC10,” “Nontransient noncommunity water system” and “Ten States Standards,” as follows:

“Consecutive public water supply” means an active public water supply which purchases or obtains all or a portion of its water from another, separate public water supply, also called a wholesale system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

“GAC10” means granular activated carbon filter beds with an empty-bed contact time of ten minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 is 120 days when used as a best available technology for compliance with the maximum contaminant level locational running annual average for total trihalomethanes and haloacetic acids.

“Nontransient noncommunity water system” or “NTNC” means a public water system other than a community water system which regularly serves at least 25 of the same persons four hours or more per day, for four or more days per week, for 26 or more weeks per year. Examples of NTNCs are schools, day-care centers, factories, offices and other public water systems which provide water to a fixed population of 25 or more people. In addition, other service areas, such as hotels, resorts, hospitals and restaurants, are considered as NTNCs if they employ 25 or more people and are open regularly serve at least 25 or more of the same persons for four or more hours per day, for four or more days per week, for 26 or more weeks of the year.

“Ten States Standards” means the “Recommended Standards for Water Works,” 2003 2007 edition as adopted by the Great Lakes—Upper Mississippi River Board of State Sanitary Engineers and Provincial Public Health and Environmental Managers.

ITEM 3. Adopt the following **new** definitions in rule **567—40.2(455B)**:

“Bag filters” means pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed of a non-rigid, fabric filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to the outside.

“Bank filtration” means a water treatment process that uses a well to recover surface water that has naturally infiltrated into groundwater through a river bed or bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

“Cartridge filters” means pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed as rigid or semi-rigid, self-supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.

“Combined distribution system (CDS)” means the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

“Finished water” means water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary

to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion chemicals).

“Flowing stream” means a course of running water flowing in a definite channel.

“GAC20” means granular activated carbon filter beds with an empty-bed contact time of 20 minutes based on average daily flow and a carbon reactivation frequency of every 240 days.

“Lake or reservoir” means a natural or man-made basin or hollow on the Earth’s surface in which water collects or is stored that may or may not have a current or single direction of flow.

“Locational running annual average (LRAA)” means the average of the analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

“Membrane filtration” means a pressure- or vacuum-driven separation process in which particulate matter larger than 1 micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

“Plant intake” means the works or structures at the head of a conduit through which water is diverted from a surface water source (e.g., river, reservoir, or lake) into the treatment plant.

“Presedimentation” means a preliminary treatment process used to remove gravel, sand, and other particulate material from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant.

“Significant deficiency” includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the department determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

“Two-stage lime softening” means a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration.

“Uncovered finished water storage facility” means a tank, reservoir, or other facility used to store water that will undergo no further treatment to reduce microbial pathogens except residual disinfection and is directly open to the atmosphere. Such facilities are prohibited.

“Wholesale system” means a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

ITEM 4. Amend rule 567—40.3(17A,455B), introductory paragraph, as follows:

567—40.3(17A,455B) Forms. The following forms are used by the public to apply for department approvals and to report on activities related to the public water supply program of the department. All forms may be obtained from the Environmental Services Division, Administrative Support Station, Department of Natural Resources, Henry A. Wallace Building, 502 East Ninth Street, Des Moines, Iowa 50319-0034. Properly completed application forms shall be submitted to the Water Supply Section, Environmental Services Division. Water Supply System Monthly and Other Operation Reporting forms shall be submitted to the appropriate field office (see 567—subrule 42.4(3)). Properly completed laboratory forms (reference 567—Chapter 83) shall be submitted to the University State Hygienic Laboratory or as otherwise designated by the department.

ITEM 5. Amend subrule **40.3(1)**, Schedule No. “2c,” as follows:

<u>Schedule No.</u>	<u>Name of Form</u>	<u>Form Number</u>
“2c”	Notification <u>Notification of Minor Water Main Construction</u>	542-3152

ITEM 6. Amend numbered paragraph **41.2(1)“c”(1)“2”** as follows:

2. The public water supply system must collect samples at regular time intervals throughout the month, except that a system which uses only groundwater (~~except groundwater under the direct influence of surface water, as defined in 567—paragraph 43.5(1)“b”~~) and serves 4,900 persons or fewer, that is not under the direct influence of surface water and which is required to collect five or fewer routine coliform bacteria samples per month may collect all required samples on a single day if they are taken from different sites. A system that uses only groundwater and adds a chemical disinfectant or provides water with a disinfectant must measure the residual disinfectant concentration at the same points in the distribution system and at the same time as total coliform bacteria samples are collected. A system that uses surface water or IGW must comply with the requirements specified in 567—paragraph 43.5(4)“b”(2)“2.” The system shall report the residual disinfectant concentration to the laboratory with the bacteria sample; and comply with the applicable reporting requirements of 567—subrule 42.4(3).

ITEM 7. Amend subparagraph **41.2(1)“e”(3)** as follows:

(3) Total coliform bacteria analytical methodology. Public water supply systems must conduct total coliform analyses in accordance with one of the analytical methods in the following table:

Organism	Methodology ¹²	Citation ¹
Total Coliforms ²	Total Coliform Fermentation Technique ^{3,4,5}	9221A, B
	Total Coliform Membrane Filter Technique ⁶	9222A, B, C
	Presence-Absence (P-A) Coliform Test ^{5,7}	9221D
	ONPG-MUG Test ⁸	9223
	Colisure Test ⁹	
	E*Colite Test ¹⁰	
	m-ColiBlue ²⁴ Test ¹¹	
	ReadyCult Coliforms 100 Presence/Absence Test ¹³	
	Membrane Filter Technique Using Chromocult Coliform Agar ¹⁴	
Colitag Test ¹⁵		

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1, 6, 8, 9, 10, 11, 13, ~~and 14,~~ and 15 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800)426-4791. Documents may be inspected at EPA’s Drinking Water Docket, EPA West, 1301 Constitution Avenue NW, Room B102, Washington, DC 20460, telephone (202)566-2426; or at the Office of Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC 20408.

¹ to ¹⁴ No change.

¹⁵Colitag product for the determination of the presence/absence of total coliforms and *E. coli* is described in “Colitag Product as a Test for Detection and Identification of Coliforms and *E. coli* Bacteria in Drinking Water and Source Water as Required in National Primary Drinking Water Regulations,” August 2001, available from CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA 95403, telephone: (800)878-7654, Internet address: www.cpiinternational.com.

ITEM 8. Adopt the following **new** numbered paragraph **41.2(1)“e”(6)“10”**:

10. Colitag, as described in footnote 15 of the Total Coliform Methodology Table in 41.2(1)“e”(3).

ITEM 9. Amend subparagraph **41.3(1)“b”(1)** as follows:

(1) IOC MCLs. The following table specifies the MCLs for IOCs:

Contaminant	EPA Contaminant Code	Maximum Contaminant Level (mg/L)
Antimony	1074	0.006
Arsenic*	1005	0.05 (until January 23, 2006) 0.010 (beginning January 23, 2006)
Asbestos	1094	7 million fibers/liter (longer than 10 micrometers in length)
Barium	1010	2
Beryllium	1075	0.004
Cadmium	1015	0.005
Chromium	1020	0.1
Cyanide (as free Cyanide)	1024	0.2
Fluoride**	1025	4.0
Mercury	1035	0.002
Nitrate	1040	10 (as nitrogen)
Nitrite	1041	1.0 (as nitrogen)
Total Nitrate and Nitrite	1038	10 (as nitrogen)
Selenium	1045	0.05
Thallium	1085	0.002

*The arsenic MCL changed from 0.05 mg/L to 0.010 mg/L on January 23, 2006.

**The recommended fluoride level is 1.1 milligrams per liter or the level as calculated from “Water Fluoridation, a Manual for Engineers and Technicians” Table 2-4 published by the U.S. Department of Health and Human Services, Public Health Service (September 1986). At this optimum level in drinking water, fluoride has been shown to have beneficial effects in reducing the occurrence of tooth decay.

ITEM 10. Amend subrule 41.5(1), introductory paragraph, as follows:

41.5(1) MCLs and other requirements for organic chemicals. Maximum contaminant levels for ~~three~~ **two** classes of organic chemical contaminants specified in 41.5(1) “b” apply to community water systems and nontransient noncommunity water systems as specified herein. The ~~three~~ **two** referenced organic chemical classes are volatile organic chemicals (VOCs), and synthetic organic chemicals (SOCs), ~~and~~ trihalomethanes.

ITEM 11. Amend paragraph **41.5(1)“a”** as follows:

a. *Applicability.* The maximum contaminant levels for volatile and synthetic organic contaminants apply to community and nontransient noncommunity water systems. Compliance with the volatile and synthetic organic contaminant maximum contaminant level is calculated pursuant to 41.5(1)“b.” ~~The maximum contaminant level of 0.10 mg/L for total trihalomethanes (the sum of the concentrations of bromodichloromethane, tribromomethane (bromoform), dibromochloromethane, and trichloromethane (chloroform)) applies to all surface water community public water systems (CWS) serving 10,000 or more persons and all IGW CWS serving 10,000 or more persons until December 31, 2001, after which time the systems must comply with 41.6(455B). This 0.10 mg/L MCL also applies to all groundwater CWS serving 10,000 or more persons until December 31, 2003, after which time the systems must comply with 41.6(455B). Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to 41.5(1)“e”(4).~~

ITEM 12. Amend paragraph **41.5(1)“b”** as follows:

b. *Maximum contaminant levels (MCLs) and analytical methodology for organic compounds.* The maximum contaminant levels for organic chemicals are listed in the ~~following~~ table in subparagraph 41.5(1)“b”(1). Analyses for the contaminants in this subrule shall be conducted using the following methods, or their equivalent as approved by EPA.

(1) Table:

ORGANIC CHEMICAL CONTAMINANTS, CODES, MCLS, ANALYTICAL METHODS,
AND DETECTION LIMITS

Contaminant	EPA Contaminant Code	MCL (mg/L)	Methodology ¹	Detection Limit (mg/L)
Volatile Organic Chemicals (VOCs):				
Benzene	2990	0.005	502.2, 524.2	0.0005
Carbon tetrachloride	2982	0.005	502.2, 524.2, 551.1	0.0005
Chlorobenzene (mono)	2989	0.1	502.2, 524.2	0.0005
1,2-Dichlorobenzene (ortho)	2968	0.6	502.2, 524.2	0.0005
1,4-Dichlorobenzene (para)	2969	0.075	502.2, 524.2	0.0005
1,2-Dichloroethane	2980	0.005	502.2, 524.2	0.0005
1,1-Dichloroethylene	2977	0.007	502.2, 524.2	0.0005
cis-1,2-Dichloroethylene	2380	0.07	502.2, 524.2	0.0005
trans-1,2-Dichloroethylene	2979	0.1	502.2, 524.2	0.0005
Dichloromethane	2964	0.005	502.2, 524.2	0.0005
1,2-Dichloropropane	2983*	0.005	502.2, 524.2	0.0005
Ethylbenzene	2992	0.7	502.2, 524.2	0.0005
Styrene	2996	0.1	502.2, 524.2	0.0005
Tetrachloroethylene	2987	0.005	502.2, 524.2, 551.1	0.0005
Toluene	2991	1	502.2, 524.2	0.0005
1,1,1-Trichloroethane	2981	0.2	502.2, 524.2, 551.1	0.0005
Trichloroethylene	2984	0.005	502.2, 524.2, 551.1	0.0005
1,2,4-Trichlorobenzene	2378	0.07	502.2, 524.2	0.0005
1,1,2-Trichloroethane	2985	0.005	502.2, 524.2, 551.1	0.0005
Vinyl chloride	2976	0.002	502.2, 524.2	0.0005
Xylenes (total)	2955*	10	502.2, 524.2	0.0005
Synthetic Organic Chemicals (SOCs):				
Alachlor ³	2051	0.002	505, 507, 508.1, 525.2, 551.1	0.0002
Aldicarb	2047	0.003	531.1, 6610	0.0005
Aldicarb sulfone	2044	0.002	531.1, 6610	0.0008
Aldicarb sulfoxide	2043	0.004	531.1, 6610	0.0005
Atrazine ³	2050	0.003	505, 507, 508.1, 525.2, 551.1, Syngenta AG-625	0.0001
Benzo(a)pyrene	2306	0.0002	525.2, 550, 550.1	0.00002
Carbofuran	2046	0.04	531.1, 531.2, 6610	0.0009
Chlordane ³	2959	0.002	505, 508, 508.1, 525.2	0.0002
2,4-D ⁶ (as acids, salts, and esters)	2105	0.07	515.1, 515.2, 515.3, 515.4, 555, D5317-93	0.0001
Dalapon	2031	0.2	515.1, 515.3, 515.4, 552.1, 552.2	0.001
1,2-Dibromo-3-chloropropane (DBCP)	2931	0.0002	504.1, 551.1	0.00002
Di(2-ethylhexyl)adipate	2035	0.4	506, 525.2	0.0006
Di(2-ethylhexyl)phthalate	2039	0.006	506, 525.2	0.0006
Dinoseb ⁶	2041	0.007	515.1, 515.2, 515.3, 515.4, 555	0.0002
Diquat	2032	0.02	549.2	0.0004
Endothall	2033	0.1	548.1	0.009

Contaminant	EPA Contaminant Code	MCL (mg/L)	Methodology ¹	Detection Limit (mg/L)
Endrin ³	2005	0.002	505, 508, 508.1, 525.2, 551.1	0.00001
Ethylene dibromide (EDB)	2946	0.00005	504.1, 551.1	0.00001
Glyphosate	2034	0.7	547, 6651	0.006
Heptachlor ³	2065	0.0004	505, 508, 508.1, 525.2, 551.1	0.00004
Heptachlor epoxide ³	2067	0.0002	505, 508, 508.1, 525.2, 551.1	0.00002
Hexachlorobenzene ³	2274	0.001	505, 508, 508.1, 525.2, 551.1	0.0001
Hexachlorocyclopentadiene ³	2042	0.05	505, 508, 508.1, 525.2, 551.1	0.0001
Lindane (gamma BHC) ³	2010	0.0002	505, 508, 508.1, 525.2, 551.1	0.00002
Methoxychlor ³	2015	0.04	505, 508, 508.1, 525.2, 551.1	0.0001
Oxamyl	2036	0.2	531.1, 531.2, 6610	0.002
Pentachlorophenol	2326	0.001	515.1, 515.2, 515.3, 515.4, 525.2, 555, D5317-93	0.00004
Picloram ^{3,6}	2040	0.5	515.1, 515.2, 515.3, 515.4, 555, D5317-93	0.0001
Polychlorinated biphenyls ⁴ (as decachlorobiphenyl) (as Arochlors) ³	2383	0.0005	508A 505, 508, 508.1, 525.2	0.0001
Simazine ³	2037	0.004	505, 507, 508.1, 525.2, 551.1	0.00007
2,3,7,8-TCDD (dioxin)	2063	3x10 ⁻⁸	1613	5x10 ⁻⁹
2,4,5-TP ⁶ (Silvex)	2110	0.05	515.1, 515.2, 515.3, 515.4, 555, D5317-93	0.0002
Toxaphene ³	2020	0.003	505, 508, 508.1, 525.2	0.001
Total Trihalomethanes (TTHMs)⁵:				
Total Trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform), and trichloromethane (chloroform))	2950	0.10	502.2, 524.2, 551.1	

*As of January 1, 1999, the contaminant codes for the following compounds were changed from the Iowa Contaminant Code to the EPA Contaminant Code:

Contaminant	Iowa Contaminant Code (Old)	EPA Contaminant Code (New)
1,2 Dichloropropane	2325	2983
Xylenes (total)	2974	2955

¹ to ⁴ No change.

⁵The TTHM MCL for surface water or influenced groundwater CWS and NTNC systems serving over 10,000 persons was changed to 0.080 mg/L on January 1, 2002. All remaining CWS and NTNC will be required to comply with the 0.080 mg/L MCL on January 1, 2004. See rule 41.6(455B) for additional requirements. Reserved.

