



Rules Governing Public Water Systems

North Carolina Administrative Code

Title 15 A

Department of Environmental Quality

Subchapter 18C

- Water Supplies -

Sections .0100 through .2200

Public Water Supply Section

Last Updated February 1, 2022

NOTES

- The following document contains the rules and regulations applicable to public water systems for the State of North Carolina. Because the State “Rules of Governing Public Water Systems” has adopted state laws and federal regulations by reference, copies of these adoptions are printed into the document after the State Rules.
- The public water supply rules were recodified into the North Carolina Administrative Code Title 15A, Subchapter 18C from Title 10 Chapter 10, Subchapter 10D on April 4, 1990. The original Title 10, Chapter 19, Subchapter 10D became effective on JANUARY 1, 1977, and was amended on the following dates: SEPTEMBER 1, 1979; SEPTEMBER 30, 1980; MARCH 31, 1981; FEBRUARY 27, 1982; APRIL 1, 1982; OCTOBER 1, 1982; APRIL 1, 1983; OCTOBER 1, 1983; OCTOBER 1, 1984; OCTOBER 1, 1985; JANUARY 1, 1986; OCTOBER 1, 1986; FEBRUARY 1, 1987; MAY 1, 1987; AUGUST 1, 1987; NOVEMBER 1, 1987; DECEMBER 1, 1987; JUNE 1, 1988; DECEMBER 1, 1988; MARCH 1, 1989; NOVEMBER 1, 1989; JANUARY 1, 1990; and FEBRUARY 1, 1990.
- The North Carolina Administrative Code Title 15A, Subchapter 18C has been amended on the following dates: JUNE 1, 1990; SEPTEMBER 1, 1990; JANUARY 1, 1991; AUGUST 1, 1991; SEPTEMBER 1, 1991; DECEMBER 1, 1991; JANUARY 1, 1992; FEBRUARY 1, 1992; APRIL 1, 1992; OCTOBER 1, 1992; JULY 1, 1993; JULY 1, 1994; OCTOBER 1, 1999; AUGUST 1, 2000; JANUARY 1, 2002; AUGUST 1, 2002, and JANUARY 1, 2003, SEPTEMBER 1, 2004, APRIL 1, 2014, JULY 7, 2014, JULY 1, 2015, AND JULY 1, 2019.
- As of April 1, 2014: These are technical changes to numerous rules to correct agency name, address, and viewing of documents.
- As of July 7, 2014: Amended Rule .0203.
- As of July 1, 2015: Added Rules .1539.
- As of November 23, 2015: Many rules were readopted without change pursuant to G.S. 150B-21 .3A on November 23, 2015 (see History Notes for each rule); Rules .121, .1513, .1514, .1517, .1533, and .2103 expired effective December 1, 2015 pursuant to G.S. 150B-21 .3A.
- As of July 1, 2019 the following Rules were re-adopted with changes by the Commission for Public Health (see History Notes in each rule); .0102, .0202, .0203, .0305, .0307, .0402, .0403, .0404, .0405, .0406, .0408, .0409, .0503, .0601, .0706, .0707, .0708, .0711, .0713, .0714, .0803, .0904, .0906, .1002, .1003, .1004, .1406, .1507, .1508, .1509, .1511, .1512, .1515, .1516, .1519, .1523, .1524, .1525, .1527, .1528, .1529, .1532, .1535, .1537, .1538, .1804, .2001, .2002, .2005, and .2008

- As of July 1, 2019 the following Rule was amended by the Commission for Public Health (see History Note); .0703.
- As of July 1, 2019 the following Rule was repealed by the Commission for Public health (see History Note); .0715.
- As of April 1, 2020 the following Rule was re-adopted with changed by the Commission for Public Health (see History Note); .1305.
- The Public Water Supply Section website can be found at the following internet address:
www.ncwater.org/.

This document is provided as a courtesy to the public. Every effort has been made to ensure the accuracy and completeness of the document; however, the Public Water Supply Section does not guarantee the accuracy of this information. Compliance with requirements of the regulations and statutes is the responsibility of the individual water systems owners.

State regulations can also be viewed on the NC Office of Administrative Hearings' website at:
<http://reports.oah.state.nc.us/ncac.asp>

Federal regulations can also be viewed at:
<http://www.ecfr.gov>

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AUTHORITY: 42 U.S.C. 300f, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-4, 300j-9, and 300j-11.

SOURCE: 40 FR 59570, Dec. 24, 1975, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes to part 141 appear at 69 FR 18803, Apr. 9, 2004.

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NOTE: For community water systems serving 75,000 or more persons, monitoring must begin 1 year following promulgation and the effective date of the MCL is 2 years following promulgation. For community water systems serving 10,000 to 75,000 persons, monitoring must begin within 3 years from the date of promulgation and the effective date of the MCL is 4 years from the date of promulgation. Effective immediately, systems that plan to make significant modifications to their treatment processes for the purpose of complying with the TTHM MCL are required to seek and obtain State approval of their treatment modification plans. This note affects §§141.2, 141.6, 141.12, 141.24, and 141.30. For additional information see 44 FR 68641, Nov. 29, 1979.

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SUBCHAPTER 18C - WATER SUPPLIES

SECTION .0100 – PUBLIC WATER SUPPLY DEFINITIONS

15A NCAC 18C .0102 DEFINITIONS

(a) The definitions contained in G.S. 130A-2, G.S. 130A-290, and G.S. 130A-313 shall apply to this Subchapter.

(b) The definitions contained in 40 C.F.R. 141.2 are hereby incorporated by reference including any subsequent amendments and editions except the following definitions are not adopted:

- (1) "Contaminant;"
- (2) "Maximum contaminant level;"
- (3) "Person;"
- (4) "Public Water System;" and
- (5) "Supplier of water."

Copies of governing federal regulations may be obtained at no cost from the United States Environmental Protection Agency's (USEPA) homepage at <http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm> or from the USEPA's Drinking Water Hotline at 1-800-426-4791.

(c) In addition to the definitions referred to in Paragraph (a) and (b) of this Rule, the following definitions shall apply to this Subchapter:

- (1) "Act" means the North Carolina Drinking Water Act.
- (2) "Air gap" means the unobstructed vertical distance through free atmosphere between the lowest effective opening from any pipe or faucet conveying a water or waste to a tank, plumbing fixture, receptor, or other assembly and the flood level rim of the receptacle. These vertical, physical separations shall be at least twice the effective opening of the water supply outlet, never less than one inch (25 mm) above the receiving vessel flood rim.
- (3) "Backflow" means the undesirable reversal of flow of a liquid, gas, or other substance in a potable water distribution piping system as a result of a cross-connection.
- (4) "Backflow preventer" means an assembly, device, or method that prohibits the backflow of water into potable water supply systems.
- (5) "Class I reservoir" means a reservoir from which water flows by gravity or is pumped directly to a treatment plant or to a small intervening storage basin and thence to a treatment plant.
- (6) "Class II reservoir" means a reservoir from which the water flows by gravity or is pumped to a Class I reservoir prior to final entrance to a water treatment plant.
- (7) "Class III reservoir" means an impoundment used for electric power generation, flood control and similar purposes, and that serves as a source of raw water for a community water system.
- (8) "Cross-connection" means:
 - (A) any physical connection between a potable water supply system and any other piping system, sewer fixture, container, or device, whereby water or other liquids, mixtures, or substances may flow into or enter the potable water supply system;
 - (B) any potable water supply outlet that is submerged or is designed or intended to be submerged in non-potable water or in any source of contamination; or
 - (C) an air gap, that does not meet the requirements set forth in Subparagraph (2) of this Paragraph.
- (9) "Community Water System intake" means the structure at the head of a conduit into which water is diverted from a stream or reservoir for transmission to a water treatment facility.
- (10) "Division" means the Department of Environmental Quality, Division of Water Resources.
- (11) "Fecal Coliform" means bacteria that serve as indicators of recent fecal contamination. Fecal Coliforms include the Family Enterobacteriaceae, Genus Escherichia, Species coli.
- (12) High-Health Hazard: A cross-connection or potential cross-connection involving any substance that could, if introduced into the potable water supply, cause illness or death, spread disease, or have a high probability of causing such effects.
- (13) Low-Health Hazard: A cross-connection or potential cross-connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable if introduced into the potable water supply.

- (14) "Mobile Home Park" means a site or tract of land where spaces are provided for lease or rental only for the placement of mobile homes.
- (15) "Mobile home subdivision" means a subdivided site or tract of land in which lots are sold for the placement of mobile homes.
- (16) "Non-potable water supply" means waters not approved for drinking or other household uses.
- (17) "Non-regulated public water system" means a public water system that meets the exclusion conditions set forth in G.S. 130A-314.
- (18) "Potable water supply" means water approved for drinking and other household uses.
- (19) "Raw water" means surface water or groundwater that because of bacteriological quality, chemical quality, turbidity, color, or mineral content makes it unsatisfactory as a source for a community water system without treatment.
- (20) "Raw water reservoir" means a natural or artificial impoundment used for the primary purpose of storing raw water to be subsequently treated for use as a source of water for a community water system.
- (21) "Service connection" means a piped connection from a water main for the purpose of conveying water to a building or onto premises for human use. A service connection begins:
 - (A) at the point downstream of a service meter; or
 - (B) for unmetered service, at the point of connection to the potable water supply system.
- (22) "Water supply product" means any chemical or substance added to a public water system in conjunction with a treatment technique or material used in construction of a public water system. The term includes any material used in the manufacture of public water system components, appurtenances, pipe, storage tank, or valve that comes in contact with water intended for use in a public water system.

*History Note: Authority G.S. 130A-311 through 130A-327; P.L. 93-523; 40 C.F.R. 141.2;
Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. April 1, 2014; July 1, 1994; August 1, 1991;
January 1, 1991; September 1, 1990;
Readopted Eff. July 1, 2019.*

SECTION .0200 – LOCATION OF SOURCES OF PUBLIC WATER SUPPLIES**15A NCAC 18C .0201 SURFACE SUPPLIES FOR PUBLIC WATER SYSTEMS**

- (a) A surface supply may be used for a community or a non-transient, non-community water system with disinfection and without filtration if it complies with the provisions of this Section and Rule .2005 of this Subchapter.
- (b) Such water supply shall be derived from uninhabited wooded areas.
- (c) The entire watershed shall be either owned or controlled by the person supplying the water or be under the control of the federal or state government; however, no such new water supply shall be created except where the water system owner shall own in its entirety the watershed from which the water will be obtained.
- (d) The water after disinfection shall be of potable quality as determined by bacteriological and chemical tests performed by a certified laboratory. The presence of contaminants shall not exceed the limits set forth in Section .1500 of this Subchapter.
- (e) The water source shall have a WS-I classification as established by the Environmental Management Commission and shall meet the quality standards for that classification, codified in 15A NCAC 02B. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; 130A-318; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. April 1, 2014; July 1, 1994; February 1, 1987; September 1, 1979; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .0202 SURFACE SUPPLIES FROM CLASSIFIED WATERSHEDS

Any surface water that is to receive treatment for removal of dissolved matter or suspended matter in order to be used for a public water system shall be obtained from a source that meets the WS-I, WS-II, WS-III, WS-IV or WS-V stream classification standards established by the Environmental Management Commission codified in 15A NCAC 02B. Copies are available for public inspection as set forth in Rule .0102(a) of this Subchapter.

History Note: Authority G.S. 130A-315; 130A-318; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. April 1, 2014; July 1, 1994; September 1, 1990; February 1, 1987; September 1, 1979; Readopted Eff. July 1, 2019.

15A NCAC 18C .0203 PUBLIC WELL WATER SUPPLIES

(a) A site or sites for a water supply well to be used as a community or non-transient, non-community water system shall be investigated by an authorized representative of the Department prior to approval. Approval by the Department is required in addition to any approval or permit issued by any other state agency. The site shall meet the following requirements at the time of approval:

- (1) The well shall be located on a lot so that the area within 100 feet of the well is owned or controlled by the person supplying the water. The supplier of water shall be able to protect the well lot from potential sources of pollution and to construct landscape features for drainage and diversion of pollution.
- (2) The minimum horizontal separation between the well and known potential sources of pollution shall be as follows:
 - (A) 100 feet from any sanitary sewage disposal system, sewer, or a sewer pipe unless the sewer is constructed of water main materials and joints, in which case the sewer pipe shall be at least 50 feet from the well;
 - (B) 200 feet from a subsurface sanitary sewage treatment and disposal system designed for 3000 or more gallons of wastewater a day flows, unless the well water source is from a confined aquifer;
 - (C) 500 feet from a septage disposal site;

- (D) 100 feet from buildings, mobile homes, permanent structures, animal houses or lots, or cultivated areas to which chemicals are applied;
 - (E) 100 feet from surface water;
 - (F) 100 feet from a chemical or petroleum fuel underground storage tank with secondary containment;
 - (G) 500 feet from a chemical or petroleum fuel underground storage tank without secondary containment;
 - (H) 500 feet from the boundary of a ground water contamination area;
 - (I) 500 feet from a sanitary landfill or non-permitted non-hazardous solid waste disposal site;
 - (J) 1000 feet from a hazardous waste disposal site or in any location that conflicts with the North Carolina Hazardous Waste Management Rules cited as 15A NCAC 13A;
 - (K) 300 feet from a cemetery or burial ground; and
 - (L) 100 feet from any other potential source of pollution.
- (3) The Department may require greater separation distances or impose other protective measures if necessary to protect the well from pollution, taking into consideration factors such as:
- (A) the hazard or health risk associated with the source of pollution;
 - (B) the proximity of the potential source to the well;
 - (C) the type of material, facility, or circumstance that poses the source or potential source of pollution;
 - (D) the volume or size of the source or potential source of pollution;
 - (E) hydrogeological features of the site that could affect the movement of contaminants to the source water;
 - (F) the effect that well operation might have on the movement of contamination; and
 - (G) the feasibility of providing additional separation distances or protective measures.
- (4) The lot shall be graded or sloped so that surface water is diverted away from the wellhead. The well shall not have greater than a one percent annual chance of flooding.
- (5) If a supplier of water demonstrates that it is impracticable, taking into consideration feasibility and cost, to locate water from any other approved source and an existing well can no longer provide water that meets the requirements of this Subchapter, a representative of the Division may approve a variance for a smaller well lot and reduced separation distances to meet existing demands. Additional monitoring under this Part or other conditions shall be imposed if necessary to mitigate the increased risk from the variance.
- (b) The Division of Water Resources may grant a variance from the minimum horizontal separation distances for public water supply wells set out in Parts (a)(2)(D) and (E) of this Rule.
- (1) Such variance shall require the following findings:
 - (A) the well supplies water to a non-community water system as defined in G.S. 130A-313(10)(b) or supplies water to a business or institution, such as a school, that has become a non-community water system through an increase in the number of people served by the well;
 - (B) it is impracticable, taking into consideration feasibility and cost, for the public water system to comply with the minimum horizontal separation distance set out in Parts (a)(2)(D) and (E) of this Rule;
 - (C) there is no reasonable alternative source of drinking water available to the public water supply system and;
 - (D) the granting of the variance will not result in an unreasonable risk to public health.
 - (2) Such variance shall require that the non-community public water supply well meet the following requirements:
 - (A) the well shall comply with the minimum horizontal separation distances set out in Parts (a)(2)(D) and (E) of this Rule to the maximum extent practicable;
 - (B) the well shall meet a minimum horizontal separation distance of 25 feet from a building, mobile home, or other permanent structure that is not used primarily to house animals;
 - (C) the well shall meet a minimum horizontal separation distance of 100 feet from any animal house or feedlot and from cultivated areas to which chemicals are applied;
 - (D) the well shall meet a minimum horizontal separation distance of 50 feet from surface water;

- and
(E) the well shall comply with all other requirements for public well water supplies set out in Paragraph (a) of this Rule.