⁶No change.

(2) Organic chemical compliance calculations (~~other than total trihalomethanes~~). Compliance with 41.5(1) "b"(1) shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL listed in 41.5(1) "b"(1), the system is in violation of the MCL.

If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected. If a sample result is less than the detection limit, zero will be used when calculating the running annual average. If the system is in violation of an MCL, the water supplier is required to give notice to the department in accordance with 567—subrule 42.4(1) and to notify the public as required by 567—42.1(455B).

1. to 3. No change.

(3) No change.

ITEM 13. Amend subrule 41.6(1), catchwords, as follows:

41.6(1) *Disinfection byproducts Stage 1 disinfection byproducts requirements.*

ITEM 14. Amend paragraph **41.6(1)“a”** as follows:

a. Applicability.

(1) and (2) No change.

(3) Compliance dates for this rule are based upon the source water type and the population served.

Systems are required to comply with this rule as follows, unless otherwise noted. The department may assign an earlier monitoring period as part of the operation permit, but compliance with the maximum contaminant level is not required until the dates stated below.

~~1.—Surface water and IGW CWS and NTNC. CWS and NTNC systems using surface water or groundwater under the direct influence of surface water in whole or in part and which serve 10,000 or more persons must comply with this rule beginning January 1, 2002. CWS and NTNC systems serving fewer than 10,000 persons must comply with this rule beginning January 1, 2004.~~

~~2.—Groundwater CWS and NTNC.~~

~~●—Community water systems which use a groundwater source, which serve a population of 10,000 or more individuals, and which add a disinfectant or oxidant to the water in any part of the drinking water treatment process shall monitor for only total trihalomethanes in accordance with 41.6(1)“e”(1) and (4), 41.6(1)“d,” 41.6(1)“e”(1) and (4), and 41.6(1)“f,” until December 31, 2003. The MCL for these systems is 0.010 mg/L until December 31, 2003.~~

~~●—Beginning January 1, 2004, all CWS and NTNC systems using only groundwater not under the direct influence of surface water must comply with this rule.~~

1. CWS and NTNC systems which use surface water or groundwater under the direct influence of surface water in whole or in part and which serve 10,000 or more persons must comply with this rule beginning January 1, 2002.

2. All other CWS and NTNC systems covered by 41.6(1)“a”(1) must comply with this rule by January 1, 2004.

~~3.—Rescinded IAB 1/7/04, effective 2/11/04.~~

(4) Consecutive systems. Consecutive systems that provide water containing a disinfectant or oxidant are required to comply with this rule. ~~A consecutive system may be incorporated into the sampling plan of the supply that produces the water (the primary water supplier), provided:~~

~~1.—There is a mutual signed agreement between the primary and consecutive system supplied by that primary system that states the primary system will be responsible for the compliance of its consecutive system with this rule, regardless of additional treatment by the consecutive system.~~

~~2.—Beginning with the primary water supply, each successive consecutive system must also be included in the primary supply’s sampling plan, so that there is no system with its own sampling plan between the primary supply and the consecutive supply covered by the primary supply’s plan.~~

~~3.—It is understood by the primary and all consecutive systems that, even if only one system in the sampling plan has a violation, all systems in the sampling plan will receive the violation and be required to conduct public notification.~~

~~4.—The department receives a copy of the signed agreement and approves the sampling plan prior to the beginning of the compliance period.~~

~~If a mutual agreement is not possible, each system (the primary system and each consecutive system) is responsible for compliance with this rule for its specific system.~~

(5) No change.

ITEM 15. Amend paragraph **41.6(1)“b”** as follows:

b. *Maximum contaminant levels for disinfection byproducts.*

(1) The maximum contaminant levels (MCLs) for disinfection byproducts are as follows:

Disinfection byproduct	MCL (mg/L)
Bromate	0.010
Chlorite	1.0
Haloacetic acids (HAA5)	0.060
Total trihalomethanes (TTHM)*	0.080 0.10 until December 31, 2003*

*The MCL of 0.10 mg/L only applies to a CWS using groundwater sources that serves at least 10,000 people. Beginning January 1, 2004, the TTHM MCL for all CWS and NTNC systems regardless of source type and system size is 0.080 mg/L. The TTHM MCL changed from 0.10 mg/L to 0.080 mg/L effective January 1, 2002, for CWS serving at least 10,000 people and effective January 1, 2004, for all other CWS and NTNC systems which are subject to this rule.

(2) Beginning on the date listed in the following table, a system must comply with the total trihalomethanes MCL and the haloacetic acid MCL as a locational running annual average at each monitoring location.

System Size (number of people served)	Date system must comply with MCL at each sampling location*
<u>Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system</u>	
<u>System serving at least 100,000 people</u>	<u>April 1, 2012</u>
<u>System serving 50,000-99,999 people</u>	<u>October 1, 2012</u>
<u>System serving 10,000-49,999 people</u>	<u>October 1, 2013</u>
<u>System serving fewer than 10,000 people</u>	<ul style="list-style-type: none"> • <u>October 1, 2013, for all groundwater systems and for SW/IGW systems that did not collect <i>Cryptosporidium</i> source water samples</u> • <u>October 1, 2014, for SW/IGW systems that collected <i>Cryptosporidium</i> source water samples.</u>
<u>Other systems that are part of a combined distribution system</u>	
<u>Consecutive or wholesale system</u>	<u>At the same time as the system with the earliest compliance date in the combined distribution system</u>

*The department may grant up to an additional 24 months for compliance with the MCLs and operational evaluation levels if the system requires capital improvements to comply with an MCL.

ITEM 16. Amend subparagraph **41.6(1)“c”(1)** as follows:

(1) General requirements.

1. to 5. No change.

6. Each system required to monitor under the provisions of this rule or 567—43.6(455B) 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 41.6(1)“a”(3). All systems using surface water or groundwater under the direct influence of surface water and serving more than 3,300 people must submit a copy of the monitoring plan to the department by the applicable date in 41.6(1)“a”(3)“1.” 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:

- Specific locations and schedules for collecting samples for any parameters included in this rule.
- How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

● If providing water to one or more consecutive systems, and the consecutive systems have agreed to the sampling plan by the primary supplier of the water pursuant to 41.6(1)“a”(4), the sampling plan of the primary water supplier must reflect the entire distribution system.

7. No change.

ITEM 17. Amend subparagraph 41.6(1)“c”(2) as follows:

(2) Bromate. Community and nontransient noncommunity systems using ozone for disinfection or oxidation must conduct monitoring for bromate.

1. No change.

2. Reduced monitoring. ~~The department may allow systems required to analyze for bromate to 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 greater than or equal to 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 41.6(1)“e”(2)“1.”~~ A system 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 for the most recent four quarters. If the system previously qualified for reduced bromate monitoring and is on quarterly sampling frequency, it may remain on reduced monitoring as long as the running annual average of the bromate samples is less than or equal to 0.0025 mg/L. If the running annual average of quarterly bromate samples exceeds 0.0025 mg/L, the system must resume routine bromate monitoring. Only three analytical methods may be used for bromate samples under reduced monitoring: EPA Method 317.0 Revision 2.0, Method 326.0, or Method 321.8.

ITEM 18. Amend subparagraph 41.6(1)“c”(4) as follows:

(4) Total trihalomethanes (TTHM) and haloacetic acids (HAA5).

1. Routine monitoring. Systems must monitor at the frequency indicated in the following table. Both the TTHM and HAA5 samples must be collected as paired samples during the same time period in order for each parameter to have the same annual average period for result comparison. A paired sample is one that is collected at the same location and time and is analyzed for both TTHM and HAA5 parameters.

Routine Monitoring Frequency for TTHM and HAA5

Type of System (source water type and population served)	Minimum Monitoring Frequency	Sample Location in the Distribution System
SW/IGW ³ system serving ≥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
SW/IGW ³ system serving 500-9,999 persons	One water sample per quarter per treatment plant	Locations representing maximum residence time. ¹
SW/IGW ³ system serving <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 41.6(1)“c”(4)“2,” fourth unnumbered second bulleted paragraph.

Type of System (source water type and population served)	Minimum Monitoring Frequency	Sample Location in the Distribution System
System using only non-IGW groundwater using chemical disinfectant and serving $\geq 10,000$ persons	One water sample per quarter per treatment plant ²	Locations representing maximum residence time. ¹
System using only non-IGW groundwater using chemical disinfectant and serving $< 10,000$ 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 41.6(1)“c”(4)“2,” fourth unnumbered second bulleted paragraph.

¹ If a system chooses 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 department approval.

³ SW/IGW indicates those systems that use either surface water (SW) or groundwater under the direct influence of surface water (IGW), in whole or in part.

2. **Reduced monitoring.** The department may allow systems a reduced monitoring frequency, except as otherwise provided, in accordance with the following table. Source water total organic carbon (TOC) levels must be determined in accordance with 567—subparagraph 43.6(2)“c”(1).

Reduced Monitoring Frequency for TTHM and HAA5

If you are a ...	And you have monitored at least one year and your ...	You may reduce monitoring to this level
SW/IGW ¹ system serving $\geq 10,000$ persons which has a source water annual average TOC level, before any treatment, of ≤ 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.
SW/IGW ¹ system serving 500 - 9,999 persons that has a source water annual average TOC level, before any treatment, of ≤ 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.
SW/IGW ¹ system serving < 500 persons	Any SW/IGW ¹ system serving < 500 persons may not reduce its monitoring to less than one sample per treatment plant per year.	
System using only non-IGW groundwater using chemical disinfectant and serving $\geq 10,000$ 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.

If you are a ...	And you have monitored at least one year and your ...	You may reduce monitoring to this level
System using only non-IGW groundwater using chemical disinfectant and serving <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.

¹ SW/IGW indicates those systems that use either surface water (SW) or groundwater under the direct influence of surface water (IGW), in whole or in part.

- 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 less than or equal to 0.060 mg/L for TTHMs and is less than or equal to 0.045 mg/L for HAA5. Systems that do not meet these levels must resume monitoring at the frequency identified in 41.6(1)“c”(4)“1” in the quarter immediately following the quarter in which the system exceeds 0.060 mg/L for TTHMs and 0.045 mg/L for HAA5. For systems using only groundwater not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to increased monitoring identified in 41.6(1)“c”(4)“1” in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L for TTHMs or 0.060 mg/L for HAA5.

- The department may allow systems on increased monitoring to return to routine monitoring if, after one year of monitoring, TTHM annual average is less than or equal to 0.060 mg/L and HAA5 annual average is less than or equal to 0.045 mg/L.

- The department may return a system to routine monitoring at the department’s discretion.

ITEM 19. Rescind subparagraph **41.6(1)“d”(2)** and adopt the following new subparagraph in lieu thereof:

(2) Systems must measure disinfection byproducts by the methods (as modified by the footnotes) listed in the following table:

Approved Methods for Disinfection Byproduct Compliance Monitoring

Contaminant and Methodology	EPA Method ¹	Standard Method ²	ASTM Method ³
TTHM			
P&T/GC/EICD & PID	502.2 ⁴		
P&T/GC/MS	524.2		
LLE/GC/ECD	551.1		
HAA5			
LLE (diazomethane)/GC/ECD		6251 B ⁵	
SPE (acidic methanol)/GC/ECD	552.1 ⁵		
LLE (acidic methanol)/GC/ECD	552.2, 552.3		
Bromate			
Ion chromatography	300.1		D 6581-00

Contaminant and Methodology	EPA Method ¹	Standard Method ²	ASTM Method ³
Ion chromatography & postcolumn reaction ⁹	317.0 Rev. 2.0 ⁶ , 326.0 ⁶		
IC/ICP-MS ⁹	321.8 ⁶ , ⁷		
Chlorite			
Amperometric titration		4500-ClO ₂ E ⁸	
Spectrophotometry	327.0 Rev. 1.1 ⁸		
Ion chromatography	300.0, 300.1, 317.0 Rev. 2, 326.0		

ECD = electron capture detector

IC = ion chromatography

P&T= purge and trap

EICD = electrolytic conductivity detector

LLE = liquid/liquid extraction

PID = photoionization detector

GC = gas chromatography

MS = mass spectrometer

SPE = solid phase extractor

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents was approved by the Director of the Federal Register on February 16, 1999, in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800)426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street SW, Washington, DC 20460 (telephone: (202)260-3027); or at the Office of Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC 20408.

¹EPA: The following methods are available from the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161 (telephone: (800)553-6847):

Methods 300.0 and 321.8: Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1, USEPA, August 2000, EPA 815-R-00-014 (available through NTIS, PB2000-106981).

Method 300.1: "Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision 1.0," EPA-600/R-98/118, 1997 (available through NTIS, PB98-169196).

Method 317.0: "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis, Revision 2.0," USEPA, July 2001, EPA 815-B-01-001.

Method 326.0: "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis, Revision 1.0" USEPA, June 2002, EPA 815-R-03-007.

Method 327.0: "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry, Revision 1.1," USEPA, May 2005, EPA 815-R-05-008.

Methods 502.2, 524.2, 551.1, and 552.2: Methods for the Determination of Organic Compounds in Drinking Water—Supplement III, EPA-600/R-95-131, August 1995 (NTIS PB95-261616).

Method 552.1: Methods for the Determination of Organic Compounds in Drinking Water—Supplement II, EPA-600/R-92-129, August 1992 (NTIS PB92-207703).

Method 552.3: "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection, Revision 1.0," USEPA, July 2003, EPA-815-B-03-002.

²4500-ClO₂ E: Standard Methods for the Examination of Water and Wastewater, 19th and 20th editions, American Public Health Association, 1995 and 1998, respectively, which is available from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

³Method D 6581-00: American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428: Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 2001 (or any year containing the cited version).

⁴If TTHMs are the only analytes being measured in the sample, then a PID is not required.

⁵The samples must be extracted within 14 days of sample collection.

⁶Ion chromatography and postcolumn reaction or IC/ICP-MS must be used for bromate analysis for purposes of demonstrating eligibility of reduced monitoring.

⁷Samples must be preserved at sample collection with 50 mg ethylenediamine (EDA)/L of sample and must be analyzed within 28 days.

⁸Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in 41.6(1) “c”(3)“1.” Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in 41.6(1) “c”(3)“2” and “3.”

⁹These are the only methods approved for reduced bromate monitoring under 41.6(1) “c”(2)“2.”

ITEM 20. Amend subparagraph **41.6(1)“d”(3)** as follows:

(3) Certified laboratory requirements. Analyses under this rule for disinfection byproducts shall only be conducted by laboratories that have been certified by the department and are in compliance with the requirements of 567—Chapter 83, except as specified under 41.6(1) “d”(4). The performance evaluation sample acceptance limits and minimum reporting levels are listed in 567—subparagraph 83.6(7) “a”(6).

ITEM 21. Adopt the following **new** subrule 41.6(2):

41.6(2) Stage 2 initial distribution system evaluation. The department is adopting by reference the requirements for the Stage 2 initial distribution system evaluation (IDSE) listed in 40 CFR 141.600-605 as adopted on January 4, 2006. This regulation establishes monitoring and other requirements for identifying compliance monitoring locations that will be used to determine compliance with maximum contaminant levels for total trihalomethanes and haloacetic acids. All CWS required to comply with 41.6(1) and all NTNC serving at least 10,000 people that are required to comply with 41.6(1) are required to comply with this subrule. The requirements in this subrule constitute national primary drinking water regulations. Only the analytical methods specified in 41.6(1) “d” may be used to demonstrate compliance with this subrule.

ITEM 22. Adopt the following **new** subrule 41.6(3):

41.6(3) Stage 2 disinfection byproducts requirements. The requirements of this subrule constitute national primary drinking water regulations. This subrule establishes monitoring and other requirements for achieving compliance with MCLs based on locational running annual averages (LRAA) for TTHM and HAA5.

a. Applicability. All CWS and NTNC systems that use a primary or residual disinfectant other than ultraviolet light or deliver water that has been treated with a primary or residual disinfectant other than ultraviolet light must comply with the requirements in this subrule.