*History Note: Authority G.S. 130A-315; 130A-318; P.L. 93-523; S.L. 2011-394;
Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 7, 2014; July 1, 1994; September 1, 1990; September 1, 1979;
Readopted Eff. July 1, 2019.*

SECTION .0300 - SUBMISSION OF PLANS; SPECIFICATIONS; AND REPORTS**15A NCAC 18C .0301 APPLICABILITY: PRIOR NOTICE**

- (a) All persons, including units of local government, intending to construct, alter, or expand a community or non-transient, non-community water system shall give written notice thereof, including submission of applicable Water System Management Plan, engineering reports, and engineering plans and specifications to the Department, as required by the rules of this Section. Any construction, alteration, or expansion which affects capacity, hydraulic conditions, operating units, the functioning of water treatment processes or the quality of water to be delivered shall require submission of the documents described in this Paragraph. A non-community water system using surface water or ground water under the direct influence of surface water shall be subject to the provisions of this Rule. Non-transient, non-community water systems shall not be subject to the provisions of this Rule unless constructed, altered, or expanded on or after July 1, 1994.
- (b) Water System Management Plan and Engineer's Report shall be submitted to the Department at least 60 days prior to the date upon which action by the Department is desired.
- (c) All reports, other than those in Paragraph (b) of this Rule, engineering plans and specifications and other data intended for approval shall be submitted to the Department at least 30 days prior to the date upon which action by the Department is desired.
- (d) If revisions to the Water System Management Plan are necessary, the system applicant will be notified. A revised Water System Management Plan will constitute a resubmittal and additional time will be required for review.
- (e) If revisions to the engineering plans or specifications are necessary, the engineer who prepared them will be notified. Revised engineering plans and specifications will constitute a resubmittal and additional time will be required for review.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1990; March 1, 1989; June 30, 1980; September 1, 1979;
Temporary Amendment Eff. October 1, 1999;
Amended Eff. August 1, 2000;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0302 SUBMITTALS

- (a) All plans, specifications, reports, or other data shall be submitted in triplicate for review by the Public Water Supply Section, Division of Water Resources at 512 N Salisbury Street, Room 1304A, Raleigh NC 27604-1170, or 1634 Mail Service Center, Raleigh NC 27699-1634.
- (b) Engineering plans shall consist of legible prints having black, blue, or brown lines on a white background suitable for microfilming. The engineering plans shall not be more than 36 inches wide and 48 inches long and not be less than 11 inches wide and 17 inches long.
- (c) An applicant subject to G.S. 143-355(l) shall submit three copies of the adopted Local Water Supply Plan. If information required in the Engineer's Report or the Water System Management Plan is included in an adopted Local Water Supply Plan, a submittal to the Department may incorporate this information by referencing the location in the adopted Local Water Supply Plan.
- (d) Existing systems that have previously submitted an Engineer's Report and a Water System Management Plan in accordance with Rule .0307 of this Section shall document any changes either as revised reports and plans or addendums.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; December 1, 1991; September 1, 1990; June 30, 1980; September 1, 1979;
Temporary Amendment Eff. October 1, 1999;
Amended Eff. April 1, 2014; August 1, 2000;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0303 SUBMISSIONS REQUIRED BY ENGINEER AND APPLICANT

(a) Detailed Engineer's Reports and engineering plans and specifications shall be prepared by a professional engineer licensed to practice in the State of North Carolina. These documents shall bear an imprint of the registration seal of the engineer. Upon completion of the construction or modification, the applicant shall submit a certification statement signed and sealed by a registered professional engineer stating that construction was completed in accordance with approved engineering plans and specifications, including any provisions stipulated in the Department's plan approval letter or authorization to construct letter, and revised only in accordance with the provisions of Rule .0306 of this Section. The statement shall be based upon observations during and upon completion of construction by the engineer or a representative of the engineer's office who is under the engineer's supervision.

(b) A Water System Management Plan as required in Paragraph (c) of Rule .0307 of this Section shall include a signed certification stating that the information submitted is true, accurate, and complete. This certification shall be in accordance with Paragraph (d) of this Rule.

(c) The applicant shall submit a signed certification, prior to Final Approval, stating that the requirements in Paragraph (d) (Operation and Maintenance Plan) and Paragraph (e) (Emergency Management Plan) of Rule .0307 of this Section have been satisfied, and that the system will have a certified operator as required by Section .1300 of this Subchapter prior to operation. This certification shall be in accordance with Paragraph (d) of this Rule.

(e) The certifications required in Paragraphs (b) and (c) of this Rule shall be provided on a form provided by the Department and shall be signed by the following individual or his duly authorized representative:

- (1) for a corporation, limited liability company, home owner association or a non-profit organization: a president, vice president, secretary, or treasurer;
- (2) for a partnership or sole proprietorship: by a general partner or the proprietor; or
- (3) for a municipality, State, Federal or other agency: by either a principal executive officer or ranking elected official.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; December 1, 1987; September 1, 1979;
Temporary Amendment Eff. October 1, 1999;
Amended Eff. August 1, 2000;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0304 APPLICATION FOR APPROVAL: BY WHOM MADE

Applications for approval shall be filed by the current owner on blanks which will be supplied by the Department. If ownership changes before Final Approval, the new owner shall submit a new Water System Management Plan in accordance with Rule .0307 of this Section.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1990;
Temporary Amendment Eff. October 1, 1999;
Amended Eff. August 1, 2000;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0305 APPROVALS NECESSARY BEFORE CONTRACTING OR CONSTRUCTING

(a) No construction shall be undertaken, and no contract for construction, alteration, or installation shall be entered into, unless the Department determines the system complies with G.S. 130A-317(c) and the Department issues the authorization to construct letter. This authorization shall be issued following completion and submittal of the Engineer's Report and Water System Management Plan, as specified in Rule .0307(b) and (c) of this Section, and approval of the engineering plans and specifications by the Department. Authorization to construct from the

Department shall be valid for 36 months from the date of the letter. Authorization to construct may only be extended if the rules governing a public water supply and site conditions have not changed since the letter was issued. The authorization to construct and the approval for engineering plans and specifications letters from the Department shall be posted at the primary entrance of the job site during construction.

(b) Upon request, permission to drill test wells at approved sites in order to establish the quality and quantity of the ground water shall be granted by the Department prior to completion and submittal of the Engineer's Report and Water System Management Plan and approval of engineering plans and specifications. All wells abandoned, either temporarily or permanently, shall be abandoned in accordance with 15A NCAC 02C .0113 (Well Construction Standards) and all local ordinances.

(c) Units of local government that have an adopted water system extension program pursuant to Section .1800 of this Subchapter, upon submission to and approval of their program by the Department, shall be excluded from the requirements of submitting engineering plans and specifications for water main extensions that would not have adverse effect upon the existing system supply or pressure, provided the following requirements are met:

- (1) Engineering plans and specifications for all such extensions shall be prepared by or under the direct supervision of an engineer licensed to practice in the State of North Carolina.
- (2) All engineering plans shall be approved by the unit of local government's engineering department or its consulting engineers prior to the commencement of construction.
- (3) The Department shall have approved the extension program submitted by the unit of local government prior to construction commencing.
- (4) The extension program submitted for review and approval by the Department shall provide for establishing ownership, operation, and maintenance of water system extensions and shall constitute prior notice of proposed construction.
- (5) Where design is to be based on a local government's standard specifications in lieu of written separate specifications for each extension project, the standard specifications shall have been previously approved by the Department.
- (6) The local government shall have obtained from the Department a letter stating they have met the requirements set forth in Section .1800 of this Subchapter.
- (7) An annual up-to-date plan of the entire public water system shall be maintained by the supplier of water and made available on request by the Department.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1990; September 1, 1979;
Temporary Amendment Eff. October 1, 1999;
Amended Eff. August 1, 2000;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0306 CHANGES IN ENGINEERING PLANS OR SPECIFICATIONS AFTER APPROVAL

Deviations from the approved engineering plans and specifications or changes in site conditions affecting capacity, hydraulic conditions, operating units, the functioning of water treatment processes, the quality of water to be delivered, or any provisos stipulated in the Department's original and subsequent letters of approval must be approved by the Department before any construction or installation. Revised engineering plans and specifications shall be submitted in time to permit the review and approval of such plans or specifications before any construction work affected by such deviations is begun. The Secretary may seek injunctive relief under G.S. 130A-18, assess an administrative penalty under G.S. 130A-22(b), or revoke or suspend engineering plan approval under G.S. 130A-23 for any violation of this Rule.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. November 1, 1987;
Temporary Amendment Eff. October 1, 1999;
Amended Eff. August 1, 2000;*

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .0307 ENGINEER'S REPORT, WATER SYSTEM MANAGEMENT PLAN AND OTHER PLANS

- (a) The applicant shall submit to the Department an Engineer's Report and Water System Management Plan.
- (b) Engineer's Report. The Engineer's Report shall contain a system description for the entire project, including scheduled phase development and the following information, where applicable:
- (1) description of all existing water systems related to this project;
 - (2) identification of the municipality, community, area, or facility to be served by the proposed water system;
 - (3) the name and address of the applicant;
 - (4) a description of the nature of the establishments and of the area to be served by the proposed water system;
 - (5) a description of the future service areas of the public water system for 5, 10, 15 and 20 years;
 - (6) consideration of alternative plans for meeting the water supply requirements of the area, including, for new systems, obtaining water service from an existing system;
 - (7) for applicants seeking State loan or grant support for the project, financial considerations, including:
 - (A) technical alternatives;
 - (B) the costs of integral units; and
 - (C) the total costs.
 - (8) population records and trends, present and anticipated future water demands, and present and future yield of source or sources of water supply, including provisions to supply water to other systems;
 - (9) character of source or sources of water supply, including:
 - (A) hydrological or hydrogeological data;
 - (B) stream flow rates or well yields;
 - (C) for surface sources, analytical results for chemical, mineral, bacteriological, and physical qualities; and
 - (D) the location and nature of sources of pollution.
 - (10) proposed water treatment processes, including:
 - (A) the criteria and basis of design of units;
 - (B) the methods or procedures used in arriving at recommendations; and
 - (C) the reasons or justifications for any deviations from conventional or indicated process or method.
 - (11) for purchased water, a copy of the agreement with the supplier and the hydraulic analysis showing the supplier's capabilities for supplying the purchased water;
 - (12) a description of the design basis of the source, treatment, and distribution system, and the useful life of all sources, treatment, and transmission facilities including pipes, pumping stations, and storage facilities;
 - (13) for existing system projects intending to alter or expand a distribution system, a statement of maximum daily treated water supply and maximum daily demand, including supporting documentation and calculations; and
 - (14) for existing systems, a prioritized list of infrastructure improvements.
- (c) Water System Management Plan. The Water System Management Plan shall document the ability to finance, operate, and manage the system in accordance with this Subchapter for the current owner and for any entity that assumes ownership of the water system within the first 24 months of operation. The Water System Management Plan shall include the following information, where applicable:
- (1) Organization:
 - (A) a description of organizational structure or a chart showing all aspects of water system management and operation;
 - (B) an identification of positions responsible for policy decisions ensuring compliance with State rules and the day-to-day operation of the system; and
 - (C) a copy of all contracts for management or operation of the water system by persons or agencies other than the system's owner.