(1) Schedule. Systems must comply with the dates listed in the appropriate schedule. For the purposes of this subrule, the combined distribution system (CDS) as defined in 567—40.2(455B) only includes active connections; emergency connections are excluded. Any CWS or NTNC that purchases or sells water on a routine basis through an active connection to another CWS or NTNC is part of a combined distribution system. All systems included in a CDS must adhere to the schedule of the system that serves the largest population in that CDS. The system must comply with the requirements on the schedule for systems that are not a part of a CDS and for systems that serve the largest population in the CDS. The schedule for the other systems that are a part of a CDS, either wholesale or consecutive, is the same schedule as that of the system with the earliest compliance date in the CDS.

Schedule	System Population	Date by which system must begin Stage 2 compliance monitoring
1	At least 100,000	April 1, 2012
2	50,000-99,999	October 1, 2012
3	10,000-49,999	October 1, 2013
4	Fewer than 10,000	<ul style="list-style-type: none"> • October 1, 2013, for all GW systems and any SW/IGW systems that did not conduct <i>Cryptosporidium</i> sampling under 567—43.11(3) “b”(2)“4” • October 1, 2014, for SW/IGW systems that conducted <i>Cryptosporidium</i> sampling under 567—43.11(3) “b”(2)“4”

(2) Initiation of compliance monitoring under Stage 2. Systems shall switch from Stage 1 compliance monitoring (41.6(1)) to Stage 2 monitoring as follows:

1. Systems required to conduct quarterly monitoring must start monitoring in the first full calendar quarter that includes the compliance date in the preceding table.

2. Systems that conducted IDSE monitoring and have an approved report and that are required to conduct monitoring at a frequency less than quarterly must start monitoring in the calendar month recommended in the approved IDSE report.

3. Systems that were not required to prepare an IDSE report under 41.6(2) must update their Stage 1 monitoring plan to meet the Stage 2 requirements and submit it to the department for approval six months prior to the compliance date in the preceding table.

(3) Timing of initial determination of compliance under Stage 2.

1. Systems required to conduct quarterly monitoring must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the results of subsequent sampling. Compliance determination must continue at the end of each subsequent quarter.

2. Systems required to conduct monitoring at a frequency that is less than quarterly must make compliance calculations beginning with the first compliance sample taken after the compliance date.

(4) Monitoring and compliance.

1. Systems required to monitor quarterly must calculate LRAAs for TTHM and HAA5 using the monitoring results collected under this subrule and determine that each LRAA does not exceed the MCL. If the system does not complete the four consecutive quarters of monitoring, the system must calculate the compliance with the MCL based on the average of the available data from the most recent four quarters. If the system collects more than one sample per quarter at a monitoring location, all samples taken in the quarter at that location must be averaged to determine a quarterly average to be used for the LRAA calculation. If a system fails to monitor, it is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA.

2. Systems required to monitor yearly or triennially must determine that each sample collected is less than the MCL. If any sample exceeds the MCL, the system must comply with the requirements of 41.6(3) "e." If no sample exceeds the MCL, the sample result for each monitoring location is considered to be the LRAA for that monitoring location. If a system fails to monitor, it is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA.

3. The department may grant up to an additional 24 months for compliance with MCLs and operational evaluation levels if the system is required to make capital improvements in order to comply with an MCL.

(5) Any CWS or NTNC system that begins using water to which a disinfectant has been added, other than ultraviolet light, after the initial compliance dates for IDSE or Stage 2 compliance monitoring must comply with this subrule.

b. Monitoring plan. All systems must develop and implement a disinfection byproduct monitoring plan, which shall be kept on file at the system for review by the department and the public. The monitoring plan must contain the monitoring locations, monitoring dates, and compliance calculation procedures.

(1) If the system has an approved IDSE-standard monitoring plan (IDSE-SMP) report, that report contains all of the plan elements and meets this requirement.

(2) If the system does not have an approved IDSE-SMP report and does not have sufficient monitoring locations from its initial disinfection byproduct sampling plan, the system must identify additional locations by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. The system must provide the rationale for identifying locations as having high levels of TTHM or HAA5.

(3) If the system does not have an approved IDSE-SMP report and has more monitoring locations from its initial Stage 1 disinfection byproduct sampling plan than the number of locations required under the Stage 2 compliance monitoring, the system must identify which locations it will use for compliance

monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified.

(4) All plans must be reviewed by the system every three years and updated as system conditions change (such as changes in water quality or hydraulics, etc.).

1. A system may revise its monitoring plan to reflect changes in treatment, distribution system operations, and layout (including new service areas), to reflect other factors that may affect TTHM or HAA5 formation, or for department-approved reasons.

2. The system must consult with the department regarding the need for changes and the appropriateness of changes. The system must replace existing compliance monitoring locations that have the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels.

3. The department may require modifications in the system’s monitoring plan.

(5) Systems are also required to maintain the disinfectant and MRDL elements of the Stage 1 monitoring plan pursuant to 567—paragraphs 43.6(1)“c”(1)“5” and 41.6(1)“c”(1)“6.”

(6) All systems are required to have a valid disinfection byproducts monitoring plan prior to the start of compliance monitoring in 41.6(3)“a”(1).

c. *Routine monitoring.* Systems are required to start monitoring at the locations specified in the approved disinfection byproducts monitoring plan and on the schedule specified in 41.6(3)“a”(1). Each system must monitor the disinfection byproducts at the minimum number of locations identified in the Routine Monitoring table.

Routine Monitoring

Source water type	Population size category	Monitoring frequency	Total number of distribution system monitoring location sites per monitoring period
SW/IGW	<500	per year	2
	500-3,300	per quarter	2
	3,301-9,999	per quarter	2
	10,000-49,999	per quarter	4
	50,000-249,999	per quarter	8
Groundwater	<500	per year	2
	500-9,999	per year	2
	10,000-99,999	per quarter	4
	100,000-499,999	per quarter	6

(1) All systems must monitor during the month of highest disinfection byproduct concentrations.

(2) Systems on a quarterly monitoring frequency must collect samples for TTHM and HAA5 every 90 days at each monitoring location, except that SW/IGW systems serving 500 to 3,300 people may collect at one location as provided in 41.6(3)“c”(3). Each sample collected at each location must be analyzed for both TTHM and HAA5 components.

(3) Systems on an annual monitoring frequency and SW/IGW systems serving 500 to 3,300 people are required to collect TTHM and HAA5 samples at the locations with the highest TTHM and HAA5 concentrations, respectively. Each sample must be analyzed for both TTHM and HAA5 components. Sample collection is required from only one location if the highest TTHM concentration and the highest HAA5 concentration occur at the same location.

(4) Analytical methods. Systems must use an approved method listed in 41.6(1)“d”(2) for TTHM and HAA5 analyses pursuant to this subrule. Analyses must be conducted by laboratories certified for disinfection byproducts analyses in accordance with 567—Chapter 83.

d. *Reduced monitoring.* A system may reduce monitoring to the level specified in the Reduced Monitoring table anytime the locational running annual average is less than or equal to half the MCL for TTHM and HAA5 at all monitoring locations (i.e., less than or equal to 0.040 mg/L for TTHM and

0.030 mg/L for HAA5). Only data collected under the provisions of this rule may be used to qualify for reduced monitoring.

Reduced Monitoring

Source water type	Population size category	Monitoring frequency ¹	Distribution system monitoring location sites per monitoring period ²
SW/IGW	<500	per year	Monitoring may not be reduced
	500-3,300	per year	1 sample per year at the same location if the highest TTHM and HAA5 measurements occurred at the same location and in the same quarter, analyzed for both TTHM and HAA5
	3,301-9,999	per year	2 samples: one at the location and during the quarter with the highest TTHM single measurement; one at the location and during the quarter with the highest HAA5 single measurement
	10,000-49,999	per quarter	2 samples: one at the highest TTHM LRAA location and one at the highest HAA5 LRAA location
	50,000-249,999	per quarter	4 samples: one sample each at the highest two TTHM LRAA locations and one sample each at the highest two HAA5 LRAA locations
Groundwater	<500	every third year	1 sample per year at the same location if the highest TTHM and HAA5 measurements occurred at the same location and in the same quarter, analyzed for both TTHM and HAA5
	500-9,999	per year	1 sample per year at the same location if the highest TTHM and HAA5 measurements occurred at the same location and in the same quarter, analyzed for both TTHM and HAA5
	10,000-99,999	per year	2 samples: one at the location and during the quarter with the highest TTHM single measurement; one at the location and during the quarter with the highest HAA5 single measurement
	100,000-499,999	per quarter	2 samples: one at the highest TTHM LRAA location and one at the highest HAA5 LRAA location

¹Systems on a quarterly monitoring frequency must collect the sample(s) every 90 days.

²Each sample must be analyzed for all TTHM and HAA5 components.

(1) Additional source water TOC requirement for SW/IGW systems. For SW/IGW systems, the source water running annual average TOC level, before any treatment, must be less than or equal to 4.0 mg/L at each treatment plant treating surface water or influenced groundwater, based on the monitoring conducted under 567—paragraph 43.6(2) “b,” in order to qualify for reduced monitoring.

(2) Continued reduced monitoring frequency. Systems may remain on a reduced monitoring frequency as long as they meet the following criteria. For SW/IGW systems, the source water annual average TOC level requirement in 41.6(3) “d”(1) must continue to be met.

1. A system with a quarterly reduced monitoring frequency may remain on reduced monitoring as long as the TTHM LRAA is less than or equal to 0.040 mg/L and the HAA5 LRAA is less than or equal to 0.030 mg/L at each monitoring location.

2. A system with an annual or triennial monitoring frequency may remain on reduced monitoring as long as each TTHM sample is less than or equal to 0.060 mg/L and each HAA5 sample is less than or equal to 0.045 mg/L.

(3) Return to routine monitoring frequency. Systems that cannot meet the requirements for reduced monitoring must resume routine monitoring according to 41.6(3)“c” or begin increased monitoring according to 41.6(3)“e.”

1. A system with a quarterly reduced monitoring frequency must resume routine monitoring if the LRAA from any location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5.

2. A system with an annual or triennial monitoring frequency must resume routine monitoring if the annual sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5.

3. Any SW/IGW system must resume routine monitoring if the running annual average source water TOC level, prior to any treatment, is more than 4.0 mg/L.

4. In addition, the department may require any system to resume routine monitoring at the department’s discretion.

(4) Remaining on reduced monitoring from Stage 1 to Stage 2 transition. A system may remain on reduced monitoring after the dates listed in 41.6(3)“a”(1) if all of the following three criteria are met. If the three criteria are not met, the system must return to routine monitoring.

1. Under the IDSE, the system qualified for a 40/30 certification or received a very small system waiver;

2. The system meets the reduced monitoring criteria of this paragraph; and

3. The system has not changed or added locations for disinfection byproduct monitoring from those used under the Stage 1 requirements in 41.6(1).

e. Increased monitoring.

(1) Systems that are monitoring annually or triennially must increase their monitoring frequency to quarterly if the following conditions are met.

1. Single result exceeds the TTHM or HAA5 MCL. A system that is monitoring annually or triennially must increase monitoring to quarterly at all locations if a single TTHM sample is greater than 0.080 mg/L or a single HAA5 sample is greater than 0.060 mg/L. The quarterly samples must be analyzed for both TTHM and HAA5 components.

2. Systems with a TTHM or HAA5 MCL violation. A system that is monitoring annually or triennially that is in violation of the MCL for TTHM or HAA5, based upon the LRAA, must increase monitoring to quarterly at all locations. The quarterly samples must be analyzed for both TTHM and HAA5 components. The LRAA is calculated based on four consecutive quarters of monitoring or based on fewer quarters of data if the MCL would be exceeded regardless of the monitoring results of subsequent quarters.

(2) Systems on a quarterly monitoring frequency during Stage 1 to Stage 2 transition. A system that was on increased monitoring under Stage 1 must remain on increased monitoring until the system qualifies for a return to routine monitoring under 41.6(3)“e”(3). The system must conduct the increased monitoring at the monitoring locations in the monitoring plan developed under 41.6(3)“b,” beginning on the date identified in 41.6(3)“a”(1).

(3) Return to routine monitoring frequency. A system may return to routine monitoring once the system has conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is less than or equal to 0.060 mg/L for TTHM and less than or equal to 0.045 mg/L for HAA5. The system may not have any monitoring violations during the most recent four consecutive quarters.

f. Operational evaluation level (OEL).

(1) TTHM operational evaluation level. The TTHM operational evaluation level is determined by the sum of the two previous quarters’ TTHM results plus twice the current quarter’s TTHM result, divided by 4 to determine an average. If that average exceeds 0.080 mg/L, the system has exceeded the TTHM operational evaluation level.

(2) HAA5 operational evaluation level. The HAA5 operational evaluation level is determined by the sum of the two previous quarters’ HAA5 results plus twice the current quarter’s HAA5 result, divided by 4 to determine an average. If that average exceeds 0.060 mg/L, the system has exceeded the HAA5 operational evaluation level.

(3) A system must calculate the operational evaluation level at any monitoring location that has a single analytical result in excess of the TTHM or HAA5 MCL in the analytical data used to calculate the current 12-month LRAA. A system must determine compliance with the OEL every quarter.

(4) Requirements when the operational evaluation level is exceeded. The system must conduct an operational evaluation and submit a written report of the evaluation to the department within 90 days after the system is notified of the analytical result that caused the system to exceed the operational evaluation level. The written report must be made available to the public upon request. The report must include an examination of system treatment and distribution operational practices, including storage tank operations, excess storage capacity, distribution system flushing, changes in source water or source water quality, and treatment changes or problems that may contribute to disinfection byproduct formation, and what steps could be considered to minimize future exceedances.

1. The system may make a request to the department to limit the scope of the examination if the system is able to identify the cause of the operational evaluation level exceedance. The 90-day deadline for submitting the written report cannot be extended.

2. The system must have department approval to limit the scope of the examination. The approval must be in writing and kept with the completed report.

g. Reporting. All systems required to comply with this rule must meet the reporting requirements pursuant to 567—paragraph 42.4(3)“d.”

h. Record keeping. All systems required to comply with this rule must retain the monitoring plans and analytical results as required by 567—paragraph 42.5(1)“h.”

ITEM 23. Amend numbered paragraph **41.8(1)“c”(1)“2”** as follows:

2. To determine compliance with 41.8(1)“b”(1), the detection limit shall not exceed the following concentrations:

Detection Limits for Gross Alpha Particle Activity,
Radium-226, Radium-228, and Uranium

Contaminant	Detection Limit
Gross alpha particle activity	3 pCi/L
Radium-226	1 pCi/L
Radium-228	1 pCi/L
Uranium	Reserve <u>1 µg/L</u>

ITEM 24. Amend numbered paragraph **41.8(1)“e”(4)“2”** as follows:

2. Six-year frequency. If the average of the initial monitoring results for gross alpha particle activity, uranium, and combined radium-226 and radium-228 is at or above the detection limit and at or below half the MCL for that contaminant, the system must collect and analyze for that contaminant using at least one sample at that source/entry point every six years. The analytical results for radium-226 and radium-228 must be added together to yield the combined result.

ITEM 25. Amend numbered paragraph **41.8(1)“f”(3)“2”** as follows:

2. Reduced monitoring. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L (screening level), the department may reduce the frequency of monitoring at that sampling point to every three years. Systems must collect all samples required in 41.8(1)“f”(3) during the reduced monitoring period.

ITEM 26. Amend subparagraph **41.8(1)“f”(6)** as follows:

(6) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample, and the appropriate doses must be calculated and summed to determine compliance with 41.8(1)“b”(2)“1,” using the formula in 41.8(1)“b”(2)“2.”

Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

ITEM 27. Amend subparagraph **41.8(1)“f”(7)** as follows:

(7) Monitoring after an MCL violation. Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in 41.8(1)“b”(2) beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of three monthly samples, that the MCL is being met. Systems that establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in ~~41.8(1)“f”(2)“3” 41.8(1)“f”(2) or 41.8(1)“f”(3)“1,” first bulleted paragraph. 41.8(1)“f”(3)“2.”~~

ITEM 28. Adopt the following **new** paragraph **42.1(7)“d”**:

d. Repeated failure to conduct monitoring of the source water for Cryptosporidium.

(1) Applicability. The owner or operator of any public water system that is required to monitor source water under 567—43.11(455B) must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect samples in any three months of monitoring as specified in 567—paragraph 43.11(3)“a.” The notice must be repeated as specified in 42.1(3).

(2) Form and manner of notice. The form and manner of the special notice must follow the Tier 2 public notice requirements in 42.1(3) and be presented as required in 42.1(5)“b.”

(3) Mandatory language. The special notice must contain the following language, including the language necessary to fill in the brackets.

“We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at the [treatment plant name] is sufficient to adequately remove *Cryptosporidium* from your drinking water. We are required to complete this monitoring and make this determination by [required bin determination date]. We [“did not monitor or test” or “did not complete all monitoring or testing”] on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate *Cryptosporidium* removal. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of [date]. For more information, please call [name of water system contact] of [name of water system] at [telephone number].”

(4) Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

ITEM 29. Adopt the following **new** paragraph **42.1(7)“e”**:

e. Failure to determine bin classification or mean Cryptosporidium level.

(1) Applicability. The owner or operator of a public water system that is required to determine a bin classification under 567—subrule 43.11(5) must notify persons served by the water system that the determination has not been made as required no later than 30 days after the system has failed to report the determination as specified in 567—paragraph 43.11(5)“c.” The notice must be repeated as specified in 42.1(3). The notice is not required if the system is in compliance with a department-approved schedule to address the violation.

(2) Form and manner of notice. The form and manner of the special notice must follow the Tier 2 public notice requirements in 42.1(3) and be presented as required in 42.1(5)“b.”

(3) Mandatory language. The special notice must contain the following language, including the language necessary to fill in the brackets.

“We are required to monitor the source of your drinking water for *Cryptosporidium* in order to determine by [date] whether water treatment at the [treatment plant name] is sufficient to adequately remove *Cryptosporidium* from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of [date]. For more information, please call [name of water system contact] of [name of water system] at [telephone number].”

(4) Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

ITEM 30. Amend paragraph **42.3(3)“c,”** introductory paragraph, as follows:

c. Information on detected contaminants. This paragraph specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*, which is listed in 42.3(3)“c”(2)) as follows: contaminants subject to an MCL, action level, MRDL, or treatment technique (regulated contaminants); contaminants for which monitoring is required by CFR Title 40, Part 141.40 (unregulated contaminants), 567—subrule 41.11(1) (sodium monitoring), and 567—41.15(455B) (other contaminants); and disinfection byproducts or microbial contaminants for which monitoring is required by 567—Chapters 40 to 43, except as provided under 42.3(3)“e”(1), and which are detected in the finished water. The ammonia monitoring conducted pursuant to 567—subrule 41.11(2) is not subject to this paragraph. For the purposes of this subrule, “detected” means at or above the levels prescribed by the following: inorganic contaminants in 567—subparagraph 41.3(1)“e”(1); volatile organic contaminants in 567—paragraph 41.5(1)“b”; synthetic organic contaminants in 567—paragraph 41.5(1)“b”; radionuclide contaminants in 567—paragraph 41.9(1)“e” 41.8(1)“c”; disinfection byproducts in 567—paragraph 83.6(7)“a”(6)“3”; and other contaminants with health advisory levels, as assigned by the department.

ITEM 31. Amend numbered paragraph **42.3(3)“c”(1)“3”** as follows:

3. For contaminants subject to an MCL, except turbidity and total coliforms, the table must contain the highest contaminant level used to determine compliance with a primary drinking water standard and the range of detected levels, as follows:

- When compliance with the MCL is determined annually or less frequently: the highest detected level at any sampling point and the range of detected levels expressed in the same units as the MCL (such as inorganic compounds).

- When compliance with the MCL is determined by calculating a running annual average of all samples taken at a sampling point: the highest average of any of the sampling points and the range of all sampling points expressed in the same units as the MCL (such as organic compounds and radionuclides). For TTHM and HAA5 MCLs, systems must include the highest locational running annual average for TTHM and HAA5 and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5 MCL, the system must include the locational running annual averages for all locations that exceed the MCL.

- When compliance with an MCL is determined on a systemwide basis by calculating a running annual average of all samples at all sampling points: the average and range of detection expressed in the same units as the MCL (~~such as total trihalomethane compounds~~).

NOTE: When rounding of results to determine compliance with the MCL is allowed by the regulations, rounding should be done prior to multiplying the results by the factor listed in Appendix C.

ITEM 32. Amend subparagraph **42.4(3)“d”(2)** as follows:

(2) Disinfection byproducts. Systems must report the information specified in the following table:

Disinfection Byproducts Reporting Table

If you are a ...	You must report ...
System monitoring for TTHMs and HAA5 under the requirements of 567—subparagraph 41.6(1)“c”(4) on a quarterly or more frequent basis	<ol style="list-style-type: none"> 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 all samples taken in the last quarter. 4. The annual arithmetic average of the quarterly arithmetic averages for the last four quarters.* 5. Whether the MCL was exceeded. 6. <u>Under Stage 2, any operational evaluation levels that were exceeded during the quarter, including the location and date and the calculated TTHM and HAA5 levels.</u>

If you are a ...	You must report ...
System monitoring for TTHMs and HAA5 under the requirements of 567—subparagraph 41.6(1) “c”(4) less frequently than quarterly, but at least annually	<ol style="list-style-type: none"> 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 the MCL was exceeded.
System monitoring for TTHMs and HAA5 under the requirements of 567—subparagraph 41.6(1) “c”(4) less frequently than annually	<ol style="list-style-type: none"> 1. The location, date, and result of the last sample taken. 2. Whether the MCL was exceeded.
System monitoring for chlorite under the requirements of 567—subparagraph 41.6(1) “c”(3)	<ol style="list-style-type: none"> 1. The number of samples taken each month for the last 3 months. 2. The location, date, and result of each sample taken during the last quarter. 3. For each month in the reporting period, the arithmetic average of all samples taken in each three sample set taken in the month. 4. Whether the MCL was exceeded, and in which month it was exceeded.
System monitoring for bromate under the requirements of 567—subparagraph 41.6(1) “c”(2)	<ol style="list-style-type: none"> 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 the MCL was exceeded.

*The calculation of the running annual average will transition from a system-wide RAA calculation under Stage 1 to a locational running annual average (LRAA) under Stage 2. The transition will commence according to the system schedule listed in 567—paragraph 41.6(1) “b.” Beginning at the end of the fourth calendar quarter that follows the compliance date, and at the end of each subsequent quarter, the system must report the arithmetic average of quarterly results for the last four quarters of each monitoring location. If the calculated LRAA, based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, the system must report this information to the department no later than the due date of the next compliance report.

ITEM 33. Amend subparagraph **42.4(3)“d”(4)** as follows:

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

Disinfection Byproduct Precursors and Enhanced Coagulation or Enhanced Softening Reporting Table

If you are a ...	You must report ...
System monitoring monthly or quarterly for TOC under the requirements of 567—subparagraph 43.6(1)“c”(2) and required to meet the enhanced coagulation or enhanced softening requirements in 567—subparagraph 43.6(3)“b”(2) or (3).	<ol style="list-style-type: none"> 1. The number of paired (source water and treated water, prior to continuous 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 567—subparagraph 43.6(3)“c”(1). 5. Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in 567—paragraph 43.6(3)“b” for the last four quarters.

If you are a ...	You must report ...
System monitoring monthly or quarterly for TOC under the requirements of 567—subparagraph 43.6(1)“c”(2) and meeting one or more of the alternative compliance criteria in 567—subparagraph 43.6(3)“a”(2) or (3).	<ol style="list-style-type: none"> 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 567—numbered paragraph 43.6(3)“a”(2)“1” or “3” or of treated water TOC for systems meeting the criterion in 567—numbered paragraph 43.6(3)“a”(2)“2.” 5. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in 567—numbered paragraph 43.6(3)“a”(2)“5” or of treated water SUVA for systems meeting the criterion in 567—paragraph 43.6(3)“a”(2)“6.” 6. The running annual average of source water alkalinity for systems meeting the criterion in 567—numbered paragraph 43.6(3)“a”(2)“3” and of treated water alkalinity for systems meeting the criterion in 567—paragraph 43.6(3)“a”(3)“1.” 7. The running annual average for both TTHM and HAA5 for systems meeting the criterion in 567—numbered paragraph 43.6(3)“a”(2)“3” or “4.” 8. The running annual average for the amount of magnesium hardness removal (as CaCO₃, in mg/L) for systems meeting the criterion in 567—numbered paragraph 43.6(3)“a”(3)“2.” 9. Whether the system is in compliance with the particular alternative compliance criterion in 567—subparagraph 43.6(3)“a”(2) or (3).
SW/IGW system on reduced monitoring for TTHM/HAA5 under the requirements of 567—paragraph 41.6(3)“d.”	<p>For each treatment plant that treats surface or IGW source water, report the following:</p> <ol style="list-style-type: none"> 1. The number of source water TOC samples taken each month during the last quarter. 2. The date and result of each sample taken during the last quarter. 3. The quarterly average of monthly samples taken during the last quarter or the result of the quarterly sample. 4. The running annual average (RAA) of quarterly averages from the past four quarters. 5. Whether the TOC RAA exceeded 4.0 mg/L.

ITEM 34. Amend numbered paragraph **42.5(1)“a”(2)“1”** as follow:

1. ~~Bacteria. Records of bacteriological analyses made pursuant to this subrule shall be kept for not less than five years.~~ Microbiological and turbidity: Records of microbiological analyses and turbidity analyses made pursuant to 567—Chapters 41 and 43 shall be kept for not less than five years.

ITEM 35. Adopt the following **new** paragraph **42.5(1)“h”**:

h. Monitoring plans. Copies of monitoring plans developed pursuant to 567—Chapters 41, 42, and 43 shall be kept for the same period of time as the records of analyses taken under the plans are required to be kept, unless otherwise specified.

ITEM 36. Amend **567—Chapter 42**, Appendix C, “Regulated Contaminants Table for Consumer Confidence Report,” “Synthetic Organic Contaminants” section, entry for “Haloacetic Acids,” as follows:

Contaminant (CCR units)	MCL, in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major sources in drinking water	Health effects language
Haloacetic Acids (HAA) (ppb)	0.060	1000	60	n/a (footnote 4)	Byproduct of drinking water disinfection	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.

ITEM 37. Amend 567—Chapter 42, Appendix C, “Regulated Contaminants Table for Consumer Confidence Report,” “Volatile Organic Contaminants” section, entry for “TTHMs,” as follows:

Contaminant (CCR units)	MCL, in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major sources in drinking water	Health effects language
TTHMs [total trihalomethanes] Total trihalomethanes (TTHM) (ppb)	0.10 or 0.080 (footnote 4)	1000	100 or 80	n/a (footnote 4)	Byproduct of drinking water disinfection	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

ITEM 38. Amend 567—Chapter 42, Appendix C, footnote “4,” as follows:

⁴Beginning on January 1, 2002, for surface water and influenced groundwater systems serving at least 10,000 persons, the TTHM MCL is 0.080 mg/L. For all other systems, the TTHM MCL is 0.10 mg/L until January 1, 2004, at which time the TTHM MCL is 0.080 mg/L for all systems required to monitor under 567—41.6(455B). The MCLGs for total trihalomethanes and haloacetic acids:

<u>Disinfection Byproduct</u>	<u>MCLG, mg/L</u>	<u>MCLG in CCR units</u>
<u>Bromodichloromethane</u>	<u>0</u>	<u>0</u>
<u>Bromoform</u>	<u>0</u>	<u>0</u>
<u>Chloroform</u>	<u>0.07</u>	<u>70</u>
<u>Dibromochloromethane</u>	<u>0.06</u>	<u>60</u>
<u>Dichloroacetic acid</u>	<u>0</u>	<u>0</u>
<u>Monochloroacetic acid</u>	<u>0.07</u>	<u>70</u>
<u>Trichloroacetic acid</u>	<u>0.02</u>	<u>20</u>

ITEM 39. Amend subrule 43.1(5), introductory paragraph, as follows:

43.1(5) Requirement for certified operator. The department maintains a list of operators who are certified in accordance with 567—Chapter 81. The list includes the operator’s name, certification classification (Water Treatment, Water Distribution, or Grade A Water System), and grade (A, I, II, III, or IV), and is periodically updated during the year.

ITEM 40. Amend paragraph 43.3(2)“a” as follows:

a. The standards for a project are the Ten States Standards as adopted through 2007 and the American Water Works Association (AWWA) Standards as adopted through 2003 2010 and 43.3(7) to 43.3(9). To the extent of any conflict between the Ten States Standards and the American Water Works Association Standards and 43.3(7) to 43.3(9), the Ten States Standards, 43.3(2), and 43.3(7) to 43.3(9) shall prevail. Additional standards include the following:

(1) Polyvinyl chloride (PVC) pipe manufactured in accordance with ASTM D2241, AWWA C900, AWWA C905, ASTM F1483, or AWWA C909 may be used for water main construction. The maximum allowable pressure for PVC or polyethylene (PE) pipe shall be determined based on a safety factor of ~~2.5~~ 2.0 and a surge allowance of no less than two feet per second (2 fps).

(2) and (3) No change.

ITEM 41. Amend paragraph 43.3(3)“a” as follows:

a. *Construction permit issuance conditions.* A permit to construct shall be issued by the director if the director concludes from the application and specifications submitted pursuant to 43.3(4) and 567—40.4(455B) that the project will comply with the rules of the department. The construction of the project must begin within one year from the date the permit was issued; if it is not, the permit is no longer valid. If construction is ongoing and continuous (excepting winter delays) and the permitted project cannot be completed within one year, the permit shall remain valid until the project is completed. The department may grant an extension of the permit for segmented projects, for a maximum two

additional years, provided the department’s design and construction standards have not changed during the intervening period.

ITEM 42. Amend subparagraph **43.3(10)“b”(1)** as follows:

(1) Inorganic compounds. The department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the inorganic contaminants listed in 567—paragraph 41.3(1) “b,” except arsenic and fluoride.

INORGANIC CHEMICAL	BAT(s)
Antimony	2, 7
Arsenic ^d	1, 2, 5, 6, 7, 9, 11 ^e
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Cadmium	2, 5, 6, 7
Chromium	2, 5, 6 ^b , 7
Cyanide	5, 7, 10 <u>12</u>
Mercury	2 ^a , 4, 6 ^a , 7 ^a
Nickel	5, 6, 7
Nitrate	5, 7, 9
Nitrite	5, 7
Selenium	1, 2 ^c , 6, 7, 9
Thallium	1, 5

Key to BATs

1=Activated Alumina	5=Ion Exchange	9=Electrodialysis
2=Coagulation/Filtration*	6=Lime Softening*	10=Chlorine
3=Direct and Diatomite Filtration	7=Reverse Osmosis	11=Oxidation/Filtration
4=Granular Activated Carbon	8=Corrosion Control	<u>12=Alkaline Chlorination (pH greater than or equal to 8.5)</u>

*not BAT for systems with less than 500 service connections

^aBAT only if influent Hg concentrations are less than or equal to 10 micrograms/liter.

^bBAT for Chromium III only.

^cBAT for Selenium IV only.

^dBAT for Arsenic V. Preoxidation may be required to convert Arsenic III to Arsenic V.

^eTo obtain high removals, iron to arsenic ratio must be at least 20:1.