- (2) Ownership:
 - (A) identify the ownership structure, such as sole proprietor, partnership, corporation, limited liability company, homeowner association, nonprofit organization, local government unit, state or federal agency, or other legal entity, and disclose if the ownership of the system is expected to change once the system is constructed and, if known, identify the future owners;
 - (B) provide the mailing address and street address of the owner and the physical location of the water system;
 - (C) disclose any encumbrances, trust indentures, bankruptcy decrees, legal orders or proceedings, or other items that may affect or limit the owner's control over the system and describe how compliance with the requirements of this Subchapter will be maintained; and
 - (D) describe the legal authority, such as ownership, leases or recorded easements, allowing inspection, repair, and maintenance of system components.
- (3) Management qualifications:
 - (A) describe the qualifications of the owners and managers of the water system, including training and experience in owning or managing a water system; and
 - (B) provide the name and Public Water Supply Identification Number of all public water systems owned within the last five years as well as all systems operated under contract for another owner within the last five years. If any system has been assessed a penalty for violating a requirement set forth in this Subchapter, describe how the owner will prevent similar violations at this system.
- (4) Management training. Describe plans to keep management current with regulatory requirements for managing and operating a public water system.
- (5) Policies. The system shall have policies regarding the following procedures:
 - (A) cross-connection control;
 - (B) customer information, complaints, and public education;
 - (C) budget development and rate structure;
 - (D) response and notification if water quality violations occur;
 - (E) customer connection, disconnection, billing, and collection; and
 - (F) safety procedures.
- (6) System monitoring, reporting and record keeping. The applicant shall provide:
 - (A) a summary of the applicable system monitoring and reporting requirements; and
 - (B) a description of procedures for keeping and compiling records and reports in accordance with this Subchapter.
- (7) Financial Plans. The plan shall contain the following financial information, where applicable:
 - (A) Units of Local Government:
 - (i) For projects that require the unit of local government to incur debt, the unit of local government shall submit a statement from the Local Government Commission stating that debt issue has been approved.
 - (ii) For projects that do not require the unit of local government to incur debt, the unit of local government shall submit the following:
 - (I) a statement from the unit of local government documenting that they are in compliance with G. S. 159, Article 3, The Local Government Budget and Fiscal Control Act; and
 - (II) estimated revenues, expenditures, and rate structure for the construction, operation and maintenance, administration, and reasonable expansion of the project. This information shall be provided on a form designated by the Department and shall demonstrate that revenues are greater than expenses.
 - (B) The North Carolina Utilities Commission's financial determination may be used as the financial plan for systems subject to its regulations:
 - (i) submit a copy of the Order Granting Franchise and Approving Rates from the North Carolina Utility Commission; or
 - (ii) submit a copy of the Order Recognizing Continuous Extension and Approving Rates from the North Carolina Utilities Commission.
 - (C) Non-transient non-community water systems. Owners of existing non-transient non-

community water system(s) which receive no violation of this Subchapter during the preceding three years shall provide a description of negative impacts the project would have on the financial ability to comply with this Subchapter. The owner of either a proposed new or existing non-transient non-community water system that was in violation of this Subchapter within the prior three years shall follow the requirements in Part (D) of this Subparagraph.

- (D) All other community and non-transient non-community water systems shall document the following:
- (i) analysis that compares anticipated revenues with planned expenditures for a five-year period that demonstrates a positive cash flow in each year, and a 20-year equipment replacement cost plan documenting the methods to finance equipment replacement;
 - (ii) the creation and funding of a continuous operating cash reserve greater than or equal to one-eighth of the annual operating, maintenance, and administrative expenses for the water system. The operating cash reserve shall be fully funded by the end of the first year of operation;
 - (iii) the creation and funding of an emergency cash reserve greater than or equal the cost of replacing the largest capacity pump. The emergency cash reserve shall be fully funded by the end of the fifth year of operation; and
 - (iv) a description of the budget and expenditure control procedures that assure budget control for the applicant, including procedures or policies to prevent misuse of funds and a demonstration that the system has adopted generally accepted accounting procedures.
 - (v) In lieu of Sub-Items (ii) and (iii) of this Paragraph, substitute documentation shall be accepted in the following instances:
 - (I) an applicant with multiple water systems showing reserves affording greater or equal capabilities; or
 - (II) an applicant showing equivalent financial capacity to comply with requirements of this Section.

- (8) One Water System Management Plan may be submitted on behalf of an applicant owning and operating multiple water systems or an applicant pursuing multiple alterations or expansions and may include future projected construction or system acquisitions. The applicant shall submit a new Water System Management Plan for a project not covered under the existing Water System Management Plan or if violations of this Subchapter occur or continue at a system under an applicant's ownership or control.

(d) Operation and Maintenance Plan. The plan shall be completed prior to submitting the applicant's certification in accordance with Rule .0303(c) of this Section. This plan shall be accessible to the operator on duty at all times and available to the Department upon request. The Operation and Maintenance Plan shall include, at a minimum, a description of the location and routine operation and maintenance procedures for:

- (1) components of the treatment facility;
- (2) pumps, meters, valves, blowoffs, and hydrants;
- (3) backflow devices;
- (4) storage tanks; and
- (5) all other appurtenances requiring routine operation and maintenance.

(e) Emergency Management Plan. The Emergency Management Plan shall be completed prior to submitting the applicant certification required in Rule .0303(c) of this Section. The Emergency Management Plan shall be available to personnel responsible for emergency management and operator on duty at all times and available to the Department upon request. The supplier of water shall consider using the principles, practices, forms, nomenclature, structure, and definitions found in the National Incident Management System and shall contain the following information where applicable:

- (1) For community water systems, a plan with the following elements shall be required:
 - (A) an identification and phone numbers of personnel responsible for emergency management, including public water system, local, State, and federal emergency contacts;
 - (B) an identification of foreseeable natural and human-caused emergency events, including water shortages and outages;

- (C) a description of the emergency response plan for each identified event;
 - (D) a description of the notification procedures; and
 - (E) an identification and evaluation of all facilities and equipment whose failure would result in a water outage or water quality violations.
- (2) For a supplier of water that treats and furnishes water from a surface water source, completion of the Source Water Protection Plan in accordance with Rule .1305 of this Subchapter shall fulfill the Emergency Management Plan requirement.
 - (3) For non-transient, non-community water systems, the plan shall contain the positions and phone numbers of responsible persons to contact in the event of an emergency, including public water system, local, State and federal emergency contacts.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
 Readopted Eff. December 5, 1977;
 Amended Eff. July 1, 1994; September 1, 1990; June 30, 1980; September 1, 1979;
 Temporary Amendment Eff. October 1, 1999;
 Amended Eff. August 1, 2000;
 Readopted Eff. July 1, 2019.*

15A NCAC 18C .0308 ENGINEERING PLANS AND SPECIFICATIONS

- (a) Engineering Plans. Engineering Plans for water supply systems shall consist of the following:
- (1) title information including the following:
 - (A) name of the city, town, board, commission or other owner for whom the plans were prepared;
 - (B) the locality of the project;
 - (C) the general title of the set of drawings and prints;
 - (D) the specific title of each sheet;
 - (E) the date; and
 - (F) the scales used;
 - (2) a preliminary plat plan or map showing the location of proposed sources of water supply;
 - (3) a general map of the entire water system showing layout and all pertinent topographic features;
 - (4) detail map of source or sources of water supply;
 - (5) layout and detail plans for intakes, dams, reservoirs, elevated storage tanks, standpipes, pumping stations, treatment plants, transmission pipelines, distribution mains, valves, and appurtenances and their relation to any existing water system, and the location of all known existing structures or installations and natural barriers that might interfere with the proposed construction; and
 - (6) the north point.
- (b) Specifications. Complete detailed specifications for materials, equipment, workmanship, test procedures and specified test results shall accompany the plans. The specifications shall include, where applicable:
- (1) the design and number of chemical feeders, mixing devices, flocculators, pumps, motors, pipes, valves, filter media, filter controls, laboratory facilities and equipment, and water quality control equipment and devices;
 - (2) provision for continuing with minimum interruption the operation of existing water supply facilities during construction of additional facilities;
 - (3) safety devices and equipment;
 - (4) procedure for disinfection of tanks, basins, filters, wells and pipes; and
 - (5) identification of type, brand name, and model number for all back flow devices.
- (c) One copy of the engineering plans and specification, upon approval, will be returned to the person or persons making application for approval.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
 Readopted Eff. December 5, 1977;
 Amended Eff. July 1, 1994; July 1, 1993;
 Temporary Amendment Eff. October 1, 1999;
 Amended Eff. August 1, 2000;*

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .0309 FINAL APPROVAL

(a) No construction, alteration, or expansion of a water system, subject to approval as described in Section .0300 of this Subchapter, shall be placed into final service or made available for human consumption until the applicant has complied fully with Section .0300 of this Subchapter and received Final Approval from the Department.

(b) Temporary approval may be granted by the Department for system alterations required to remedy an imminent hazard as determined by the Department.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;

Temporary Adoption Eff. October 1, 1999;

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SECTION .0400 – WATER SUPPLY DESIGN CRITERIA**15A NCAC 18C .0401 MINIMUM REQUIREMENTS**

The design criteria given in this Section are the minimum requirements for approval of plans and specifications by the Department. The Department provides supplemental criteria for design of water systems in Sections .0500-.1000 of this Subchapter.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
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15A NCAC 18C .0402 WATER SUPPLY WELLS

(a) Well Construction. The construction of water supply wells shall conform to well construction regulations and standards of the Department, codified in 15A NCAC 02C.

(b) Upper Terminal of Well. A well casing shall terminate neither below ground nor in a pit. The pump pedestal for above ground pumps of every water supply well shall project not less than six inches above the concrete floor of the well house or the concrete slab surrounding the well. A well casing shall project at least one inch above the pump pedestal. For submersible pumps, the casing shall project at least six inches above the concrete floor or slab surrounding the well head.

(c) Sanitary Seal. The upper terminal of a well casing shall be sealed watertight, with the exception of a vent pipe or vent tube having a downward-directed, screened opening.

(d) Concrete Slab or Well House Floor. A water supply well shall have a continuous bond concrete slab or well house concrete floor extending at least three feet horizontally around the outside of the well casing. Minimum thickness for the concrete slab or floor shall be four inches.

(e) Sample Tap and Waste Discharge Pipe. Faucets or spigots shall be provided for sampling both raw water prior to treatment and treated water prior to delivery to the first customer. Sample spigots shall not be threaded for hose connection. Threaded hose bibs shall be equipped with anti-siphon devices. A water sample tap and piping arrangement for discharge of water to waste shall be provided.

(f) Physical Security and Well Protection. A water supply well shall be secured against unauthorized access and protected from the weather. One of the following structures shall be provided:

- (1) Well house. A well house shall be constructed as follows:
 - (A) Structures shall comply with applicable provisions of state and local building codes.
 - (B) Drainage shall be provided by floor drain, wall drain, or slope to door.
 - (C) Access into the structure shall be a doorway with minimum dimensions of 36 inches wide and 80 inches high.
 - (D) The structure shall have adequate space for the use and maintenance of the piping and appurtenances. If treatment is provided at the well, the provisions of Rule .0404(a) of this Section shall apply.
 - (E) The structure shall be secured with lock and key.
- (2) Prefabricated structures. A prefabricated structure shall be constructed as follows:
 - (A) A well-head cover shall be hinged and constructed so that it can be lifted by one person.
 - (B) A locking mechanism shall be provided.
 - (C) The structure shall not be permanently fastened to the slab.
- (3) Fencing and temperature protection. Fencing and temperature protection shall be constructed as follows:
 - (A) The fence height shall be a minimum of six feet.
 - (B) The fence shall be constructed of chain link with locked access.
 - (C) The fence shall enclose the well, hydropneumatic tank, and associated equipment.
 - (D) Access shall be provided for maintenance and operation.
 - (E) The well, piping, treatment equipment, and electrical controls shall be protected against freezing. Wrapping with insulation shall be acceptable for appurtenances such as the air vent, meter, valves, and sample taps, provided they are visible and accessible. Insulation shall be

jacketed.

(g) Yield:

- (1) Wells shall be tested for yield and drawdown. A report or log of at least a 24-hour drawdown test to determine yield shall be submitted to the Department for each well.
- (2) Wells shall be located so that the drawdown of any well shall not interfere with the required yield of another well.
- (3) The combined yield of all wells of a public water system shall provide in 12-hours pumping time the daily flow requirements as determined in Rule .0409 of this Section.
- (4) The capacity of the permanent pump to be installed in each well shall not exceed the yield of the well as determined by the drawdown test.
- (5) A residential community water system using well water as its source of supply and designed to serve 50 or more connections shall provide at least two wells. A travel trailer park or campground designed to serve 100 or more connections shall provide at least two wells. In lieu of a second well, another approved water supply source may be accepted.
- (6) A totalizing meter shall be installed in the piping system from each well.

(h) Initial Chemical Analyses. A representative sample of water from every new water supply well shall be collected and submitted for chemical analyses to the State Laboratory of Public Health or to a certified laboratory. The results of the analysis shall demonstrate that the water is treatable to meet the water quality standards in Section .1500 of this Subchapter, and this treatment shall be provided before the well is placed into service.

(i) Continuous Disinfection. Continuous application of chlorine, hypochlorite solution, or another approved and equally efficient disinfectant shall be provided for all well water supplies introduced on or after January 1, 1972. Equipment for determining residual chlorine concentration in the water shall be included in the plans and specifications.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;

Readopted Eff. December 5, 1977;

Amended Eff. April 1, 2014; July 1, 1994; September 1, 1990; January 1, 1986; March 31, 1980;

Readopted Eff. July 1, 2019.

15A NCAC 18C .0403 SURFACE WATER FACILITIES

(a) Unimpounded Stream. Both the minimum daily flow of record of the stream and the estimated minimum flow calculated from rainfall and run-off shall exceed the maximum daily draft for which the water treatment plant is designed, with due consideration given to requirements for future expansion of the treatment plant. The Department shall approve a water plant capacity greater than the minimum daily flow of record of the stream if rules or regulations of other government agencies will not be violated.

(b) Impoundments. Raw water storage capacity shall be sufficient to reasonably satisfy the designed water supply demand during periods of drought.

(c) Clearing of Land for Impoundment. The area in and around the proposed impoundment of class I and class II reservoirs shall be cleared as follows:

- (1) The area from normal full level to five feet below the normal pool elevation of the impoundment shall be cleared and grubbed of all vegetation and shall be kept cleared until the reservoir is filled. Secondary growth shall be removed prior to flooding.
- (2) The entire area below the five-foot water depth shall be cleared and shall be kept cleared of all growth of less than six inches in diameter until the reservoir is filled. Stumps greater than six inches in diameter shall be cut off at ground level.
- (3) All brush, trees, and stumps shall be burned or removed from the proposed reservoir.