ITEM 43. Amend paragraph **43.3(10)“c”** as follows:

c. BATs for disinfection byproducts and disinfectants. The department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the disinfection byproducts listed in 567—paragraph 41.5(2) “b,” and the maximum residual disinfectant levels listed in 567—paragraph 41.5(2) “c.”

DBP MCL or MRDL	Best Available Technology
Bromate MCL	Control of ozone treatment process to reduce production of bromate
Chlorite MCL	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels
HAA5 and TTHM MCL running annual average	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant
HAA5 and TTHM MCL LRAA	<ul style="list-style-type: none"> • Non-consecutive system: Enhanced coagulation or enhanced softening, plus GAC10; or nanofiltration with a molecular weight cutoff that is less than or equal to 1000 Daltons; or GAC20 • Consecutive system serving at least 10,000 persons*: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance • Consecutive system serving fewer than 10,000 persons*: Improved distribution system and storage tank management to reduce residence time
TTHM MCL	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant
MRDL	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels

* Applies only to the disinfected water that consecutive systems buy or otherwise receive.

ITEM 44. Amend paragraph 43.5(2)“a” as follows:

a. *Disinfection treatment criteria.* The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation or removal of viruses, acceptable to the department. At least 0.5 log inactivation of *Giardia lamblia* cysts must be achieved through disinfection treatment even if the required inactivation or removal is met or exceeded through physical treatment processes. Each system is required to calculate the total inactivation ratio ($CT_{\text{calculated}}/CT_{\text{required}}$) each day the treatment plant is in operation. The system’s total inactivation ratio must be equal to or greater than 1.0 in order to ensure that the minimum inactivation and removal requirements have been achieved.

ITEM 45. Amend subparagraph 43.6(1)“a”(5) as follows:

(5) Consecutive systems. Consecutive systems that provide water containing a disinfectant or oxidant are required to comply with this rule. ~~A consecutive system may be incorporated into the sampling plan of the supply that produces the water (the primary water supplier), provided:~~

1. ~~There is a mutual signed agreement between the primary and consecutive system supplied by that primary system that states the primary system will be responsible for the compliance of its consecutive system with this rule, regardless of additional treatment by the consecutive system.~~

2. ~~Beginning with the primary water supply, each successive consecutive system must also be included in the primary supply’s sampling plan, so that there is no system with its own sampling plan between the primary supply and the consecutive supply covered by the primary supply’s plan.~~

3. ~~It is understood by the primary and all consecutive systems that even if only one system in the sampling plan has a violation, all systems in the sampling plan will receive the violation and be required to conduct public notification.~~

4. ~~The department receives a copy of the signed agreement and approves the sampling plan prior to the beginning of the compliance period.~~

~~If a mutual agreement is not possible, each system (the primary system and each consecutive system) is responsible for compliance with this rule for its specific system.~~

ITEM 46. Amend subparagraph **43.6(1)“d”(1)** as follows:

(1) Analytical methods. Systems must measure residual disinfectant concentrations for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table:

Approved Methods for Residual Disinfectant Compliance Monitoring

Methodology	Standard Methods	ASTM Other Method	Residual measured ¹			
			Free Chlorine	Combined Chlorine	Total Chlorine	Chlorine Dioxide
Amperometric Titration	4500-Cl D	ASTM: D 1253-86 (96), 03	X	X	X	
Low Level Amperometric Titration	4500-Cl E				X	
DPD Ferrous Titrimetric	4500-Cl F		X	X	X	
DPD Colorimetric	4500-Cl G		X	X	X	
Syringaldazine (FACTS)	4500-Cl H		X			
Iodometric Electrode	4500-Cl I				X	
DPD	4500-ClO ₂ D					X
Amperometric Method II	4500-ClO ₂ E					X
<u>Lissamine Green Spectrophotometric</u>		<u>EPA: 327.0 Rev. 1.1</u>				<u>X</u>

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents was approved by the Director of the Federal Register on February 16, 1999, in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800)426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street SW, Washington, DC 20460 (telephone: (202)260-3027); or at the Office of Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC 20408.

The following method is available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428:

Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 1996: Method D 1253-86.

The following methods are available from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005: Standard Methods for the Examination of Water and Wastewater, 19th edition and 20th editions, American Public Health Association, 1995 and 1998, respectively (both editions are acceptable): Methods: 4500-Cl D, 4500-Cl E, 4500-Cl F, 4500-Cl G, 4500-Cl H, 4500-Cl I, 4500-ClO₂ D, 4500-ClO₂ E.

The following methods are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161 (telephone: (800)553-6847):

“Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry, Revision 1.1,” USEPA, May 2005, EPA 815-R-05-008.

¹ X indicates method is approved for measuring specified residual disinfectant. Free chlorine or total chlorine may be measured for demonstrating compliance with the chlorine MRDL, and combined chlorine or total chlorine may be measured for demonstrating compliance with the chloramine MRDL.

ITEM 47. Amend subparagraph **43.6(2)“b”(1)** as follows:

(1) Routine monitoring for total organic carbon (TOC).

1. Surface water and groundwater under the direct influence of surface water systems which use conventional filtration treatment must monitor each treatment plant for total organic carbon (TOC) no later than at the point of combined filter effluent turbidity monitoring and representative of the treated water. ~~All systems required to monitor under this paragraph~~ The systems 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 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 set of source water and treated water samples and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

2. Surface water and groundwater under the direct influence of surface water systems which do not use conventional filtration treatment must conduct the TOC monitoring under 43.6(2) “b”(1)“1” in order to qualify for reduced disinfection byproduct monitoring for TTHM and HAA5 under 567—paragraph 41.6(1) “c”(4)“2.” 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, a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

ITEM 48. Amend subparagraph 43.6(2)“c”(1) as follows:

(1) Analytical methods. Systems required to monitor disinfectant byproduct precursors must use the following methods, which must be conducted by a certified laboratory pursuant to 567—Chapter 83, unless otherwise specified.

Approved Methods for Disinfection Byproduct Precursor Monitoring¹

Analyte	Methodology	EPA	Standard Methods	ASTM	Other
Alkalinity ⁶	Titrimetric		2320B	D 1067-92B	
	Electrometric titration				I-1030-85
Bromide	Ion chromatography	300.0			
		<u>317.0</u> Rev. 2.0			
		<u>326.0</u>			
				D 6581-00	
Dissolved Organic Carbon ²	High temperature combustion		5310B or <u>5310B-00</u>		
	Persulfate-UV or heated-persulfate oxidation		5310C or <u>5310C-00</u>		
	Wet oxidation		5310D or <u>5310D-00</u>		
		<u>415.3</u> Rev. <u>1.1</u>			
pH ³	Electrometric	150.1	4500-H ⁺ -B	D 1293-84	
		150.2			
Total Organic Carbon ⁴	High temperature combustion		5310B or <u>5310B-00</u>		
	Persulfate-UV or heated-persulfate oxidation		5310C or <u>5310C-00</u>		
	Wet oxidation		5310D or <u>5310D-00</u>		
		<u>415.3</u> Rev. <u>1.1</u>			
Ultraviolet Absorption at 254 nm ⁵	UV absorption		5910B or <u>5910B-00</u>		
		<u>415.3</u> Rev. <u>1.1</u>			

¹The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents was approved by the Director of the Federal Register on February 16, 1999, in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800)426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street SW, Washington, DC 20460 (telephone: (202)260-3027); or at the Office of Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC 20408.

The following methods are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428:

Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 1996: Method D 1067-92B and Method D1293-84.

Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 2001 (or any year containing the cited version): Method D 6581-00.

The following methods are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161 (telephone: (800)553-6847):

"Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision 1.0," EPA-600/R-98/118, 1997 (NTIS, PB98-169196): Method 300.1.

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1983, (NTIS PB84-128677): Methods 150.1 and 150.2.

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA-600/R-93/100, August 1993, (NTIS PB94-121811): Method 300.0.

"Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis, Revision 2.0," USEPA, July 2001, EPA 815-B-01-001: Method 317.0.

"Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis, Revision 1.0" USEPA, June 2002, EPA 815-R-03-007: Method 326.0.

"Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water, Revision 1.1," USEPA, February 2005, EPA/600/R-05/055: Method 415.3 Revision 1.1.

The following methods are available from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005:

Standard Methods for the Examination of Water and Wastewater, 19th edition, American Public Health Association, 1995: Methods: 2320B (20th edition, 1998, is also accepted for this method), 4500-H⁺-B, and 5910B.

Standard Methods for the Examination of Water and Wastewater, Supplement to the 19th edition, American Public Health Association, 1996: Methods: 5310B, 5310C, and 5310D.

For method numbers ending "-00", the year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that are IBR-approved.

Method I-1030-85 is available from the Books and Open-File Reports Section, U.S. Geological Survey, Federal Center, Box 25425, Denver, CO 80225-0425.

²Dissolved Organic Carbon (DOC). DOC and UV₂₅₄ samples used to determine a SUVA value must be taken at the same time and at the same location, prior to the addition of any disinfectant or oxidant by the system. Prior to analysis, DOC samples must be filtered through a 0.45 µ pore-diameter filter, as soon as practical after sampling, not to exceed 48 hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within 28 days. Inorganic carbon must be removed from the samples prior to analysis. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet a DOC concentration of <0.5 mg/L. ~~DOC samples must be filtered through the 0.45 µ pore diameter filter prior to acidification. DOC samples must either be analyzed or must be acidified to achieve pH less than 2.0 by minimal addition of phosphoric or sulfuric acid as soon as practical after sampling, not to exceed 48 hours. Acidified DOC samples must be analyzed within 28 days.~~

³No change.

⁴Total Organic Carbon (TOC). Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. ~~TOC samples must either be analyzed or must be acidified to achieve pH less than 2.0 by minimal addition of phosphoric or sulfuric acid as soon as practical after sampling, not to exceed 24 hours. TOC samples must be acidified at the time of sample collection to achieve a pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within 28 days.~~

⁵ and ⁶No change.

ITEM 49. Adopt the following **new** subparagraph **43.6(2)“c”(3)**:

(3) Magnesium. All methods approved for magnesium in 567—subparagraph 41.3(1)“e”(1) are approved for use in measuring magnesium under this rule.

ITEM 50. Amend subparagraph **43.7(4)“d”(1)** as follows:

(1) Notification of residents. At least 45 days prior to commencing with the partial replacement of a lead service line, the water system shall provide to the resident(s) of all buildings served by the line notice explaining that the resident(s) may experience a temporary increase of lead levels in their drinking water, along with guidance on measures consumers may take to minimize their exposure to lead. The department may allow the water system to provide this notice less than 45 days prior to commencing partial lead service line replacement where such replacement is in conjunction with emergency repairs. In addition, the water system shall inform the resident(s) served by the line that the system will, at the system’s expense, collect from each partially replaced lead service line a sample that is representative of the water in the service line for analysis of lead content, as prescribed under 567—~~subparagraph 41.4(1)“b”(3), paragraph 41.4(1)“c”(2)“3,”~~ within 72 hours after the completion of the partial replacement of the service line. The system shall collect the sample and report the results of the analysis to the owner and the resident(s) served by the line within three business days of receiving the results. Mailed notices postmarked within three business days of receiving the results shall be considered “on time.”

ITEM 51. Amend paragraph **43.9(1)“c”** as follows:

c. Prohibition of ~~new construction of uncovered intermediate or finished water reservoirs~~ new construction storage facilities. ~~Systems are not permitted to begin construction of uncovered intermediate or finished water storage facilities. Systems that are required to comply with this rule may construct only covered intermediate or finished water storage facilities. For the purposes of this rule, an intermediate storage facility is defined as a storage facility or reservoir after the clarification treatment process.~~

ITEM 52. Amend paragraph **43.10(1)“b”** as follows:

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

ITEM 53. Amend numbered paragraph **43.10(2)“b”(2)“1”** as follows:

1. If the system uses only one point of disinfectant application, it must determine:
 - One inactivation ratio (CT calc/CT_{99,9}) before or at the first customer during peak hourly flow,or
 - Successive (CT calc/CT_{99,9}) values, representing sequential inactivation ratios, between the point of disinfection application and a point before or at the first customer during peak hourly flow. Under this alternative, the system must calculate the total inactivation ratio by determining (CT calc/CT_{99,9}) for each sequence and then adding the (CT calc/CT_{99,9}) values together to determine (\sum CT calc/CT_{99,9}).

ITEM 54. Adopt the following **new** rule 567—43.11(455B):

567—43.11(455B) Enhanced treatment for *Cryptosporidium*.

43.11(1) Applicability. The requirements of this rule are national primary drinking water regulations and establish or extend treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium*. These requirements are in addition to the filtration and disinfection requirements of 567—43.5(455B), 567—43.9(455B) and 567—43.10(455B) and apply to all Iowa public water systems supplied by surface water or influenced groundwater sources.

a. Wholesale systems. Wholesale systems must comply with the requirements based on the population of the largest system in the combined distribution system.

b. *Filtered systems.* The requirements of this rule for filtered systems apply to systems that are required to provide filtration treatment pursuant to 567—43.5(455B), whether or not the system is currently operating a filtration system.

43.11(2) General requirements. Systems subject to this rule must comply with the following requirements:

a. *Source water monitoring.* Systems must conduct two rounds of source water monitoring for each plant that treats a surface water or influenced groundwater source. This monitoring may include sampling for *Cryptosporidium*, *E. coli*, and turbidity, as described in 43.11(3), to determine what level, if any, of additional *Cryptosporidium* treatment the systems must provide.

b. *Disinfection profiles and benchmarks.* Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in 43.11(4).

c. *Cryptosporidium treatment bin determination.* Systems must determine their *Cryptosporidium* treatment bin classification and provide additional treatment for *Cryptosporidium*, if required, according to the prescribed schedule.

d. *Additional treatment for Cryptosporidium.* Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in 43.11(8) through 43.11(13).

e. *Record keeping and reporting.* Systems must comply with the applicable record-keeping and reporting requirements described in 43.11(14) and 43.11(15).

f. *Significant deficiencies.* Systems must address significant deficiencies identified during sanitary surveys as described in 43.1(7).

43.11(3) Source water monitoring.

a. *Schedule.* Systems must conduct the source water monitoring no later than the month and year listed in Table 1. A system may avoid the source water monitoring if the system provides a total of at least 5.5-log treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in 43.11(6). The system must install and operate technologies to provide this level of treatment by the applicable treatment compliance date specified in 43.11(7).

Table 1: Source Water Monitoring Schedule

System	First round of monitoring	Second round of monitoring
Serves at least 100,000 people	October 2006	April 2015
Serves 50,000-99,999 people	April 2007	October 2015
Serves 10,000-49,999 people	April 2008	October 2016
Serves fewer than 10,000 people and only conducts <i>E. coli</i> monitoring	October 2008	October 2017
Serves fewer than 10,000 people and conducts <i>Cryptosporidium</i> monitoring	April 2010	April 2019

b. *Monitoring requirements.* The minimum monitoring requirements are listed below. Systems may sample more frequently, provided the sampling frequency is evenly spaced throughout the monitoring period.

(1) Systems serving at least 10,000 people. Systems serving at least 10,000 people must sample their source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for 24 months.

(2) Systems serving fewer than 10,000 people. Systems serving fewer than 10,000 people are allowed to first conduct *E. coli* monitoring to determine if further monitoring for *Cryptosporidium* is required.

1. Systems must sample their source water for *E. coli* at least once every two weeks for 12 months. If the annual mean *E. coli* concentration is at or below 100 *E. coli* per 100 mL, the system can avoid further *Cryptosporidium* monitoring in that sampling round.

2. A system may avoid *E. coli* monitoring if the system notifies the department no later than three months prior to the *E. coli* monitoring start date that the system will conduct *Cryptosporidium* monitoring.

3. Systems that fail to conduct the required *E. coli* monitoring or that cannot meet the *E. coli* annual mean limit are required to conduct *Cryptosporidium* monitoring. The system must sample its source water for *Cryptosporidium* either at least twice per month for 12 months or at least monthly for 24 months.

4. A system that begins monitoring for *E. coli* and determines during the sampling period that the system mathematically cannot meet the applicable *E. coli* annual mean limit may discontinue the *E. coli* sampling. The system is then required to start *Cryptosporidium* monitoring according to the schedule in Table 1.

(3) Plants operating only part of the year. Systems with surface water or influenced groundwater treatment plants that operate for only part of the year must conduct source water monitoring in accordance with this rule, but with the following modifications.

1. Systems must sample their source water only during the months that the plant operates unless the department specifies another monitoring period based on plant operating practices.

2. Systems with plants that operate less than six months per year and that monitor for *Cryptosporidium* must collect at least six samples per year for two years.

(4) New sources. A system that begins using a new surface water or influenced groundwater source after the dates in Table 1 must monitor according to a schedule approved by the department and meet the requirements of this subrule. The system must also meet the requirements of the bin classification and *Cryptosporidium* treatment for the new source on a schedule approved by the department. The system must conduct the second round of source water monitoring no later than six years following the initial bin classification or determination of the mean *Cryptosporidium* level, as applicable.

(5) Monitoring violation determination. Failure to collect any source water sample required under this subrule in accordance with the sampling plan, location, analytical method, approved laboratory, or reporting requirements of 43.11(3)“c” through 43.11(3)“e” is a monitoring violation.

(6) Grandfathered monitoring data. Systems were allowed to use source water monitoring *Cryptosporidium* data collected prior to the applicable start date in Table 1 to meet the requirements of the first round of monitoring, a process referred to as grandfathering data. This grandfathered data substituted for an equivalent number of months at the end of the monitoring period and had to meet the requirements of 40 CFR 141.707 as adopted on January 5, 2006, which the department hereby adopts by reference. Department approval of the grandfathered data application is required.

c. *Sampling plan.* Systems must submit a sampling plan that specifies the sampling locations in relation to the sources and treatment processes and the calendar dates when the system will collect each required sample. The specific treatment process locations that must be included in the plan are pretreatment, points of chemical treatment, and filter backwash recycle.

(1) The sampling plan must be submitted no later than three months prior to the applicable monitoring date in Table 1. If the department does not respond to a system regarding the submitted sampling plan prior to the start of the monitoring period, the system must sample according to the submitted sampling plan.

(2) The plan must be submitted in a form acceptable to the department.

(3) The system must monitor within two days of the date specified in the plan, unless one of the following conditions occurs.

1. If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided, and causes the system to be unable to sample in the scheduled five-day period, the system must sample as close to the scheduled date as is feasible unless the department approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the department within one week of the missed sampling period. A replacement sample must be collected.

2. If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method or

quality control requirements, or failure of the laboratory to analyze the sample, the system must notify the department of the cause of the delay and collect a replacement sample.

3. A replacement sample must be collected within 21 days of the scheduled sampling period or on the resampling date approved by the department.

(4) Missed sampling dates. Systems that fail to meet the dates in their sampling plan for any source water sample must revise their sampling plan to add dates for collecting all missed samples. The revised schedule must be submitted to the department for approval prior to the collection of the missed samples.

d. Sampling locations. Systems must collect samples for each treatment plant that treats a surface water or influenced groundwater source.

(1) Chemical treatment location. Systems must collect source water samples prior to chemical treatment. If the system cannot feasibly collect a sample prior to chemical treatment, the department may grant approval for the system to collect the sample after chemical treatment. This approval would only be granted if the department determines in writing that collecting the samples prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

(2) Filter backwash recycle return location. Systems that recycle filter backwash water must collect the source water samples prior to the point of filter backwash water addition.

(3) Bank filtration credit sampling location.

1. Systems that receive *Cryptosporidium* treatment credit for bank filtration under 43.9(3) "b" or 43.10(4) "c" must collect source water samples in the surface water source prior to bank filtration.

2. Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well, which is after bank filtration has occurred. Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under 43.11(10) "c."

(4) Multiple sources. Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and groundwater sources, must collect samples as follows:

1. The use of multiple sources during monitoring must be consistent with routine operational practice.

2. If a sampling tap is available where the sources are combined prior to treatment, the system must collect samples from that tap.

3. If a sampling tap where the sources are combined prior to treatment is not available, the system must collect samples at each source near the intake on the same day and must use either of the following options for sample analysis.

- Physically composite the source samples into a single sample for analysis. Systems may composite the sample from each source into one sample prior to analysis. The volume of the sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.

- Analyze the samples separately and mathematically composite the results. Systems may analyze samples from each source separately and calculate a weighted average of the analytical results for each sampling date. The weighted average must be calculated by multiplying the analytical result for each source by the fraction that source contributed to the total plant flow at the time the sample was collected and then summing the weighted analytical results.

e. Analytical methodology, laboratory certification, and data reporting requirements. Systems must have samples analyzed pursuant to the specifications listed in this paragraph. The system must report, in a format acceptable to the department, the analytical results from the source water monitoring no later than ten days after the end of the first month following the month when the sample is collected.

(1) *Cryptosporidium.* Systems must have *Cryptosporidium* samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of *Cryptosporidium* in Water.

1. There are two approved analytical methods for *Cryptosporidium*: “Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA,” 2005, US EPA, EPA-815-R-05-002; and, “Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA,” 2005, US EPA, EPA-815-R-05-001.

2. Using one of the two approved methods, the laboratory must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL.

3. A matrix spike (MS) sample must be spiked and filtered by the laboratory according to the approved method. If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

4. Flow cytometer-counted spiking suspensions must be used for the matrix spike samples and the ongoing precision and recovery samples.

5. The following data elements must be reported for each *Cryptosporidium* analysis:

- PWSID.
- Facility ID.
- Sample collection date.
- Sample type (i.e., field or matrix spike).
- Sample volume filtered (L), to the nearest 0.25 L.
- Whether 100 percent of the filtered volume was examined by the laboratory.
- Number of oocysts counted.
- For matrix spike samples: sample volume spiked and estimated number of oocysts spiked.
- For samples in which less than 10 L is filtered or less than 100 percent of the sample volume is examined: the number of filters used and the packed pellet volume.

• For samples in which less than 100 percent of sample volume is examined: the volume of resuspended concentrate and the volume of this resuspension processed through immunomagnetic separation.

(2) *E. coli*. Systems must have the *E. coli* samples analyzed by a laboratory certified by EPA, the National Environmental Laboratory Accreditation Conference, or the department for total coliform or fecal coliform analysis in drinking water samples using the same approved *E. coli* method for the analysis of source water.

1. The approved analytical methods for the enumeration of *E. coli* in source water are shown in Table 2.

Table 2: *E. coli* Analytical Methods

Method	EPA	Standard Methods: 18th, 19th, and 20th editions	Other
Most probable number with multiple tube or multiple well ^{1,2}		9223 B ³	991.15 ⁴ Colilert ^{3,5} Colilert-18 ^{3,5,6}
Membrane filtration single step ^{1,7,8}	1603 ⁹		mColiBlue-24 ¹⁰

¹Tests must be conducted to provide organism enumeration (i.e., density). Select the appropriate configuration of tubes/filtrations and dilutions/volumes to account for the quality, consistency, and anticipated organism density in the water sample.

²Samples shall be enumerated by the multiple-tube or multiple-well procedure. Using multiple-tube procedures, employ an appropriate tube and dilution configuration of the sample as needed and report the Most Probable Number (MPN). Samples tested with Colilert® may be enumerated with the multiple-well procedures, Quanti-Tray®, Quanti-Tray® 2000, and the MPN calculated from the table provided by the manufacturer.

³These tests are collectively known as defined enzyme substrate tests, where, for example, a substrate is used to detect the enzyme beta-glucuronidase produced by *E. coli*.

⁴Association of Official Analytical Chemists, International. “Official Methods of Analysis of AOAC International, 16th Ed., Volume 1, Chapter 17, 1995. AOAC, 481 N. Frederick Ave., Suite 500, Gaithersburg, MD 20877-2417.

⁵Descriptions of the Colilert®, Colilert-18®, Quanti-Tray®, and Quanti-Tray® 2000 may be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092.

⁶Colilert-18® is an optimized formulation of the Colilert® for the determination of total coliforms and *E. coli* that provides results within 18 hours of incubation at 35 degrees C rather than the 24 hours required for the Colilert® test.

⁷The filter must be a 0.45 micron membrane filter or a membrane filter with another pore size certified by the manufacturer to fully retain organisms to be cultivated and to be free of extractables which could interfere with organism growth.

⁸When the membrane filter method has been used previously to test waters with high turbidity or large numbers of noncoliform bacteria, a parallel test should be conducted with a multiple-tube technique to demonstrate applicability and comparability of results.

⁹“Method 1603: *Escherichia coli* (*E. coli*) in Water by Membrane Filtration Using Modified Membrane-Thermotolerant *Escherichia coli* Agar (modified mTEC), USEPA, July 2006.” US EPA, Office of Water, Washington, DC EPA 821-R-06-011.

¹⁰A description of the mColiBlue24® test, Total Coliforms and *E. coli*, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010.

2. The holding time (the time period from sample collection to initiation of analysis) shall not exceed 30 hours. The department may approve on a case-by-case basis an extension of the holding time to 48 hours, if the 30-hour holding time is not feasible. If the extension is allowed, the laboratory must use the Colilert® reagent version of the Standard Methods 9223B to conduct the analysis.

3. The samples must be maintained between 0 and 10 degrees C during storage and transit to the laboratory.

4. The following data elements must be reported for each *E. coli* analysis:

- PWSID.
- Facility ID.
- Sample collection date.
- Analytical method number.
- Method type.
- Source type (flowing stream or river; lake or reservoir; or influenced groundwater).
- Number of *E. coli* per 100 mL.
- Turbidity in NTU.

(3) Turbidity. The approved analytical methods for turbidity are listed in 43.5(4)“a”(1). Measurements of turbidity must be made by a party approved by the department, and reported on the laboratory data sheet with the corresponding *E. coli* sample.

43.11(4) Disinfection profiling and benchmarking.

a. General requirements. Following completion of the first round of source water monitoring, a system that plans to make a significant change to its disinfection practice must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses.

(1) Notification to the department. The system must notify the department prior to changing its disinfection practice and must include in the notice the completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses, a description of the proposed change in disinfection practice, and an analysis of how the proposed change will affect the current level of disinfection.

(2) Definition of “significant change.” A significant change to the disinfection practice is defined as follows:

1. Any change to the point of disinfection;
2. Any change to the disinfectant(s) used in the treatment plant;
3. Any change to the disinfection process; or
4. Any other modification identified by the department as a significant change to disinfection practice.

b. Developing the disinfection profile. In order to develop a disinfection profile, a system must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If a system monitors more frequently, the monitoring frequency must be evenly spaced. A system that operates for fewer than 12 months per year must monitor weekly during the period of operation. A system must determine log inactivation for *Giardia lamblia* through the entire plant, based on CT_{99.9} values in Appendix A, Tables 1 through 6, as applicable. Systems must

determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the department.

(1) Monitoring requirements. Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring listed in this subparagraph. Systems with multiple points of disinfectant application must conduct the same monitoring for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio. The analytical methods for the parameters are listed in 43.5(4) "a." All measurements must be taken during peak hourly flow.

1. For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured in degrees Celsius at each residual disinfectant concentration sampling point or at an alternative location approved by the department.

2. For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point or at an alternative location approved by the department.

3. The disinfectant contact time must be determined in minutes.

4. The residual disinfectant concentrations of the water must be determined in mg/L before or at the first customer and prior to each additional point of disinfectant application.

5. A system may use existing data to meet the monitoring requirements if the data are substantially equivalent to the required data, the system has not made any significant change to its treatment practice, and the system has the same source water as it had when the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

6. A system may use disinfection profiles developed under 43.9(2) or 43.10(2) if the system has not made a significant change to its treatment practice and has the same source water as it had when the profile was developed. The virus profile must be developed using the same data on which the *Giardia lamblia* profile is based.

(2) Calculation of the total inactivation ratio for *Giardia lamblia*.

1. Systems using only one point of disinfectant application may determine the total inactivation ratio ($CT_{cal}/CT_{99.9}$) for the disinfection segment using either of the following methods.

- Determine one inactivation ratio before or at the first customer during peak hourly flow.
- Determine successive sequential inactivation ratios between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Calculate the total inactivation ratio by determining the inactivation ratio for each sequence ($CT_{cal}/CT_{99.9}$) and adding the values together.

2. Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. Calculate the ($CT_{cal}/CT_{99.9}$) value of each segment and add the values together to determine the total inactivation ratio.

3. Systems must then determine the total logs of inactivation by multiplying the total inactivation ratio by 3.0.

(3) Calculation of the total inactivation ratio for viruses. The system must calculate the log of inactivation for viruses using a protocol approved by the department.

c. Calculation of the disinfection benchmark.

(1) For each year of profiling data collected and calculated under this subrule, systems must determine the lowest mean monthly level of both *Giardia lamblia* and virus inactivation. Systems must determine the mean *Giardia lamblia* and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly *Giardia lamblia* and virus log inactivation by the number of values calculated for that month.

(2) For a system with one year of profiling data, the disinfection benchmark is the lowest monthly mean value. For a system with more than one year of profiling data, the disinfection benchmark is the mean of the lowest monthly mean values of *Giardia lamblia* and virus log inactivation in each year of profiling data.

43.11(5) Bin classification. Upon completion of the first round of source water monitoring, systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results reported under 43.11(3)“a.”

a. Calculation of mean Cryptosporidium or bin concentration value.

(1) Systems that collect at least 48 samples. For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.

(2) Systems that collect 24 to 47 samples. For systems that collect at least 24 samples but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected.

(3) Systems serving fewer than 10,000 people and monitoring for only one year. For systems that serve fewer than 10,000 people and monitor *Cryptosporidium* for only one year (i.e., 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.

(4) Systems with plants operating on a part-time basis. For systems with plants operating only part of the year that monitor fewer than 12 months per year, the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

(5) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification.

b. Determination of bin classification.

(1) First monitoring round. A system must determine the bin classification from Table 3, using its calculated bin concentration from 43.11(5)“a.”

Table 3: Bin Classification Table

System Type	<i>Cryptosporidium</i> Concentration, in oocysts/L	Bin Classification
Systems required to monitor for <i>Cryptosporidium</i> under 43.11(3)“b”(1) or 43.11(3)“b”(2)“3”	Fewer than 0.075 oocysts/L	Bin 1
	Between 0.075 and fewer than 1.0 oocysts/L	Bin 2
	Between 1.0 and fewer than 3.0 oocysts/L	Bin 3
	3.0 oocysts/L or greater	Bin 4
Systems serving fewer than 10,000 and not required to monitor for <i>Cryptosporidium</i> , pursuant to 43.11(3)“b”(2)“1”	Not applicable	Bin 1

(2) Second monitoring round. Following completion of the second round of source water monitoring, a system must recalculate its bin concentration and determine its new bin classification, using the same protocols outlined in 43.11(5)“a” and “b.”

c. Reporting bin classification to the department. Within six months of the end of the sampling period, the system must report its bin classification to the department for approval. The report must also include a summary of the source water monitoring data and the calculation procedure used to determine the bin classification.

d. Treatment technique violation. Failure to comply with 43.11(5)“b” and “c” is a violation of the treatment technique requirement.

43.11(6) Additional *Cryptosporidium* treatment requirements. A system must provide the level of additional treatment for *Cryptosporidium* specified in Table 4 based on its bin classification determined in 43.11(5) and according to the schedule in 43.11(7).

*a. Determination of additional *Cryptosporidium* treatment requirements.* Using Table 4, a system must determine any additional treatment requirements based upon its bin classification. The Bin 1 classification does not require any additional treatment. Bins 2 through 4 require additional *Cryptosporidium* treatment.