(d) Existing Impoundments. Existing impoundments shall be approved as raw water sources if the following conditions are met.

- (1) The requirements of Paragraph (c) of this Rule and Section .0200 of this Subchapter shall be met.
- (2) A class I or class II reservoir shall meet the requirements of Section .1200 of this Subchapter.
- (3) The supplier of water shall have an engineer, along with other consultants as needed, conduct a study of the impoundment and provide the Department with information to determine whether the requirements of this Subchapter are met. The study shall include:
 - (A) plans and specifications of the impounding structure;

- (B) information concerning clearing of the land for the impoundment, as provided in Paragraph (d) of this Rule;
- (C) information concerning sources of pollution on the watershed;
- (D) documentation of control by the supplier of water of the impoundment and 50-foot margin around the impoundment measured from the normal pool elevation;
- (E) information concerning the quality of the water and sediments which could cause water quality fluctuations, such as lake stratification, turnover, and algae bloom; and
- (F) other information necessary to show that the proposed source will meet the requirements of this Subchapter.

(e) A margin of at least 50 feet around a class I and class II reservoir, measured from the normal pool elevation, shall be owned or controlled by the supplier of water.

(f) Intakes, Pumps, Treatment Units, and Equipment. Raw water intakes, pumps, treatment units, and equipment shall be designed to provide water of potable quality that meets the water quality requirements stated in Section .1500 of this Subchapter.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
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15A NCAC 18C .0404 WATER TREATMENT FACILITIES

(a) Physical Security and Facility Protection. Treatment equipment and chemicals shall be secured against unauthorized access and shall be protected against the weather as follows:

- (1) Structures shall comply with provisions of state and local building codes.
- (2) Drainage shall be provided by floor drain, wall drain, or slope to door.
- (3) Access to the structure shall be a doorway with minimum dimensions of 36 inches wide and 80 inches high. The doorway shall be large enough to accommodate installation or removal of equipment.
- (4) The structure shall have space to facilitate operation and maintenance of treatment equipment, storage of chemicals, required piping and appurtenances, electrical controls, and laboratory testing.

(b) Mixing and Dispersion of Chemicals. Provisions shall be made for mixing and dispersion of chlorine and other chemicals applied to the water. Facilities treating surface water or ground water influenced by surface water shall comply with the disinfection requirements in Rule .2002 of this Subchapter.

(c) Chemical Feed Machines:

- (1) Durable chemical feed machines designed for adjustable accurate control of feed rates shall be installed for application of all chemicals necessary for treatment of the water. Sufficient stand-by units to assure uninterrupted operation of the treatment processes shall be provided. Continuous chemical application shall be protected from electrical circuit interruption that could result in overfeed or underfeed or otherwise interrupt the feed of chemicals.
- (2) Chemical feed lines from the feeders to the points of application shall be of material sized for the design flow rate and corrosion resistant and shall be accessible for cleaning and protected against freezing. The length and the number of bends shall be reduced to a minimum.
- (3) Piping and appurtenances shall be constructed of suitable material for the chemical being added and the specific application.
- (4) A separate feeder shall be used for each chemical applied.

(d) Disinfection Equipment:

- (1) Equipment designed for application of chlorine or some other approved, equally efficient disinfectant shall be provided. Spare units shall be available. The plans and specifications shall describe the equipment.
- (2) Chlorinators shall be installed in tightly constructed, above ground rooms with mechanical ventilation to the outside air. The capacity of exhaust fans shall be sufficient to discharge all air in the rooms every 60 seconds. The fans or their suction ducts shall be located not more than eight inches above floor level. Provisions for entrance of fresh air shall be made. The point of discharge shall be so located as not to contaminate the air in any building or inhabited areas. Electrical

switches for operation of fans shall be located outside the chlorinator rooms. Rooms used for storage of chlorine cylinders shall be designed as described in this Subparagraph.

(e) Meters and Gauges. Meters and gauges, including raw and finished water meters, shall be installed to indicate and record water flow entering the treatment facility and water pumped or conducted to the distribution system.

(f) Prevention of Backflow and Backsiphonage. Water treatment facilities shall not have submerged inlets and interconnections whereby non-potable water, water of questionable quality, or other liquids may be siphoned or forced into or otherwise allowed to enter the finished water supply.

(g) Chemical Storage. Separate space for storing at least a 30-day supply of chemicals shall be provided. A separate room or partitioned space shall be provided for storage of dry fluoride chemicals or liquid fluoride chemicals in portable containers.

(h) Laboratory. Space, equipment, and supplies shall be provided for daily chemical and bacteriological tests. A layout of laboratory furniture and equipment shall be included in the plans.

(i) Waste Handling and Disposal:

- (1) Provisions shall be made for disposal of water treatment plant wastes, such as clarification sludge, softening sludge, iron-manganese sludge, filter backwash water, and brines. Untreated waste shall not be returned to the head of the water treatment plant.
- (2) Recycling of supernatant or filtrate from waste treatment facilities treating filter wash water, sedimentation basin sludge, or clarifier basin sludge to the head of the water treatment plant may be allowed if the following conditions are met:
 - (A) The water recycled shall be less than 10 percent by volume of the raw water entering the water treatment plant.
 - (B) A permit has been issued by the appropriate regulatory authority for discharge of wastes to sanitary sewer, stream, lagoon or spray irrigation.
 - (C) The raw water does not contain excessive algae, finished water taste and odor problems are not encountered, and contaminant levels do not exceed allowable levels as set forth in this Subchapter.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. July 1, 1994; Readopted Eff. July 1, 2019.

15A NCAC 18C .0405 STORAGE OF FINISHED WATER

(a) Ground Level Storage:

- (1) Finished Water Ground Storage Tank. Finished water ground storage tanks shall be provided with a light-proof and insect-proof cover of concrete, steel, or equivalent material approved by the Department. The construction joints between side walls and the covers of concrete tanks or reservoirs shall be above ground level and above flood level, except that clearwells constructed below filters may be excepted from this requirement if total design, including waterproof joints, gives equal protection from flooding.
- (2) Access Manholes. The access manholes for finished water ground storage tanks or reservoirs shall be framed at least four inches above the tank or reservoir covers at the opening and shall be fitted with solid covers of materials that overlap the framed openings and extend down around the frames at least two inches. The covers for the openings shall be hinged at one side and fitted with a locking device.
- (3) Venting. Finished water ground storage tanks or reservoirs shall have vents with screened, downward directed openings. The vent and screen shall be of corrosion resistant material.
- (4) Overflow. The overflow pipes for finished water ground storage tanks or reservoirs shall not be connected directly to sewers or storm drains. Screens or other devices to prevent access by vermin, such as rodents and insects, shall be provided in the overflow pipe.
- (5) Inlets and Outlets. Water supply inlets and outlets of finished water ground storage tanks and reservoirs shall be located and designed to provide circulation of the water and to meet the CT requirements in Section .2000 of this Subchapter. Baffles shall be constructed where necessary to provide thorough circulation of the water.
- (6) Drain Valves. All finished water ground storage tanks and reservoirs shall be equipped with drain

valves that allow for unobstructed emptying of the tank.

(b) Elevated Storage Tanks:

- (1) Standards. The specifications for elevated tanks, stand-pipes, towers, paints, coatings, and other appurtenances shall meet the appropriate ANSI/AWWA Standards D100 11, D102 17, and D103 09 of the American Water Works Association, Inc., incorporated by reference including any subsequent amendments and editions. Copies may be obtained for public inspection as set forth in Rule .0503 of this Subchapter.
- (2) Elevation of Storage Tanks. The elevation of storage tanks shall be sufficient to produce a designed minimum distribution system pressure of 20 pounds per square inch at peak demand (fire flow) and 30 pounds per square inch during peak flow.
- (3) Elevated storage tanks shall be designed to minimize water age by avoiding short-circuiting of flows and dead-zones.
- (4) Drain. Elevated storage tanks shall be equipped with drain valves that allow for unobstructed emptying of the tank.

(c) Hydropneumatic Storage Tanks, referred to in this Rule as Pressure Tanks:

- (1) Use of Pressure Tanks. Where well yields and pumping capacities are sufficient, pressure tanks may be used to control pumps, stabilize pressures, and provide a minimum of storage. Pressure tanks shall have the capacity to maintain a minimum pressure of 30 pounds per square inch throughout periods of peak flow. Pressure tanks shall not be considered acceptable for meeting total storage requirements for public water systems of over 300 connections, except as provided in Paragraph (d) of this Rule.
- (2) Corrosion Control. Pressure tanks shall be galvanized after fabrication and provided with an ANSI/NSF approved liner or coating in accordance with Rule .1537 of this Subchapter.
- (3) Required Parts. Pressure tanks shall have access manholes, bottom drains, pressure gauges, and properly sized safety and vacuum relief valves.
- (4) Controls. Automatic pressure and start-stop controls for the operation of pumps shall be provided.
- (5) Hydropneumatic Storage Tanks. Hydropneumatic storage tanks shall conform to the construction and inspection requirements for pressure vessels adopted by the North Carolina Department of Labor and codified in 13 NCAC 13, incorporated by reference including any subsequent amendments and editions.
- (6) Appurtenances to pressure tanks, such as valves, drains, gauges, sight tubes, safety devices, air-water volume controls, and chemical feed lines, shall be protected against freezing.

(d) High Yield Aquifers:

- (1) Equipment. In lieu of providing elevated storage for public water systems over 300 connections in areas where aquifers are known to produce high yields, such as 400-500 gpm from an eight-inch well, a system of extra well pumping capacity, auxiliary power generating equipment, pressure tanks, controls, alarms, and monitoring systems may be provided. The design and installation of such system shall assure that reliable, continuous service is provided.
- (2) Auxiliary Power. A system relying on high-yield aquifers under Paragraph (d) of this Rule shall have an adequate number of wells equipped with sufficient pumping capacity so that the required flow rate will be maintained if the single largest capacity well and pump are out of operation. Auxiliary power generating equipment shall be provided for each well sufficient to operate the pump, lights, controls, chemical feeders, alarms, and other electrical equipment.
- (3) Pump Control. Pressure tanks designed in accordance with Paragraph (c) of this Rule and Section .0800 of this Subchapter shall be provided to maintain pressure and control the pump operation.
- (4) Alarm System. An alarm system shall be provided that will send a visual or audible signal to a constantly monitored location so that the water system operator will be advised of a primary power failure.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. April 1, 2014; July 1, 1994; September 1, 1990; October 1, 1986; June 30, 1980; Readopted Eff. July 1, 2019.

15A NCAC 18C .0406 DISTRIBUTION SYSTEMS

(a) Water Pipe Materials. Water pipes shall be cast iron, ductile iron, reinforced concrete, plastic, or other material designed for potable water system service and shall meet AWWA standards, section C, or be certified as meeting the specifications of ANSI/NSF Standard 61 Drinking Water System Components – Health Effects, which is incorporated by reference including any subsequent amendments and editions. Copies of AWWA standards may be obtained for public inspection as set forth in Rule .0503 of this Subchapter. Copies of ANSI/NSF Standard 61 may be obtained for public inspection as set forth in Rule .1537 of this Subchapter. The pressure rating class of the pipe shall be in excess of the maximum design pressure within that section of the water distribution system. The quality of pipe to be used shall be stated in the project specifications.

(b) Cross-Connections. No person shall construct, maintain, or operate a physical arrangement whereby a public water system has a cross-connection without the use of proper backflow protection.

- (1) No person shall introduce any water into the distribution system of a public water supply through any means other than from a source of supply duly approved by the Department or its representatives or make any physical connection between an approved supply and unapproved supply unless authorized in an emergency by the Department or its representative.
- (2) Service Connection Relation to Plumbing Code. No supplier of water shall provide a service connection to any plumbing system that does not comply with the North Carolina State Building Code, Volume II, and all applicable local plumbing codes. Where required, the supplier of water shall install or require to be installed an appropriate testable backflow prevention assembly prior to making the service connection. Design of backflow prevention assemblies for service connections shall not require Department review.
- (3) Connections Requiring Departmental Review. Connections between a public water system and the connection types in Parts (A) through (D) of this Subparagraph shall require review and approval by the Department prior to making the connection. Installation of a testable backflow prevention assembly or air gap shall be required if the connection is non-potable or unapproved. Engineering plans and specifications shall be submitted in accordance with Section .0300 of this Subchapter.
 - (A) Any regulated public water system;
 - (B) any community non-regulated public water system. Before providing a connection, a supplier of water shall ensure that the construction of the non-regulated public water system either was approved in accordance with Rule .0301(a) of this Subchapter or that backflow prevention is provided in accordance with this Rule;
 - (C) non-potable water treatment processes within a potable water treatment plant; and
 - (D) all cross-connections between potable water supplies and non-potable or unprotected supplies that are not specifically addressed in this Rule or AWWA M-14 Backflow Prevention and Cross Connection Control.
- (4) Backflow Prevention Not Addressed by the Plumbing Code. The following requirements shall apply to backflow prevention not addressed by the plumbing code.
 - (A) Testable backflow prevention assemblies shall meet American Society of Sanitary Engineering (ASSE) standards and carry an ASSE seal, be on the University of Southern California approval list for testable backflow prevention assemblies, or be on the North Carolina State Plumbing Code approval list for approved testable backflow prevention assemblies.
 - (B) For each identified water treatment process-related hazard, the supplier of water shall provide the appropriate backflow prevention assembly or method to protect the water supply and water treatment employees, in accordance with AWWA M-14 Backflow Prevention and Cross Connection Control.
 - (C) No person shall fill special use tanks or tankers containing pesticides, fertilizers, other toxic chemicals, or their residues from a public water system except at a location equipped with an over-the-rim free discharge of water or a reduced pressure backflow preventer properly installed on the public water supply. No supplier of water shall permit the filling of such special use tanks or tankers except at locations so equipped.
 - (D) A supplier of water shall not authorize for construction or other temporary, non-emergency use connections to hydrants that are not equipped with an approved air gap or an installed reduced pressure principle backflow prevention assembly.