Table 4: Additional *Cryptosporidium* Treatment Requirements

Bin Classification	Treatment Used by the System for Compliance with 43.5, 43.9, and 43.10			
	Conventional filtration (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	At least 4.0-log ¹
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	At least 5.0-log ¹
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	At least 5.5-log ¹

¹The total *Cryptosporidium* removal and inactivation must be at least this value, as determined by the department.

b. Treatment requirements for Bins 2 through 4. A system that is classified as Bin 2, 3, or 4 must use one or more of the treatment and management options listed in 43.11(8) to comply with the required additional *Cryptosporidium* treatment. Systems classified as Bins 3 and 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required by using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as listed in 43.11(9) through 43.11(13).

c. Treatment technique violation. Failure by a system in any month to achieve treatment credit by meeting criteria in 43.11(9) through 43.11(13) that is at least equal to the level of treatment required in 43.11(6) “a” is a violation of the treatment technique requirement.

d. Significant changes to the watershed. If, after the system’s completion of source water monitoring (either round), the department determines during a sanitary survey or an equivalent source water assessment that significant changes occurred in the system’s watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the department to address the contamination. These actions may include additional source water monitoring and implementing microbial toolbox options listed in 43.11(8).

43.11(7) Schedule for compliance with *Cryptosporidium* treatment requirements. Following the initial bin classification under 43.11(5), systems must provide the level of treatment for *Cryptosporidium* required in 43.11(6), according to the schedule in Table 5. If the bin classification of a system changes following the second round of source water monitoring, the system must provide the level of treatment for *Cryptosporidium* required in 43.11(6), on a schedule approved by the department.

Table 5: *Cryptosporidium* Treatment Compliance Dates

Schedule	Population Served by System	Compliance Date for <i>Cryptosporidium</i> treatment requirements ¹
1	At least 100,000 people	April 1, 2012
2	From 50,000 to 99,999 people	October 1, 2012
3	From 10,000 to 49,999 people	October 1, 2013
4	Fewer than 10,000 people	October 1, 2014

¹The department may allow up to an additional two years for compliance with the treatment requirement if the system must make capital improvements.

43.11(8) Microbial toolbox options for meeting *Cryptosporidium* treatment requirements. Systems receive the treatment credits listed in Table 6 by meeting the conditions for microbial toolbox options described in 43.11(9) through 43.11(13). Systems apply these treatment credits to meet the treatment requirements in 43.11(6). Table 6 summarizes options in the microbial toolbox.

Table 6: Microbial Toolbox Summary Table: Options, Treatment Credits, and Criteria

Toolbox Option	Specific Criteria Rule	<i>Cryptosporidium</i> treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options		
Watershed control program	43.11(9)	0.5-log credit for department-approved program comprising required elements, annual program status report to department, and regular watershed survey.
Alternative source/intake management	43.11(9)“b”	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies.
Prefiltration Toolbox Options		
Presedimentation basin with coagulation	43.11(10)“a”	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative department-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through the basins.
Two-stage lime softening	43.11(10)“b”	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment.
Bank filtration	43.11(10)“c”	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. A system using a well followed by filtration when conducting source water monitoring must sample the well to determine bin classification and is not eligible for additional credit.
Treatment Performance Toolbox Options		
Combined filter performance	43.11(11)“a”	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month.
Individual filter performance	43.11(11)“b”	0.5-log credit (in addition to the 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter.
Demonstration of performance	43.11(11)“c”	Credit awarded to unit process or treatment train based on a demonstration to the department with a department-approved protocol.
Additional Filtration Toolbox Options		
Bag or cartridge filters (individual filters)	43.11(12)“a”	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety.
Bag or cartridge filters (in series)	43.11(12)“a”	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety.

Toolbox Option	Specific Criteria Rule	<i>Cryptosporidium</i> treatment credit with design and implementation criteria
Membrane filtration	43.11(12)“b”	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing.
Second-stage filtration	43.11(12)“c”	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter.
Slow sand filtration	43.11(12)“d”	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option.
Inactivation Toolbox Options		
Chlorine dioxide	43.11(13)	Log credit based on measured CT in relation to CT table.
Ozone	43.11(13)	Log credit based on measured CT in relation to CT table.
Ultraviolet light (UV)	43.11(13)	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions.

43.11(9) Source toolbox components.

a. *Watershed control program.* Systems receive 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of this paragraph.

(1) Notification. Systems that intend to apply for the watershed control program credit must notify the department of this intent no later than two years prior to the treatment compliance date in 43.11(7) applicable to the system.

(2) Proposed watershed control plan. Systems must submit to the department a proposed watershed control plan no later than one year before the applicable treatment compliance date in 43.11(7). The department must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the following elements:

1. Identification of an “area of influence” outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under 43.11(9)“a”(5)“2.”

2. Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system’s source water quality.

3. An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system’s source water.

4. A statement of goals and specific actions the system will undertake to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

(3) Existing watershed control programs. Systems with watershed control programs that were in place on January 5, 2006, are eligible to seek this credit. The systems’ watershed control plans must meet the criteria in 43.11(9)“a”(2) and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

(4) Department response to submitted plan. If the department does not respond to a system regarding approval of a watershed control plan submitted under this subrule and the system meets the other requirements of this subrule, the watershed control program will be considered approved and 0.5-log *Cryptosporidium* treatment credit will be awarded unless and until the department subsequently withdraws such approval.

(5) System requirements to maintain 0.5-log credit. Systems must complete the following actions to maintain the 0.5-log credit.

1. Submit an annual watershed control program status report to the department. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. The plan must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the department or as a result of the watershed survey conducted under 43.11(9) "a"(5) "2." It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the department prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

2. Undergo a watershed sanitary survey every three years for community water systems and every five years for noncommunity water systems and submit the survey report to the department. The survey must be conducted according to department guidelines and by persons acceptable to the department.

- The watershed sanitary survey must meet the following criteria: encompass the region identified in the department-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.

- If the department determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by the date specified by the department, which may be earlier than the regular schedule of a three- or five-year frequency.

3. The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The department may approve systems to withhold portions of an annual status report, watershed control plan, and watershed sanitary survey from the public, based on water supply security considerations.

(6) Withdrawal of watershed control program treatment credit. If the department determines that a system is not carrying out the approved watershed control plan, the department may withdraw the watershed control program treatment credit.

b. Alternative source. A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the department approves, a system may determine its bin classification under 43.11(5) based on alternative source monitoring results.

(1) Systems conducting alternative source monitoring must also monitor their current plan intake concurrently, as described in 43.11(3).

(2) Alternative source monitoring must meet the requirements for source monitoring to determine bin classification, as described in 43.11(3). Systems must report to the department the alternative source monitoring results and provide supporting information documenting the operating conditions under which the samples were collected.

(3) If a system determines its bin classification under 43.11(5) using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in 43.11(7).

43.11(10) Prefiltration treatment toolbox components.

a. Presedimentation. Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.

(1) The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or influenced groundwater source.

(2) The system must continuously add a coagulant to the presedimentation basin.

(3) The presedimentation basin must achieve either of the following performance criteria:

1. Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\text{LOG}_{10}(\text{monthly mean of daily influent turbidity}) - \text{LOG}_{10}(\text{monthly mean of daily effluent turbidity})$.

2. Complies with department-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

b. Two-stage lime softening. Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or influenced groundwater source.

c. Bank filtration. Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring under 43.11(3)“a” must collect samples as described in 43.11(3)“d”(3) and are not eligible for this credit.

(1) Treatment credit. Wells with a groundwater flow path of at least 25 feet receive 0.5-log treatment credit; wells with a groundwater flow path of at least 50 feet receive 1.0-log treatment credit. The groundwater flow path must be determined as specified in 43.11(10)“c”(4).

(2) Granular aquifers only. Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.

(3) Horizontal and vertical wells only. Only horizontal and vertical wells are eligible for treatment credit.

(4) Measurement of groundwater flow path. For vertical wells, the groundwater flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the 100-year floodplain elevation boundary or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the groundwater flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

(5) Turbidity monitoring at the wellhead. Systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the department and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the department determines that microbial removal has been compromised, the department may revoke treatment credit until the system implements corrective actions approved by the department to remediate the problem.

43.11(11) Treatment performance toolbox components. This option pertains to physical treatment processes.

a. Combined filter performance. Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log *Cryptosporidium* treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in 43.5(4) and, if applicable, 43.10(4).

b. Individual filter performance. Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit during any month the system meets the criteria in this paragraph, which can be in addition to the CFE 0.5-log credit from 43.11(11)“a.” Compliance with these criteria must be based on individual filter turbidity monitoring as described in 43.9(4) or 43.10(5), as appropriate.

(1) The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.

(2) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

(3) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of 43.11(11)“b”(2) and (3) during any month shall not receive a treatment technique violation under 43.11(6) if the department determines the following:

1. The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing the treatment plant design, operation, and maintenance.

2. The system has experienced no more than two such failures in any calendar year.

c. *Demonstration of performance.* The department may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in 43.11(6) or 43.11(10) through 43.11(13) and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(1) Systems cannot receive the prescribed treatment credit for any toolbox option in 43.11(10) through 43.11(13) if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

(2) The demonstration of performance study must follow a department-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

(3) Approval by the department must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The department may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

43.11(12) Additional filtration toolbox components.

a. *Bag and cartridge filters.* By meeting the criteria in this paragraph, systems receive *Cryptosporidium* treatment credit of up to 2.0-log for the use of individual bag or cartridge filters and up to 2.5-log for the use of bag or cartridge filters operated in series. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of 43.11(12)“a”(2) through 43.11(12)“a”(9) to the department. The filters must treat the entire plant flow taken from a surface water or influenced groundwater source.

(1) The *Cryptosporidium* treatment credit awarded for use of bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted in accordance with the criteria in 43.11(12)“a”(2) through 43.11(12)“a”(9). A safety factor equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006, if the prior testing was consistent with the criteria specified in this paragraph.

(2) Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium*. Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(3) Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium*. The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discretely quantifying the specific microorganisms or surrogate used in the test; gross measurements such as turbidity shall not be used.

(4) The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using this equation:

$$\text{Maximum Feed Water Concentration} = 10,000 \times \text{Filtrate Detection Limit}$$

(5) Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

(6) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which thereby establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this paragraph.

(7) Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$$\text{LRV} = \text{LOG}_{10}(C_f) - \text{LOG}_{10}(C_p)$$

Where:

LRV = log removal value demonstrated during challenge test;

C_f = the feed concentration measured during the challenge test; and

C_p = the filtrate concentration measured during the challenge test.

Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term C_p must be set equal to the detection limit.

(8) Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter ($\text{LRV}_{\text{filter}}$) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

(9) If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest $\text{LRV}_{\text{filter}}$ among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the tenth percentile of the set of $\text{LRV}_{\text{filter}}$ values for the various filters tested. The percentile is defined by $[i/(n+1)]$ where “i” is the rank of “n” individual data points ordered lowest to highest. If necessary, the tenth percentile may be calculated using linear interpolation.

(10) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the department.

b. Membrane filtration.

(1) Systems receive *Cryptosporidium* treatment credit for using membrane filtration that meets the criteria of this paragraph. Systems using membrane cartridge filters that meet the definition of membrane filtration in 567—40.2(455B) are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under the following two paragraphs:

1. The removal efficiency demonstrated during challenge testing conducted under the criteria in 43.11(12)“b”(2).

2. The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in 43.11(12)“b”(3).

(2) Challenge testing. The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the department. Challenge testing must be conducted according to the criteria listed in this subparagraph. Systems may use data from challenge testing conducted prior to January 5, 2006, if the prior testing was consistent with the criteria listed in this subparagraph.

1. Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system’s treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

2. Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organisms or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge

particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity shall not be used.

3. The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation:

$$\text{Maximum Feed Water Concentration} = 3,160,000 \times \text{Filtrate Detection Limit}$$

4. Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure-driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (i.e., backwashing).

5. Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation:

$$\text{LRV} = \text{LOG}_{10}(C_f) - \text{LOG}_{10}(C_p)$$

Where:

LRV = log removal value demonstrated during challenge test;

C_f = the feed concentration measured during the challenge test; and

C_p = the filtrate concentration measured during the challenge test.

Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term C_p must be set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

6. The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($\text{LRV}_{C\text{-Test}}$). If fewer than 20 modules are tested, then $\text{LRV}_{C\text{-Test}}$ is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then $\text{LRV}_{C\text{-Test}}$ is equal to the tenth percentile of the representative LRVs among the modules tested. The percentile is defined by $[i/(n+1)]$ where “i” is the rank of “n” individual data points ordered lowest to highest. If necessary, the tenth percentile may be calculated using linear interpolation.

7. The challenge test must establish a quality control release value (QCRV) for a nondestructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. In order to verify *Cryptosporidium* removal capability, this performance test must be applied to each production membrane module that was not directly challenge tested but was used by the system. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

8. If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the nondestructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of the modified membrane must be conducted and submitted to the department, along with determination of a new QCRV.

(3) Direct integrity testing. Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded for the membrane filtration process and meets the requirements described in this subparagraph. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (i.e., one or more leaks that could result in contamination of the filtrate).

1. The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.

2. The direct integrity method must have a resolution of 3 micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.

3. The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded by the department for the membrane filtration process, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either of the following paragraphs as applicable to the type of direct integrity test the system uses.

- For direct integrity tests using applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

$$LRV_{DIT} = \text{LOG}_{10} [Q_p / (\text{VCF} \times Q_{\text{breach}})]$$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test;

Q_p = total design filtrate flow from the membrane unit;

Q_{breach} = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured; and

VCF = volumetric concentration factor, which is the ratio of the suspended solids concentration on the high-pressure side of the membrane relative to that in the feed water.

- For direct integrity tests using a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

$$LRV_{DIT} = \text{LOG}_{10} (C_f) - \text{LOG}_{10} (C_p)$$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test;

C_f = the typical feed concentration of the marker used in the test; and

C_p = the filtrate concentration of the marker from an integral membrane unit.

4. Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the department.

5. If the result of a direct integrity test exceeds the control limit established under 43.11(12) "b"(3)"4," the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs and may return the membrane unit to service only if the direct integrity test is within the established control limit.

6. Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The department may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.

(4) Indirect integrity monitoring. Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the following criteria. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in 43.11(12) "b"(3) is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the department summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

1. Unless the department approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

2. Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.

3. Continuous monitoring must be separately conducted on each membrane unit.

4. If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (i.e., two consecutive 15-minute readings above 0.15 NTU), direct integrity testing must immediately be performed on the associated membrane unit as specified in 43.11(12) "b"(3)"1" through 43.11(12) "b"(3)"5."

5. If indirect integrity monitoring includes a department-approved alternative parameter and if the alternative parameter exceeds a department-approved control limit for a period greater than 15 minutes,

direct integrity testing must immediately be performed on the associated membrane units as specified in 43.11(12)“b”(3)“1” through 43.11(12)“b”(3)“5.”

c. Second-stage filtration. Systems receive 0.5-log *Cryptosporidium* treatment credit for using a separate second stage of filtration that consists of sand, dual media, GAC, or other fine-grain media following granular media filtration if the department approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or influenced groundwater source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The department must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

d. Slow sand filtration (as secondary filter). Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for using a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or influenced groundwater source and no disinfectant residual is present in the influent water to the slow sand filtration process. The department must base its approval of the treatment credit on an assessment of the design characteristics of the filtration process. This does not apply to treatment credit awarded for slow sand filtration used as a primary filtration process.

43.11(13) Inactivation toolbox components.

a. Calculation of CT values.

(1) CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under 43.11(13)“b” or “c” must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in 43.5(4).

(2) Systems with several disinfection segments in sequence may calculate CT for each segment, where a disinfection segment is defined as a treatment unit process with a measureable disinfectant residual level and a liquid volume. Under this approach, systems must add the *Cryptosporidium* CT values in each segment to determine the total CT for the treatment plant.

b. CT values for chlorine dioxide and ozone.