- (E) If storage capacity is used only for non-potable purposes and there is installed either an elevated or ground tank or a ground reservoir, the following precautions shall be taken:
 - (i) If the reservoir or tank is filled from a supply other than a public water supply and the public water supply is used as a supplemental supply, the pipeline from the public water supply shall be installed with an air gap.
 - (ii) If the reservoir or tank is filled entirely by water from a public water supply and:
 - (I) a covered ground reservoir or covered elevated tank is used, an approved reduced pressure back-flow preventer or an approved double check valve assembly shall be used; or
 - (II) an uncovered ground reservoir or uncovered elevated tank is used, an air gap shall be required.
- (F) Installation. The following installation requirements shall be met, where applicable.
 - (i) Backflow prevention assemblies shall be installed in accordance with manufacturers' recommendations and specifications and shall not be modified in the field.
 - (ii) Back-flow prevention assemblies shall be located and installed in such a manner as to function as designed; be accessible for testing, maintenance, and inspection; and include all necessary test cocks and drains for testing. Valves shall be installed in the line at both ends of the back-flow prevention device to provide for replacement and maintenance.
 - (iii) Bypass lines parallel to a backflow prevention assembly shall have an approved backflow prevention assembly installed that is equal to that on the main line.
 - (iv) Reduced pressure principle assemblies shall be installed above ground or below ground in a vault with positive gravity drainage to atmosphere employing a drain of sufficient size to handle the full flow of discharge from a discharging assembly, 12-inch minimum clearance from vault walls and floor, and in accordance with manufacturer's recommendations. A reduced pressure principle assembly may be installed as protection for either a high-health or low-health hazard.
 - (v) Double check valve assemblies shall be installed either vertically or horizontal and above ground or below ground in a vault with positive gravity drainage to the atmosphere. A double check valve assembly shall be installed as protection for a low-health hazard only.
 - (vi) Pressure vacuum breaker assemblies shall be installed only where there is no possibility of a pressure higher than the supply pressure caused by a pump, elevated tank, boiler, air or steam pressure, or any other means which may cause backflow, and in accordance with manufacturer's recommendations. A pressure vacuum breaker shall be installed as protection for a high-health or low-health hazard that is subject to backsiphonage only and with no backpressure.
- (5) Interconnection to a public water system shall be subject to the approval of the supplier of water and shall not be made until authorized by the supplier of water.
- (6) A community or non-transient non-community public water system with five or more testable backflow prevention assemblies protecting the distribution system, as required pursuant to this Rule, shall maintain the following records beginning on January 1, 2020:
 - (A) records of the location, type, installation date, size, and the associated degree of hazard of backflow prevention devices whose failure would create a high-health hazard;
 - (B) a description of specific ongoing plans, actions, or schedules to inventory existing backflow prevention devices under Part (b)(5)(A) of this Rule and to identify and address all uncontrolled cross-connection hazards;
 - (C) final results of all backflow prevention assembly field testing and air gap inspections; and
 - (D) review of new service connections and existing service connections during a change of the account owner to ensure all required backflow prevention devices are properly installed and tested.
 - (E) a supplier of water which contracts with a third-party to implement any part of their cross-connection program may allow records required by this Paragraph to be maintained on the premises of the third-party, as long as the records are available on demand by the supplier of

- water.
- (F) program records under Part (C) of this Subparagraph shall be maintained for a minimum of four years. Remaining records referred to in this Paragraph shall be maintained while still current or in use.
 - (7) Each supplier of water shall notify the Department of any known incident of backflow into the public water system that creates a risk of contamination as soon as practical upon discovery of the incident but no later than the end of the next business day. If requested by the Department, the supplier of water shall submit a written report of the incident describing the nature and severity of the backflow, the actions taken by the supplier of water in response to the incident, and the action plan intended to prevent such incidents in the future.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. April 1, 2014; September 1, 1990; December 1, 1988; June 30, 1980; Readopted Eff. July 1, 2019.

15A NCAC 18C .0407 ELECTRICAL SYSTEMS

Electrical wiring and equipment shall comply with applicable provisions of the national, state, and local electrical codes. Protection against moisture and overheating shall be provided.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. July 1, 1994; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .0408 LEAD FREE CONSTRUCTION

- (a) All pipe, pipe fitting, solder or flux used in the installation or repair of a public water system shall be lead free.
- (b) "Lead free" means:
 - (1) not containing more than 0.2 percent lead when used with respect to solder and flux; and
 - (2) not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. June 1, 1988; Amended Eff. August 1, 2002; Readopted Eff. July 1, 2019.

15A NCAC 18C .0409 SERVICE CONNECTIONS

- (a) Local Water Supply Plan. Units of local government that are operating under a local water supply plan in accordance with G.S. 143-355(l) shall not be limited in the number of service connections.
- (b) No local water supply plan. A public water system that does not have a local water supply plan as stated in Paragraph (a) shall limit its number of service connections as follows:
 - (1) A public water system shall meet the daily flow requirements specified in Table 1:

Table 1: Daily Flow Requirements

Type of Service Connection	Daily Flow for Design
Residential	400 gallon/connection
Mobile Home Parks	250 gallon/connection
Campgrounds and Travel Trailer Parks	100 gallon/space
Marina	10 gallon/boat slip
Marina with bathhouse	30 gallon/boat slip

Rest Homes and Nursing Homes with laundry	120 gallon/bed
without laundry	60 gallon/bed
Schools	15 gallon/student
Day Care Facilities	15 gallon/student
Construction, work, or summer camps	60 gallon/person
Business, office, factory (exclusive of industrial use)	
- without showers	25 gallon/person/shift
- with showers	35 gallon/person/shift
Hospitals	300 gallon/bed

or;

- (2) A public water system shall meet the daily flow requirements calculated as follows:
 - (A) If records of the previous year are available that reflect daily usage, the average of the two highest consecutive days of record of the water treated shall be the value used to determine if there is capacity to serve additional service connections. Unusual events, such as massive line breaks or line flushings, shall not be considered.
 - (B) If complete daily records of water treated are not available, the public water system shall multiply the daily average use based on the amount of water treated during the previous year of record by the appropriate factor to determine maximum daily demand, as follows:
 - (i) A system serving a population of 10,000 or less shall multiply the daily average use by 2.5; or
 - (ii) A system serving a population greater than 10,000 shall multiply the daily average use by 2.0.
- (c) A supplier of water shall include the impact that demands from anticipated in-ground irrigation systems, multi-family units, or vacation rental homes will have on the daily flow needs determined in Paragraph (b) of this Rule.
- (d) If two years of metered usage data exists, a supplier of water may recalculate the daily flow requirements based on the actual usage. If actual demands are lower than the projected demand, recovered supply may be used to support additional connections in accordance with Paragraph (b) of this Rule.
- (e) A supplier of water shall be exempt from using Table 1 in Subparagraph (b)(1) of this Rule and any other design flow standards established by the Department or the Commission to determine the daily flow requirements, provided that a professional engineer licensed pursuant to G.S. 89C prepares, seals, and signs documentation supporting alternative daily flow requirements that are sufficient to sustain the water usage required in the engineering design by using low-flow fixtures or flow reduction technologies.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;
Eff. July 1, 1994;
Readopted Eff. July 1, 2019.*

SECTION .0500 - SUPPLEMENTAL DESIGN CRITERIA**15A NCAC 18C .0501 PURPOSE**

For the protection of the public health, and pursuant to authority granted by Article 10 of Chapter 130A of the General Statutes of North Carolina, the Commission for Public Health hereby adopts the following rules (15A NCAC 18C .0500 through .1000) as supplemental design criteria for approval of plans and specifications.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1991; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0502 DESIGN CRITERIA

Community and non-transient, non-community water systems and non-community water systems using surface water or ground water under the influence of surface water shall comply with these supplemental design criteria unless alternate design proposals are approved by the Department. The Department shall consider the following factors in approving an alternate design:

- (1) The potential health risk of using the alternate design;
- (2) The need for deviation from the supplemental design criteria;
- (3) The degree of deviation from the supplemental design criteria; and
- (4) The capability of the alternate design to meet the maximum contaminant levels, treatment techniques and other requirements of this Subchapter.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1979; January 1, 1978;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0503 OTHER DESIGN STANDARDS

In evaluating public water systems or water system design features, in addition to the rules in this Subchapter, the Department shall consider standards from the American Water Works Association or Recommended Standards for Water Works – Policies for the Review and Approval of Plans and Specifications for Public Water Supplies by the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers which are incorporated by reference, including any subsequent amendments and editions. Copies of the American Water Works Association standards may be obtained from the American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235 with costs determined by the American Water Works Association and available at www.awwa.org/Publications/Standards. Copies of the Recommended Standards for Water Works may be obtained from the Minnesota Department of Administration available at <https://www.mnbookstore.com/other/miscellaneous-state-agency-products/miscellaneous/recommended-standards-water-14349.html> and for a cost of nineteen dollars and ninety-five cents (\$19.95). An electronic copy can be obtained at no cost from the Minnesota Department of Health website, located at <https://www.health.state.mn.us/communities/environment/water/tenstates/standards.html>.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;
Eff. July 1, 2019 (this Rule was previously codified in 15A NCAC 18C .0715).*

SECTION .0600 - RAW SURFACE WATER FACILITIES**15A NCAC 18C .0601 IMPOUNDMENTS: PRE-SETTLING RESERVOIRS**

(a) Construction of a pre-settling reservoir shall be required if wide and rapid variations in turbidity, bacterial concentrations, or chemical qualities occur, or where the following raw water quality standards are not met: turbidity – 150 NTU, coliform bacteria – 3000/100 ml, fecal coliform bacteria – 300/100 ml, or color – 75 CU. If impoundment of the water supply stream does not or will not provide raw water of acceptable quality, a pre-settling reservoir located outside the watershed or catchment area shall be required.

(b) The Department shall approve alternatives to pre-settling reservoirs if a supplier of water demonstrates that engineered pretreatment providing an additional treatment barrier to low raw water quality will be installed and that the overall designed treatment process will comply with all other applicable requirements of this Subchapter. Pilot plant studies under Rule .0714 of this Subchapter shall be required to demonstrate treatment effectiveness unless operational data demonstrating treatment effectiveness for the variety of water quality that is experienced at the treatment facility are already available.

(c) The Department shall approve capacity increases at existing surface water treatment facilities without addition or up-sizing of pre-settling reservoirs if:

- (1) historical data or full-scale pilot studies demonstrate that the plant will provide treatment in accordance with this Subchapter without additional pre-settling; or
- (2) the use of alternative technology alleviates the need for additional pre-settling.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0602 RAW WATER INTAKES

(a) Stream Intakes. The intake structure for unimpounded streams shall be constructed so that it will not be affected by flood water or damaged by floating debris. It shall be located and designed to minimize entrance of sand, silt, fish and debris. A bar screen or grating shall be provided, with the area of the openings designed to restrict the entrance velocity to 30 feet per minute or less.

(b) Reservoir Intakes. Where water quality variations affecting the treatment process will occur at different depths of a reservoir, the intake structure shall be constructed with multiple inlets that can be readily opened and closed for selection of the optimum water quality level. A bar screen or grating shall be provided, with the area of the openings designed to restrict the entrance velocity to 50 feet per minute or less.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0603 INTAKE CONDUITS

The pipes, tunnels, or flumes used for intake conduits shall be designed to conduct water at self-cleaning velocities of at least two feet per second. A screen, accessible for cleaning, shall be provided to protect the pumps.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0604 PUMPS: POWER FACILITIES

At least two pumping units with necessary check valves, gate valves, piping and appurtenances shall be provided for both raw water and finished water. Auxiliary facilities shall be provided to supply power or to provide other means to satisfy the design minimum water needs of the system.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

SECTION .0700 - SURFACE WATER TREATMENT FACILITIES**15A NCAC 18C .0701 FLASH OR RAPID MIXING FACILITY**

Mixing shall be adequate to obtain rapid and thorough dispersal of the chemicals in the raw water before it enters the flocculation basins. The design of the flash mix facilities shall provide sufficient and efficient transfer of energy to the water to effect thorough mixing.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0702 AIR MIXING

Diffused air mixing may be used only in conjunction with mechanical or baffled mixers.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0703 MECHANICAL FLOCCULATION

- (a) Basin Inlet and Outlet. The design of inlets and outlets of flocculation basins shall prevent short circuiting of the water and destruction or deterioration of the floc.
- (b) Detention Period. The flocculation basins shall have a theoretical detention period of not less than 30 minutes.
- (c) Agitator Control. The agitators of flocculation basins shall be equipped with variable speed controls.
- (d) Paddles. Peripheral speed and paddle configuration shall be designed to obtain optimum velocity gradient.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .0704 BAFFLED MIXING AND FLOCCULATION BASINS

- (a) Detention Period. The theoretical detention period of baffled mixing and flocculation shall be at least 25 minutes.
- (b) Velocities
 - (1) The velocity of the water between the baffles shall be as follows:
 - (A) first third of basin -- 1.5 feet per second;
 - (B) second third of basin -- 0.75 feet per second; and
 - (C) last third of basin -- 0.4 to 0.5 feet per second.
 - (2) The velocity of the water under and over the baffles shall not exceed the velocity between the baffles.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0705 CONDUITS: PIPES AND FLUMES: GATES AND VALVES

Conduits conducting flocculated or coagulated water to sedimentation basins shall have sufficient capacity to limit velocity of flow to 0.5 feet per second. The optimum velocity to prevent both the breaking up and the settling of the floc is considered to be 0.5 feet per second.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0706 SEDIMENTATION BASINS

- (a) Inlets. Inlets to sedimentation basins shall be designed to dissipate inlet velocities before the diffusion walls or before other entrance arrangements designed to provide uniform flow across the basins.
- (b) Detention Period. A theoretical detention period of four hours shall be the minimum standard unless case specific engineering evidence is presented to demonstrate equivalent treatment efficiency at a shorter period of detention.
- (c) Bottom of Basin. The bottom of the basin shall be sloped and provided with a drain valve or valves for removal of sludge.
- (d) Outlet. Sedimentation basin outlets shall consist of submerged weirs or orifices. The equivalent rate of flow over or through the outlet device shall not exceed 20,000 gallons per day per foot of equivalent weir length.
- (e) Overflow. Sedimentation basins shall be equipped with an overflow pipe or pipes to limit the maximum water level over the filters and to prevent flooding above the walls of filters and basins.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. April 1, 2014;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0707 SOLIDS CONTACT OR UP-FLOW UNITS

- (a) Approval of Solids Contact or Up-Flow Units. Solids contact or up-flow clarification units shall be approved only if raw water characteristics are constant and shall not be approved for raw waters that have wide and rapid variations in turbidity or other qualities that adversely affect the treatment process.
- (b) Water Rise Rate. The rise rate shall not exceed 1.0 gallon per minute per square foot of clarification area.
- (c) Weir Loading. Weir loading shall not exceed 10 gallons per minute per foot of weir length. Horizontal flow to the collection trough shall not exceed 10 feet.
- (d) Speed Agitator Equipment. Mixing and flocculation shall be accomplished by means of adjustable, variable speed agitator equipment.
- (e) Sludge Withdrawal. Sludge withdrawal equipment shall include an intermittent sludge removal mechanism controlled by an adjustable automatic timer.
- (f) Basin Drain. The basin shall be provided with a bottom drain that is of sufficient size to empty the basin in two hours or less.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0708 GRAVITY FILTERS

- (a) Filtration Rates. The standard rate of filtration for a single media filter shall be two gallons per minute per square foot. Higher filtration rates up to four gallons per minute per square foot may be approved for dual media or multi-media filters. Filtration rates in excess of four gallons per minute per square foot may be approved subject to pilot plant or plant scale demonstrations conducted in accordance with Rule .0714 of this Section, and demonstrated equivalent treatment efficiency based on case-specific engineering evidence.
- (b) Wash Water Rate. The backwash rate of flow shall be designed to theoretically expand the filter media 50 percent.
- (c) Rate Control Devices. Rate control equipment shall be provided to control or regulate the filtration rate and the backwash rate. If declining rate filtration is to be used, orifice plates shall be installed on each filter effluent pipe to control maximum filtration rates.
- (d) Surface Washers. Filter beds shall be equipped with a revolving or fixed system of nozzles designed for agitation

of the entire beds.

(e) Gauges and Flow Indicators. Gauges or meters shall be installed to indicate the rate of filtration, the loss of head, and the backwash rate for every filter.

(f) Filter Media:

- (1) Filter Sand. Filter sand shall be clean silica sand having:
 - (A) an effective size of 0.35 mm to 0.55 mm;
 - (B) a uniformity coefficient of not more than 1.70;
 - (C) a dust content passing 150 mesh tyler of less than 0.5 percent; and
 - (D) a minimum depth of at least 24 inches.
- (2) Anthracite Filter Media. If anthracite coal is used as a single filter media, it shall have an effective size of 0.35 mm to 0.55 mm and a uniformity coefficient of 1.70 or less. Minimum depth of the media shall be 24 inches.
- (3) Dual Media or Multi-Media Filters. Particle sizes in dual media and mixed media filter beds shall be within 0.15 mm to 1.2 mm. Influent water quality shall be considered in specifying particle sizes of mixed media beds. The minimum depth of the filter media shall be 24 inches.

(g) Supporting Media and Underdrain System. The underdrain system and layers of gravel or other media supporting the filter media shall be designed to provide uniform filtration and uniform backwash throughout the filter media.

(h) Wash Water Troughs Elevation. The elevation of the bottom of the wash water troughs for new installations shall be above the maximum level of the expanded media during washing at the normal design wash water rate. The elevation of the top of the wash water troughs shall provide a two-inch freeboard above the expanded media at the maximum rate of wash.

(i) Turbidity Monitoring. Turbidimeters employing the nephelometric method, which measures the intensity of scattered light, shall be provided for the continuous determination of the turbidities of filtered water from each filter unit.

(j) Sampling Tap. A tap shall be installed for sampling of the effluent from each filter.

(k) Multiple Filter Units. Two or more filter units shall be provided such that the annual average daily demand can be satisfied at the approved filtration rate with one filter removed from service.

(l) Structural Design. Filters shall have vertical walls with no protrusions or curvature. Floors of filter rooms shall be designed to prevent flooding or spillage into filters through overflow drainage and a minimum of four-inch curbs around the filters.

(m) Filter to Waste. All filters shall have provisions for filtering to waste with backflow prevention.

(n) Filter Backwash. Backwash capacity to ensure cleaning of the filters shall be provided.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; January 1, 1978;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0709 PREVENTION OF BACKFLOW AND BACK-SIPHONAGE

The following methods and devices for prevention of backflow or back-siphonage shall be provided for the conditions indicated:

- (1) Dry Chemical Feeders. Dry chemical feeders with submerged water inlets shall have a non-pressure type vacuum breaker installed on the atmospheric side of the last control valve.
- (2) Fluoride Chemical Feeders
 - (a) Sodium fluoride saturator tank make-up water lines shall have air gaps between the overflow rim of the tank and the water supply pipe of at least four inches.
 - (b) When using the positive displacement fluoride chemical solution feed pumps, if the point of application to the water supply is at atmospheric pressure and is below the maximum elevation of the solution in the fluoride solution tank, an air gap shall be installed in the fluoride discharge line at a point above the liquid level in the tank. If the point of application is a pressure line, then a pressure type vacuum breaker shall be used.
- (3) Filter Surface Wash Agitators. Either a non-pressure type vacuum breaker shall be installed on the atmospheric side of the last control valve of each agitator, or pressure type vacuum breaker or an approved backflow preventer shall be installed on the pipe line supplying only the agitators.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0710 OTHER WATER TREATMENT PLANTS

Water treatment plants which provide conventional filtration treatment, as defined in Rule .0102 of this Subchapter, but do not meet the minimum design criteria for process flow times established in this Rule, may be approved to treat high quality source waters under the following conditions:

- (1) A proposal shall be presented to the Department to justify deviation from minimum criteria. The proposal shall include an engineering report containing information and data to substantiate high source water quality characteristics and demonstrate water treatment plant effectiveness.
- (2) The flocculation process shall have a minimum of 20 minutes theoretical detention time.
- (3) The sedimentation compartment shall utilize tube settlers, plates or equivalent settling enhancement mechanisms and have a minimum of 30 minutes detention time.
- (4) The filter media shall be a minimum of 24 inches in depth and consist of dual or multi-media.
- (5) The source waters shall be derived from watersheds which are classified as WS-I, WS-II or WS-III and shall be protected from sources of pollution as determined by a sanitary survey in accordance with Rule .0202 of this Subchapter.
- (6) The following raw water quality standards shall apply:
 - (a) WS-I, WS-II or WS-III raw water quality standards established by the Environmental Management Commission shall be met.
 - (b) In addition to Sub-Item (6)(a) of this Rule, the following maximum concentration of turbidity, coliform, fecal coliform and color shall be allowed in the water plant influent water, based on sedimentation time provided by the water treatment plant. Off-stream pre-treatment to maintain these standards shall be provided as specified in Item (7) of this Rule.

SED TIME	4hrs	2hrs	1 hr	½ hr
Turbidity (NTU)	150	75	50	25
Coliform/100 ml	3,000	2,000	1,000	500
Fecal coliform/100 ml	300	200	100	50
Color (CU)	75	60	40	20

Note: Uneven values are to be interpolated.

- (c) Maximum allowable fluctuations in turbidity, coliform, fecal coliform, color (up to the maximum of Sub-Item (6)(b) of this Rule, chemicals and other water quality characteristics shall be established by a pilot study conducted in accordance with Rule .0714 of this Section.
 - (d) The allowable raw water concentration of all other contaminants, for which drinking water standards are established in this Subchapter, shall be based on the removal capacity of the water plant as demonstrated in a pilot study conducted in accordance with Rule .0714 of this Section.
- (7) Off-stream pre-treatment/storage reservoirs shall be provided to maintain the raw water quality standards of Item (6) of this Rule, equalize fluctuations and provide an unpolluted storage reserve in the event of contaminant spills as follows:
 - (a) Off-stream pre-treatment/storage reservoirs shall not be required for source waters derived from uninhabited watersheds classified WS-I if it is demonstrated that the raw water quality standards and fluctuations of Item (6) of this Rule are maintained in the water treatment plant influent water.
 - (b) Off-stream pre-treatment/storage shall not be required for source waters derived from Class I, II or III reservoirs on WS-I, WS-II or WS-III watersheds if an engineering report demonstrates to the Department the source is not vulnerable to spills and that the water

quality standards and fluctuations of Item (6) of this Rule can be maintained in the water plant influent water.

- (c) For all other source waters derived from WS-I, WS-II or WS-III watersheds, a minimum of five days off-stream pre-treatment/storage shall be provided. An engineering report as described in Item (1) of this Rule shall be submitted to demonstrate that five days storage is adequate or to determine the greater storage needed to maintain the raw water quality standards and fluctuations of Item (6) of this Rule in the water treatment plant influent water.
- (d) When terrain or space constraints make it infeasible to construct a pre-treatment/storage reservoir, a mechanical pre-treatment system may be approved when an engineering report demonstrates to the Department that the source is not vulnerable to contaminant spills and that the raw water quality standards and fluctuations of Item (6) of this Rule can be maintained in the water treatment plant influent water.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;
Eff. July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest;
Eff. November 23, 2015.*

15A NCAC 18C .0711 ALTERNATIVE FILTRATION TREATMENT TECHNOLOGIES

A public water system may propose an alternative filtration treatment technology as provided in Rule .2003 of this Subchapter. The Department shall approve alternative filtration treatment technologies when the following conditions have been met and equivalent treatment efficiency, based on case-specific engineering evidence, has been demonstrated.

- (1) The source waters shall be derived from WS-I, WS-II, or WS-III watersheds.
- (2) The raw water quality standards and fluctuations shall be as specified in Rule .0710(6) of this Section, except that the following maximum concentrations shall be allowed in the influent water to the water treatment plant: Turbidity - 20 NTU, coliform - 500/100 ml, fecal coliform - 50/100 ml, and color - 20 CU.
- (3) Off-stream pre-treatment or storage shall be provided as specified in Rule .0710 of this Section, except that the raw water quality standards of Item (2) of this Rule shall be maintained in the water treatment plant influent water.
- (4) If the proposed water treatment plant employs treatment techniques that are consistent with this Subchapter, a pilot study shall be conducted in accordance with Rule .0714 of this Section.
- (5) If the pilot study demonstrates that the proposed water treatment plant can produce water that complies with all requirements of this Subchapter, engineering plans and specifications for the proposed plant and appurtenances shall be presented to the Department for review and approval prior to construction or letting a construction contract.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;
Eff. July 1, 1994;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0712 DIRECT FILTRATION

Water treatment plants which use direct filtration may be approved to treat high quality source waters derived from uninhibited watersheds classified WS-I. A proposal, including an engineering report as described in Rule .0710 Item (1) of this Section shall be submitted to the Department.

- (1) The following raw water maximum contaminant concentrations shall be met: Turbidity - 5 NTU, coliform - 500/100 ml, fecal coliform - 50/100 ml, color - 15 CU. Fluctuations shall not exceed 5 percent per hour.
- (2) A minimum of 5 days off-stream storage shall be provided except in cases where the source waters are derived from in-stream impoundments and it is demonstrated that the raw water quality standards and fluctuations of Item (1) of this Rule are maintained at the entrance to the water treatment plant.
- (3) If the Department determines that the proposed water treatment plant provides treatment techniques that are consistent with this Subchapter and that the treatment is feasible for the source water, a pilot

- plant study shall be conducted in accordance with Rule .0714 of this Section.
- (4) If the pilot study demonstrates to the Department that the proposed plant can consistently produce water which complies with all requirements of this Subchapter, detailed engineering plans and specifications for the proposed plant and appurtenances shall be presented to the Department for review and approval prior to construction or letting a contract.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;
Eff. July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0713 PRESSURE FILTERS

- (a) Pressure filters shall not be used in treatment of surface waters without prior coagulation and flocculation.
- (b) Pressure filters shall be approved for treatment of existing groundwater sources under the influence of surface water under the following conditions:
- (1) design standards for gravity filters shall meet the requirements set forth in Rule .0708 of this Section;
 - (2) overall plant design shall comply with Rule .0404 of this Subchapter;
 - (3) special design or operational features or modifications shall be provided when needed due to the water quality or the design of the proposed filter;
 - (4) if the proposed water treatment plant employs treatment techniques that are consistent with this Subchapter, a pilot plant study shall be conducted in accordance with Rule .0714 of this Section; and
 - (5) if the pilot study demonstrates that the proposed plant can produce water that complies with all requirements of this Subchapter, engineering plans and specifications for the proposed plant and appurtenances shall be presented to the Department for review and approval prior to construction or letting a construction contract.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;
Eff. July 1, 1994;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0714 PILOT PLANT STUDIES

- (a) A pilot plant study proposal shall be submitted to the Department for approval before the study is conducted. The proposal shall be approved if it meets all of the following conditions and includes all of the following information:
- (1) An engineering report shall describe the proposed study and shall include the information and data to justify the use of the particular plant to treat the source water.
 - (2) The proposed plant shall employ treatment techniques that are consistent with this Subchapter.
 - (3) The pilot plant shall be of the same design and operation as the proposed plant.
 - (4) A protocol for conducting the study shall be submitted that includes the duration, testing procedures, reporting procedures, plant scale, and other factors that affect the proposed plant operation.
 - (5) The study shall be conducted over a time sufficient to treat all worst-case source water conditions expected through the year.
- (b) Pilot plant finished water shall not be approved by the Department for introduction into a public water system unless case specific engineering evidence is presented to demonstrate that it will not adversely impact compliance with water quality requirements specified in this Subchapter.
- (c) A model plant may be proposed without on-site testing if the proposed plant or pilot plant has met the following conditions:
- (1) been tested under worst case conditions on similar water;
 - (2) achieved the required log inactivation and removal under Section .2000 of this Subchapter for Giardia, Cryptosporidium, and viruses; and
 - (3) achieved a maximum of 0.3 NTU turbidity levels 95 percent of the time in filtered effluent.
- (d) The pilot plant shall comply with the provisions of Section .2000 of this Subchapter.
- (e) If the proposal includes a change of treatment as defined in Rule .1507 Corrosion Control and Lead and Copper