(1) As described in 43.11(13)“a,” systems receive the *Cryptosporidium* treatment credit listed in Table 1 of Appendix B by meeting the corresponding chlorine dioxide CT value for the applicable water temperature.

(2) As described in 43.11(13)“a,” systems receive the *Cryptosporidium* treatment credit listed in Table 2 of Appendix B by meeting the corresponding ozone CT value for the applicable water temperature.

c. Site-specific study. The department may approve alternative chlorine dioxide or ozone CT values to those listed in 43.11(13)“b” on a site-specific basis. The department must base its approval on a site-specific study conducted by the system. The study must follow a department-approved protocol.

d. Ultraviolet light. Systems receive *Cryptosporidium*, *Giardia lamblia*, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in Table 3 of Appendix B. Systems must use the following procedures to validate and monitor UV reactors in order to demonstrate that the reactors are achieving a particular UV dose value for treatment credit.

(1) Reactor validation testing. Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the required UV dose (i.e., validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

1. When determining validated operating conditions, systems must account for the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.

2. Validation testing must include the following: full-scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low-pressure mercury vapor lamp.

3. The department may approve an alternative approach to validation testing.

(2) Reactor monitoring.

1. Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under 43.11(13)“d”(1). This monitoring must include UV sensor, flow rate, lamp status, and other parameters the department designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol approved by the department.

2. To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose. Systems must demonstrate compliance with this condition by the monitoring required under 43.11(13)“d”(2)“1.”

43.11(14) Reporting requirements.

a. *Sampling schedules and monitoring results.* Systems must report source water sampling schedules and monitoring results under 43.11(3)“c” and 43.11(3)“e,” unless the systems notify the department that they will not conduct source water monitoring due to meeting the criteria of 5.5-log treatment for *Cryptosporidium* under 43.11(3)“a.”

b. *Cryptosporidium bin classification.* Systems must report their *Cryptosporidium* bin classification determined under 43.11(5).

c. *Disinfection profiles and benchmarks.* Systems must report disinfection profiles and benchmarks to the department as described in 43.11(4)“a” and 43.11(4)“b” prior to making a significant change in disinfection practice.

d. *Microbial toolbox options.* Systems must report to the department in accordance with Table 7 for any microbial toolbox options used to comply with treatment requirements under 43.11(6).

Table 7: Microbial Toolbox Reporting Requirements

Toolbox Option	Systems must submit this information	Information must be submitted on this schedule
1. Watershed control program	Notice of intention to develop a new or continue an existing watershed control program	No later than two years before the applicable treatment compliance date in 43.11(7)
	Watershed control plan	No later than one year before the applicable treatment compliance date in 43.11(7)
	Annual watershed control program status report	Every 12 months, beginning one year after the applicable treatment compliance date in 43.11(7)
	Watershed sanitary survey report	- For community water systems, every three years beginning three years after the applicable treatment compliance date in 43.11(7) - For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in 43.11(7)
2. Alternative source/intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results	No later than the applicable treatment compliance date in 43.11(7)

Toolbox Option	Systems must submit this information	Information must be submitted on this schedule
3. Presedimentation	Monthly verification of the following: - Continuous basin operation - Treatment of 100 percent of the flow - Continuous addition of a coagulant - At least 0.5-log mean reduction of influent turbidity or compliance with alternative department-approved performance criteria	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
4. Two-stage lime softening	Monthly verification of the following: - Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration - Both stages treated 100 percent of plant flow	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
5. Bank filtration	Initial demonstration of the following: - Unconsolidated, predominantly sandy aquifer - Setback distance of at least 25 feet for 0.5-log credit or 50 feet for 1.0-log credit	No later than the applicable treatment compliance date in 43.11(7)
	If monthly average of daily maximum turbidity is greater than 1 NTU, then system must report result and submit an assessment of the cause.	Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
6. Combined filter performance	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4-hour CFE measurements taken each month	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
7. Individual filter performance	Monthly verification of the following: - Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter - No individual filter effluent turbidity levels greater than 0.3 NTU in two consecutive readings 15 minutes apart	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
8. Demonstration of performance	Results from testing following a department-approved protocol	No later than the applicable treatment compliance date in 43.11(7)
	As required by the department, monthly verification of operation within conditions of department approval for demonstration of performance credit	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
9. Bag filters and cartridge filters	Demonstration that the following criteria are met: - Process meets the definition of bag or cartridge filtration - Removal efficiency established through challenge testing that meets criteria in this subpart	No later than the applicable treatment compliance date in 43.11(7)
	Monthly verification that 100 percent of plant flow was filtered	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)

Toolbox Option	Systems must submit this information	Information must be submitted on this schedule
10. Membrane filtration	Results of verification testing demonstrating the following: - Removal efficiency established through challenge testing that meets criteria - Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline	No later than the applicable treatment compliance date in 43.11(7)
	Monthly report summarizing the following: - All direct integrity tests above the control limit - If applicable, any turbidity or alternative department-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
11. Second-stage filtration	Monthly verification that 100 percent of flow was filtered through both stages and that first stage was preceded by coagulation step	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
12. Slow sand filtration as a secondary filter	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100 percent of the flow from surface or influenced groundwater sources	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
13. Chlorine dioxide	Summary of CT values for each day as described in 43.11(13)	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
14. Ozone	Summary of CT values for each day as described in 43.11(13)	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)
15. Ultraviolet light (UV)	Validation test results demonstrating operating conditions that achieve required UV dose	No later than the applicable treatment compliance date in 43.11(7)
	Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in 43.11(13)“d”	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 43.11(7)

43.11(15) Record-keeping requirements.

a. Source water monitoring records. Systems must keep results from the initial round of source water monitoring under 43.11(3)“a” and the second round of source water monitoring under 43.11(3)“b” until three years after bin classification under 43.11(5) for the particular round of monitoring.

b. Systems meeting 5.5-log treatment for Cryptosporidium. Systems must keep for three years records of any notification to the department that the systems will meet the 5.5-log *Cryptosporidium* treatment requirements and avoid source water monitoring.

c. Microbial toolbox treatment monitoring records. Systems must keep the results of treatment monitoring associated with microbial toolbox options under 43.11(8) through 43.11(13) for three years.

ITEM 55. Adopt the following new rule 567—43.12(455B):

567—43.12(455B) Optimization goals.

43.12(1) Turbidity optimization goals. Surface water and IGW systems must meet the requirements listed in 567—43.5(455B), 567—43.9(455B), and 567—43.10(455B). To encourage operational optimization, the department has adopted the following goals for systems using surface water or influenced groundwater and that wish to pursue the optimization of their existing treatment processes. These goals are voluntary. Data collected for optimization purposes will not be used to determine compliance with the requirements in 567—43.5(455B), 567—43.9(455B), 567—43.10(455B), or 567—43.11(455B) unless the optimization data are identical to the compliance data.

a. Sedimentation performance goals. The sedimentation performance goals are based upon the average annual raw water turbidity levels.

(1) When the annual average raw water turbidity is less than or equal to 10 NTU over the course of the calendar year, the turbidity should be less than or equal to 1 NTU in at least 95 percent of measurements based on the maximum daily value of readings taken at least once every four hours from each sedimentation basin while the plant is operating.

(2) When the annual average raw water turbidity is more than 10 NTU over the course of the calendar year, the turbidity should be less than or equal to 2 NTU in at least 95 percent of measurements based on the maximum daily value of readings taken at least once every four hours from each sedimentation basin while the plant is operating.

b. Individual filter performance goals. The individual filter performance goals depend upon the system’s capability of filtering to waste.

(1) For systems that have the capability of filtering to waste, the individual filter turbidity should be less than or equal to 0.10 NTU in at least 95 percent of measurements over the course of the calendar year, based on the daily maximum value of readings recorded at least once per minute while the plant is in operation. The maximum individual filter turbidity must not exceed 0.30 NTU at any time. The filter must return to service with a turbidity of 0.10 NTU or less.

(2) For systems that do not have the capability of filtering to waste, the individual filter turbidity should be less than or equal to 0.10 NTU in at least 95 percent of measurements over the course of the calendar year, excepting the 15 minutes following the completion of the backwash process, based on the daily maximum value of readings recorded at least once per minute while the plant is in operation. The maximum individual filter turbidity must not exceed 0.30 NTU following backwash and must return to a level at or below 0.10 NTU within 15 minutes of returning the filter to service.

c. Combined filter performance goal. The combined filter performance goal has two components:

(1) Combined filter effluent turbidity should be less than or equal to 0.10 NTU in at least 95 percent of measurements over the course of the calendar year, based on daily maximum value of readings recorded at least once per minute while the plant is operating.

(2) The maximum individual filter turbidity must not exceed 0.30 NTU at any time.

43.12(2) Disinfection optimization goals. Reserved.

ITEM 56. Adopt the following new Appendix B in **567—Chapter 43**:

APPENDIX B: CT TABLES FOR *CRYPTOSPORIDIUM* INACTIVATION

TABLE 1: CT Values (mg-min/L) for *Cryptosporidium* Inactivation by Chlorine Dioxide¹

Log Credit	Water Temperature, °C										
	≤0.5	1	2	3	5	7	10	15	20	25	30
0.25	159	153	140	128	107	90	69	45	29	19	12
0.5	319	305	279	256	214	180	138	89	58	38	24
1.0	637	610	558	511	429	360	277	179	116	75	49
1.5	956	915	838	767	643	539	415	268	174	113	73

2.0	1275	1220	1117	1023	858	719	553	357	232	150	98
2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122
3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

¹ Systems may use this equation to determine log credit between the indicated values:

$$\text{Log credit} = [0.001506 \times (1.09116)^{\text{Temp}}] \times \text{CT}$$

TABLE 2: CT Values (mg-min/L) for *Cryptosporidium* Inactivation by Ozone¹

Log Credit	Water Temperature, °C										
	≤0.5	1	2	3	5	7	10	15	20	25	30
0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
2.0	48	46	42	38	32	26	20	12	7.8	4.9	3.1
2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

¹ Systems may use this equation to determine log credit between the indicated values:

$$\text{Log credit} = [0.0397 \times (1.09757)^{\text{Temp}}] \times \text{CT}$$

TABLE 3: UV Dose for *Cryptosporidium*, *Giardia lamblia*, and Virus Inactivation Credit¹

Log Credit	<i>Cryptosporidium</i> UV dose (mJ/cm ²)	<i>Giardia lamblia</i> UV dose (mJ/cm ²)	Virus UV dose (mJ/cm ²)
0.5	1.6	1.5	39
1.0	2.5	2.1	58
1.5	3.9	3.0	79
2.0	5.8	5.2	100
2.5	8.5	7.7	121
3.0	12	11	143
3.5	15	15	163
4.0	22	22	186

¹The treatment credits listed in Table 3 are for UV light at a wavelength of 254 nm as produced by a low-pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems.

ITEM 57. Amend paragraph **83.1(3)“a”** as follows:

a. *Water supply (drinking water)*. The requirements of this chapter apply to all laboratories conducting drinking water analyses pursuant to 567—Chapters 40, 41, 42, and 43, and 47. Routine, on-site monitoring for alkalinity, calcium, conductivity, residual disinfectant, orthophosphate, pH, silica, temperature, turbidity and on-site operation and maintenance-related analytical monitoring are excluded from this requirement, and may be performed by a Grade I, II, III, or IV certified operator meeting the requirements of 567—Chapter 81, any person under the supervision of a Grade I, II, III, or IV certified operator meeting the requirements of 567—Chapter 81, or a laboratory certified by the department to perform water supply analyses under this chapter.

ITEM 58. Amend paragraph **83.6(4)“a”** as follows:

a. *Certification of the University State of Iowa Hygienic Laboratory*. The department has designated the University State of Iowa Hygienic Laboratory (UHL SHL) as its appraisal authority for

laboratory certification. ~~The U.S. Environmental Protection Agency is responsible for the certification of UHL for the SDWA program, and the UHL~~ The SHL is responsible for attaining and maintaining laboratory certification for the SDWA program that is acceptable to the U.S. Environmental Protection Agency (EPA). The SHL quality assurance officer is responsible for the certification of ~~UHL~~ SHL for those programs with no available EPA certification program, including wastewater, underground storage tank, solid waste, and contaminated site programs. The ~~UHL~~ SHL quality assurance officer reports directly to the office of the ~~UHL~~ SHL director and operates independently of all areas of the laboratory generating data to ensure complete objectivity in the evaluation of laboratory operations. The quality assurance officer will schedule a biennial on-site inspection of the ~~UHL~~ SHL and review results for acceptable performance. Inadequacies or unacceptable performance shall be reported by the quality assurance officer to the ~~UHL~~ SHL and the department for correction. The department shall be notified if corrective action is not taken.

ITEM 59. Amend subparagraph **83.6(6)“a”(1)**, introductory paragraph, as follows:

(1) Certified laboratories must report to the department, or its designee such as ~~UHL~~ SHL, all analytical test results for all public water supplies, using forms provided or approved by the department or by electronic means acceptable to the department. If a public water supply is required by the department to collect and analyze a sample for an analyte not normally required by 567—Chapters 41 and 43, the laboratory testing for that analyte must also be certified and report the results of that analyte to the department. It is the responsibility of the laboratory to correctly assign and track the sample identification number as well as facility ID and source/entry point data for all reported samples.

ITEM 60. Rescind subparagraph **83.6(7)“a”(6)** and adopt the following **new** subparagraph in lieu thereof:

(6) Disinfection byproducts. To obtain certification to conduct analyses for disinfection byproducts listed in 567—paragraph 41.6(1)“b,” laboratories must:

1. Analyze PE samples approved by EPA, the department, or a third-party provider acceptable to the department at least once during each period of 12 consecutive months by each method for which the laboratory desires certification;
2. Achieve quantitative results on the PE sample analyses that are within the following acceptance limits:

Disinfection Byproduct	Acceptance limits (plus or minus this percent of true value)	Comments
TTHM		Laboratory must meet all four individual THM acceptance limits in order to successfully pass a PE sample for TTHM.
Bromoform	20	
Bromodichloromethane	20	
Chloroform	20	
Dibromomethane	20	
HAA5	40	Laboratory must meet the acceptance limits for 4 of the 5 HAA5 compounds in order to successfully pass a PE sample for HAA5.
Monobromoacetic Acid	40	
Dibromoacetic Acid	40	
Monochloroacetic Acid	40	
Dichloroacetic Acid	40	
Trichloroacetic Acid	40	
Chlorite	30	
Bromate	30	

3. Report quantitative data for concentrations at least as low as the levels listed in the following table for all disinfection byproduct samples analyzed for compliance with 567—41.6(455B).

Disinfection Byproduct	Minimum reporting level, mg/L ¹	Comments
TTHM ²		
Bromoform	0.0010	
Bromodichloromethane	0.0010	
Chloroform	0.0010	
Dibromomethane	0.0010	
HAA5 ²		
Monobromoacetic Acid	0.0010	
Dibromoacetic Acid	0.0010	
Monochloroacetic Acid	0.0020	
Dichloroacetic Acid	0.0010	
Trichloroacetic Acid	0.0010	
Chlorite	0.020	Applicable to chlorite monitoring conducted by a certified laboratory required under 567—paragraphs 41.6(1)“c”(3)“2” and 41.6(1)“c”(3)“3”
Bromate	0.0050 or 0.0010	Laboratories that use EPA Method 317.0 Revision 2, 321.8, or 326.0 must meet a 0.0010 mg/L MRL for bromate.

¹The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory. The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 100 percent of the MRL with each batch of samples. The measured concentration for the MRL check standard must be plus or minus 50 percent of the expected value, if any field sample in the batch has a concentration less than five times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

²When adding the individual trihalomethanes or haloacetic acid concentrations to calculate the TTHM or HAA5 concentrations, respectively, a zero is used for any analytical result that is less than the MRL concentration for that disinfection byproduct, unless otherwise specified by the department.