Monitoring of this Subchapter, the pilot study shall consider the effect of the proposed changes in compliance with lead, copper, and water quality parameters.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. July, 1994;
Amended Eff. October 1, 2009;
Readopted Eff. July 1, 2019.*

SECTION .0800 - HYDROPNEUMATIC STORAGE TANKS RULES

15A NCAC 18C .0801 CAPACITIES: DETERMINING MINIMUM EFFECTIVE VOLUME

The minimum effective volume of pressure tanks, in gallons, shall equal the peak demand, in gallons per minute, minus the pumping capacity (gpm), multiplied by 20.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523;

Eff. January 1, 1977;

Readopted Eff. December 5, 1977;

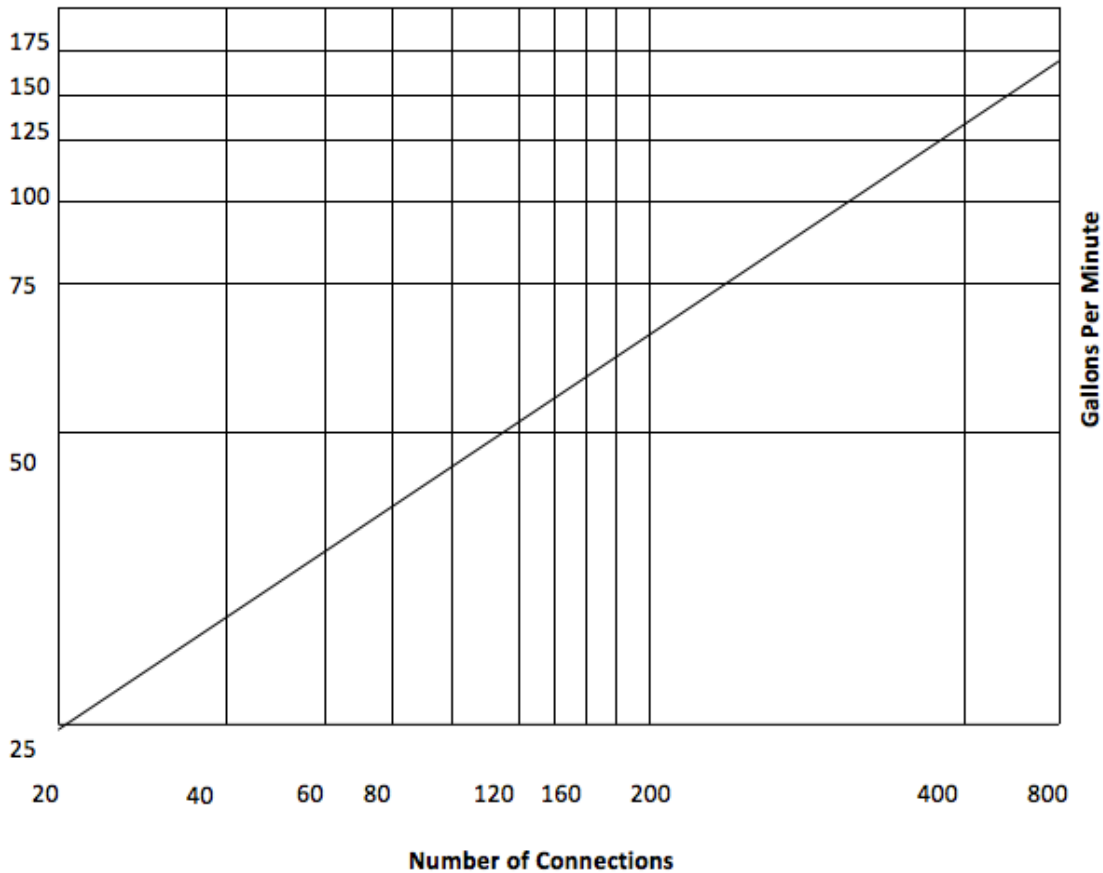
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .0802 CAPACITIES: DETERMINING PEAK DEMAND

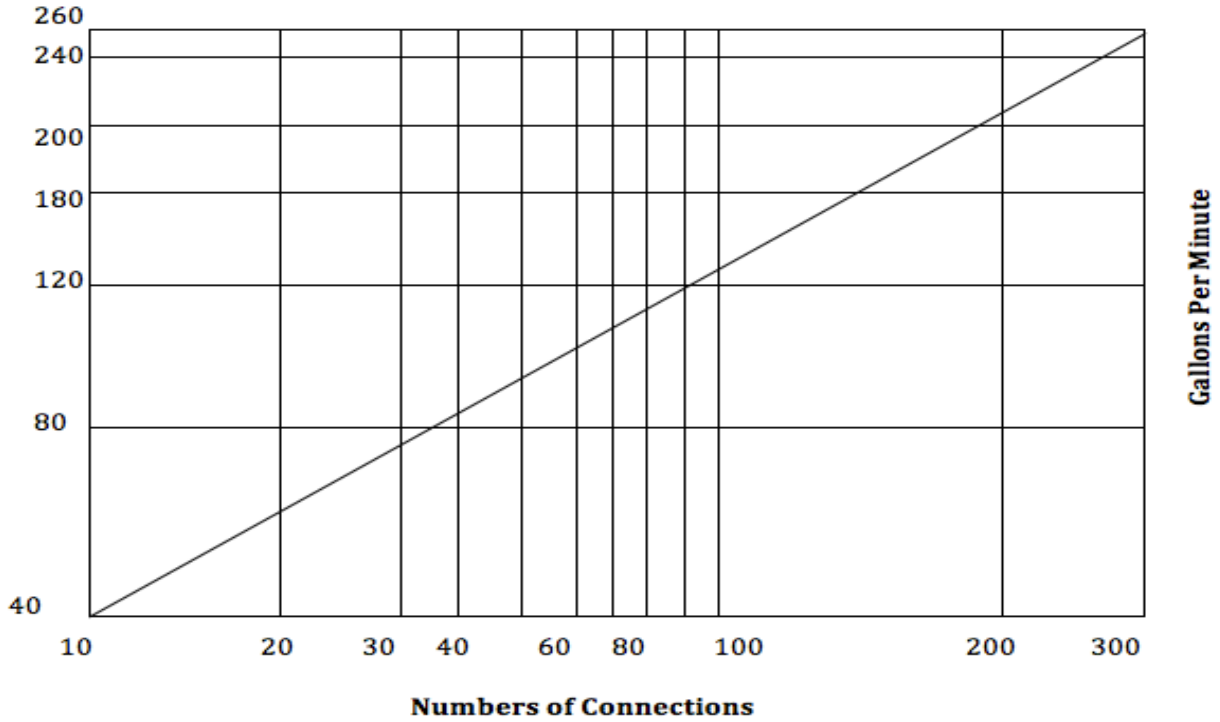
(a) The following charts shall be used to determine the peak demand for campground, residential community, and mobile home park water systems:

PEAK DEMAND FOR CAMPGROUND WATER SYSTEMS

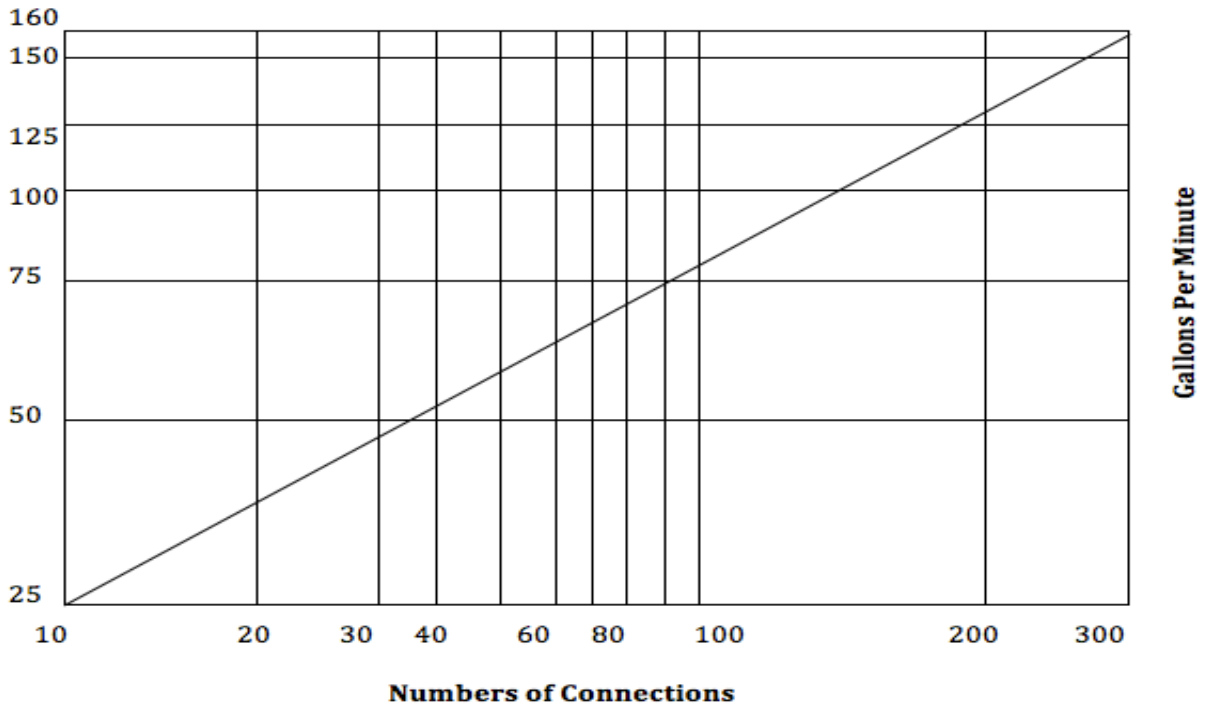
(Number of Connections vs Gallons per Minute)



PEAK DEMAND FOR RESIDENTIAL COMMUNITY WATER SYSTEMS
 (Number of Connections vs Gallons per Minute)



PEAK DEMAND FOR MOBILE HOME PARK WATER SYSTEMS
 (Number of Connections vs Gallons per Minute)



(b) The peak demand for non-transient, non-community water systems shall be determined based on the total demand weight of fixtures in accordance with the procedures of the North Carolina State Building Code, Volume II, Plumbing Section that are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977;

*Amended Eff. April 1, 2014; July 1, 1994; June 30, 1980;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0803 CAPACITIES: DETERMINING TOTAL VOLUME

The total volume of a pressure tank shall be calculated by applying the principle of Boyle's Law as set forth in this Rule.

- (1) For a mobile home park, the total volume measured in gallons shall be not less than 25 times the number of connections or 500 gallons, whichever is greater.
- (2) For a residential community water system, the total volume shall not be less than 40 times the number of connections or 500 gallons, whichever is greater.
- (3) For a campground, the total volume shall not be less than 10 times the number of connections or 500 gallons, whichever is greater.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; March 31, 1980;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0804 CAPACITIES: GROUND STORAGE PLUS HYDROPNEUMATIC TANKS

When ground level storage tanks and high-service pumps are to be used, hydropneumatic tanks shall be sized in relation to peak demand and the high-service pump capacity.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0805 CAPACITIES: ELEVATED STORAGE

- (a) Where feasible, elevated storage capacity shall meet the requirements of the ISO Commercial Risk Services, Inc. Fire Suppression Rating Schedule that are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.
- (b) The elevated storage capacity for a municipality shall be sufficient to minimize the effect of fluctuating demand and provide a reserve for fire protection, but not be less than 75,000 gallons in capacity.
- (c) The combined elevated and ground storage capacity of the finished water for community and non-transient, non-community water systems shall be a minimum of one-half day's supply of the average annual daily demand.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1978;
Amended Eff. April 1, 2014; July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

SECTION .0900 - DISTRIBUTION SYSTEMS**15A NCAC 18C .0901 SIZE OF THE WATER MAINS**

Water distribution mains shall be sized to provide a minimum pressure at all points within the distribution system of not less than 20 pounds per square inch (gauge) during periods of peak demand (fire flow), but in any case water mains shall not be less than two-inch standard nominal diameter. Fire hydrants shall not be installed on water mains of less than six inches diameter or on water mains or water systems not designed to carry fire protection flows. Systems not designed for fire flows shall have the capacity to maintain a pressure of at least 30 pounds per square inch (gauge) throughout the system during periods of peak flow.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. March 31, 1980;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0902 NUMBER OF RESIDENCES ON A WATER MAIN

(a) No more than 20, or the equivalent of 20 residences shall be connected to a two-inch diameter water line, unless the main is looped or otherwise supplied from two connections with mains of adequate capacities.

(b) A looped two-inch main shall serve no more than 40 residences, or the equivalent water demand of 40 residences. A two-inch diameter main shall not exceed 1000 feet in length.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. January 1, 1978;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0903 DEAD-END WATER MAINS

Where installation of dead-end water mains cannot be avoided, a hydrant or a valve of adequate size for flushing shall be installed at the terminal end of the line. The flush valves shall have an above-ground discharge and shall be protected from contamination.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0904 PIPE LAYING

(a) Trenching, pipe laying, and backfilling shall be accomplished in a manner to prevent damage to and misalignment of the pipe. Water mains shall be buried to a depth below the frost line or to a depth sufficient to provide a minimum of 30 inches cover, whichever is greater. In cases where it is impracticable to provide 30 inches of cover taking into consideration feasibility and cost, a deviation may be approved on a case-by-case basis, if supported by data from the design engineer including consideration of pipe material, cover material, land cover, land use, land slope, the depth of the frost line, and the location of other utilities.

(b) To allow for construction and repair, a minimum distance of 12 inches shall be maintained between the outside of the water main and the outside of other utilities.

(c) If an engineer demonstrates it is impractical to maintain the separation distances required by this Rule, taking into consideration feasibility, cost, and the factors set forth in this Paragraph, a deviation may be approved on a case-by-case basis if supported by data and alternative construction criteria submitted by the design engineer. Data and alternative construction criteria submitted by the design engineer to justify the deviation shall describe:

- (1) the rationale for determining that separation criteria described in Paragraphs (a) and (b) of this Rule are impracticable;
- (2) the extent of the deviation from separation criteria in Paragraphs (a) and (b) of this Rule;

- (3) a consideration of pipe materials, pressure ratings, type of joints for water main and non-potable water line, and soil conditions;
- (4) the ability to provide adequate work space to repair or replace pipe segments or other utility infrastructure without causing damage to or otherwise compromising the integrity of pipes; and
- (5) the rationale for determining that the deviation will not result in unreasonable risk to public health.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .0905 TESTING NEW WATER MAINS

New water mains shall be tested for leakage and any necessary repairs and re-testing shall be accomplished as specified in AWWA standards.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .0906 RELATION OF WATER MAINS TO NON-POTABLE WATER LINES

(a) For the purposes of this Rule, sewer shall mean any existing or proposed gravity or force main used to convey sanitary or industrial process waste.

(b) Lateral Separation of Sewers and Water Mains. Water mains shall be laid at least 10 feet laterally from existing or proposed sewers, unless local conditions or barriers prevent a 10-foot lateral separation, in which case:

- (1) the water main shall be laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or
- (2) the water main shall be laid in the same trench as the sewer, with the water main located at one side on a bench of undisturbed earth and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

(c) Crossings. A water main that crosses a sewer shall be laid a minimum vertical distance of 18 inches from the outside of the water main and the outside of the sewer, either above or below the sewer, with preference to the water main located above the sewer. One full length of water pipe shall be located so that both joints will be as far from the sewer as possible.

(d) Water Mains and Storm Sewer Pipes. Pipes carrying storm drainage shall be separated from water lines in accordance with Rule .0904 of this Section.

(e) Water Mains and Reclaimed Water Distribution Lines. Water lines shall be located at least 10 feet horizontally from or at least 18 inches above water pipes carrying treated and disinfected wastewater in reclaimed water distribution lines. Crossings shall be made in accordance with Paragraph (c) of this Rule.

(f) Special Conditions. If an engineer demonstrates it is impracticable to maintain the separation distances required by this Rule, taking into consideration feasibility, cost, and the factors set forth in this Paragraph, the deviation may be approved on a case-by-case basis, if supported by data and alternative construction criteria provided by the design engineer. Data and alternative construction criteria submitted by the design engineer to justify the deviation must describe:

- (1) the rationale for determining that separation criteria described in this Rule are impracticable;
- (2) the extent of the deviation from separation criteria in this Rule;
- (3) a consideration of pipe materials, pressure ratings, type of joints for water main and non-potable water line, and soil conditions;
- (4) the ability to provide adequate work space to repair or replace pipe segments or other utility infrastructure without causing damage to or otherwise compromising the integrity of pipes; and
- (5) the rationale for determining that the deviation will not result in unreasonable risk to public health.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .0907 VALVES

(a) Valves should be installed on all branches from feeder mains, and between mains and hydrants according to the following schedule:

- (1) three valves at x (crosses),
- (2) two valves at T's (tees), and
- (3) one valve on single hydrant branch.

(b) All valves installed in water distribution systems shall meet the appropriate AWWA Standards C 500-71 (adopted in 1971), C 504-74 (adopted in 1974), and C 507-73 (adopted in 1973) of the American Water Works Association, Inc., that are incorporated by reference including any subsequent amendments or editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. All valves must be installed in such a manner as to be readily accessible, preferably, the use of an appropriate valve box and cover.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. April 1, 2014; March 31, 1980;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

SECTION .1000 - DISINFECTION OF WATER SUPPLY SYSTEMS**15A NCAC 18C .1001 DISINFECTION OF NEW SYSTEMS**

(a) All interior surfaces of new potable water supply systems, including wells, filters, storage tanks and distribution lines shall be thoroughly disinfected by means of hypochlorite or chlorine solutions, after which bacteriological test samples shall be collected.

(b) After disinfection the water supply shall not be placed into service until bacteriological test results of representative water samples analyzed in an approved laboratory are found to be satisfactory.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1002 DISINFECTION OF WELLS

(a) After construction, servicing, maintenance, or any other activity or event that might lead to contamination of the water, wells shall be disinfected in accordance with ANSI/AWWA C654-13, "Disinfection of Wells." Copies may be obtained for public inspection as set forth in Rule .0503 of this Subchapter.

(b) After disinfection, wells shall not be placed into service until bacteriological test results of representative water samples analyzed by a certified laboratory are found to be satisfactory.

(c) Records demonstrating compliance with ANSI/AWWA Standard C654-13 shall be available for three years for inspection by the Department.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .1003 DISINFECTION OF STORAGE TANKS AND DISTRIBUTION SYSTEMS

(a) Water distribution systems, including storage tanks and water mains, after flushing to remove sediment and other foreign matter, and after testing for leaks, shall be disinfected in accordance with ANSI/AWWA Standard C652-11; "Disinfection of Water Storage Facilities" or in accordance with ANSI/AWWA C651-14; "Disinfection of Water Mains." Copies may be obtained for public inspection as set forth in Rule .0503 of this Subchapter.

(b) After disinfection, water storage or distribution facilities shall not be placed into service until bacteriological test results of representative water samples analyzed by a certified laboratory are found to be satisfactory.

(c) Records demonstrating compliance with ANSI/AWWA Standards C652-11 or ANSI/AWWA Standard 651-14 shall be available for three years for inspection by the Department.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. January 1, 1978;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .1004 DISINFECTION OF WATER TREATMENT FACILITIES

(a) New water treatment facilities and existing water treatment facilities taken out of service for cleaning, inspection, maintenance, painting, repair, or other activities or events that might lead to contamination of water shall be disinfected in accordance with ANSI/AWWA Standard C653-13, "Disinfection of Water Treatment Facilities." Copies may be obtained for public inspection as set forth in Rule .0503 of this Subchapter.

(b) After disinfection the water treatment facilities shall not be placed into service until bacteriological test results of representative water samples analyzed by a certified laboratory are found to be satisfactory.

(c) Records demonstrating compliance with ANSI/AWWA Standard C653-13 shall be available for three years for inspection by the Department.

*History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994;
Readopted Eff. July 1, 2019*

SECTION .1100 - PROTECTION OF UNFILTERED PUBLIC WATER SUPPLIES**15A NCAC 18C .1101 WATERSHED AREA**

No dwelling house, pasture, hog lot, cattle or horse barn, or other areas where domestic animals are confined or permitted, and no parks, camping grounds or other places of public assembly shall be permitted within the watershed area of an unfiltered public water system. The watershed area shall be posted in accordance with Rule .1107 of this Section.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1990; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1102 AUTHORIZED PERSONS WITHIN WATERSHED AREA

No persons, other than a duly authorized representative of the person or company supplying the water from an unfiltered public water system or a representative of the local health department, or the Department, or a game warden, state forester or law enforcement officer, or a representative of the U.S. Park Service or U.S. Forest Service shall be permitted within the area of the watershed of an unfiltered public water system at any time and for any purpose unless the Department determines that the proposed activity does not adversely affect the quality of the water.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1990; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1103 HUNTING: FISHING: OR HIKING

Hunting, fishing, or hiking shall not be permitted within the watershed area.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1104 DISPOSAL OF CARCASSES

The carcass of any dead animal found within the watershed area of an unfiltered community water system shall be buried by the owner or person in charge of the animal and by the person owning or in charge of the land upon which the animal dies with a covering of at least three feet of earth, or the carcass shall be burned, or removed from the watershed and buried as required by G.S. 106-403. In no case shall dead animals be placed in the reservoir or the tributaries of an unfiltered community water system.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1105 PROHIBITED CONDUCT ON WATERSHED

No timbering, lumbering, construction, or reforestation operations shall be permitted on the watershed of an unfiltered public water system unless the Department determines that the project will provide for the sanitary and physical protection of the water supply during such operations. The applicant shall submit a project plan describing

the nature and scope of the project and precautions for protection of the water supply.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1990; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

15A NCAC 18C .1106 INSPECTION OF WATERSHEDS

The person or company supplying water from the watershed of an unfiltered source shall employ an adequate number of responsible inspectors and cause satisfactory inspection of the watershed to be made at least at quarterly intervals to assure that the watershed area is at all times maintained in a manner that will promote and insure the sanitary and physical protection of the supply. A copy of the watershed inspection report shall be submitted to the Public Water Supply Section, within ten days after completion of the inspection.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

15A NCAC 18C .1107 WATERSHED BOUNDARY SIGNS

Signs advising the public of the watershed boundaries and prohibiting trespassing by all unauthorized persons shall be posted at the water works intake and along the boundaries and at entrances and accesses throughout the watershed area of an unfiltered public water system. It shall be the duty of the watershed inspectors and other water supply officials to see that these signs are posted and maintained.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1994; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

15A NCAC 18C .1108 CONTINUOUS DISINFECTION OF WATER SUPPLY

The water supply shall be continuously disinfected by means of chlorination or by other methods approved by the Commission for Public Health. Equipment shall be provided to assure uninterrupted disinfection.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

SECTION .1200 - PROTECTION OF FILTERED WATER SUPPLIES**15A NCAC 18C .1201 RECREATIONAL ACTIVITIES**

(a) No recreational activities shall be permitted on a class I or class II reservoir without a resolution by the commission or without approval by the Department. The Department may approve recreational events on a class I or class II reservoir which last one day or less upon a showing that the recreational event will not adversely affect the quality of the water to the point of rendering it unsuitable as a source for a public water system. All other recreational activities on a class I or class II reservoir shall be permitted only upon a resolution by the commission authorizing the activity.

(b) Upon request for such a resolution, the Division shall make or cause to be made a thorough investigation of the quality of the water to determine the extent to which the proposed recreational activities would adversely affect the quality of the water. If, after such investigation, the Commission for Public Health is of the opinion that the proposed recreational activities will not adversely affect the quality of the water to the point of rendering it unsuitable as a source of public water system, the Commission for Public Health may adopt a resolution authorizing the proposed recreational activities.

(c) Only those recreational activities specifically authorized in the resolution will be allowed. No recreational activities shall be permitted within 50 yards of any public water system intake.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. October 1, 1985; September 1, 1979;
Transferred and Recodified from 10 NCAC 10D .1301 Eff. April 4, 1990;
Amended Eff. July 1, 1994; September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1202 PROTECTION OF WATER QUALITY

The issuance of a resolution by the Commission for Public Health for recreational activities on public water supply reservoirs shall be contingent upon the governing authority establishing provisions for adequate sanitation facilities, supervision and police control to insure the protection of the water quality.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Transferred and Recodified from 10 NCAC 10D .1311 Eff. April 4, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1203 MAINTENANCE OF PARKS

Parks or other places of resort for the use and entertainment of the public which may be established and maintained on a watershed shall be provided with sanitary facilities for the collection of garbage and disposal of sewage. Such facilities must not cause deterioration of water quality. Persons in charge of such facilities must maintain these facilities at all times in order to prevent the pollution of the public water system.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1979;
Transferred and Recodified from 10 NCAC 10D .1302 Eff. April 4, 1990;
Amended Eff. July 1, 1994; September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1204 FISHING

(a) Fishing shall not be permitted on any Class I or Class II public water supply reservoir without a resolution granting permission by the Commission for Public Health. In order to obtain permission, a written application shall

be submitted by the owner of the water supply to the Commission for Public Health. Permission shall not be issued until an investigation has been made by an authorized representative of the Division of Water Resources and a determination made that fishing in the reservoir shall not adversely affect the water quality.

(b) The application requesting permission to fish in any reservoir shall be accompanied by sufficient evidence (such as ordinances adopted by the applicant) to insure that the following requirements shall be enforced by the applicant:

- (1) Fishing shall be permitted only from boats owned or controlled by the applicant. Boats will at all times be under the supervision and jurisdiction of a responsible representative of the applicant. Bank fishing may be permitted in restricted supervised areas with proper sanitation facilities when included as a specific, listed activity and approved by the Commission for Public Health.
- (2) A sufficient number of wardens and watershed inspectors shall be employed at all times to insure that no acts of urination, defecation, or other acts which would defile the water supply are committed by any person while fishing in the public water supply reservoir.
- (3) A dock shall be provided or controlled by the applicant for the purpose of docking fishing boats. No boat shall enter or leave the reservoir except from a ramp owned or controlled by the applicant.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1979;
Transferred and Recodified from 10 NCAC 10D .1303 Eff. April 4, 1990;
Amended Eff. April 1, 2014; September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1207 ANIMALS IN RESERVOIR

The watering, washing or wallowing of any horses, mules, cattle, or domestic animals shall not be permitted in any class I or class II reservoir. The supplier of water may permit domestic animals within 50 feet of normal pool elevation if the animal is under direct supervision by a person and the activity is regulated by the supplier of water to ensure that water quality is not adversely affected.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Transferred and Recodified from 10 NCAC 10D .1304 Eff. April 4, 1990;
Amended Eff. July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1208 CONTROLLING THE DRAINAGE OF WASTES

Precautions shall be taken on the watershed of class I and class II reservoirs and water intakes located on unimpounded streams to control the drainage of wastes from animal and poultry pens or lots, into such sources.

*History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Transferred and Recodified from 10 NCAC 10D .1305 Eff. April 4, 1990;
Amended Eff. September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1209 UNTREATED DOMESTIC SEWAGE OR INDUSTRIAL WASTES

No treated or untreated domestic sewage, treated or untreated industrial waste or by-products shall be stored on the watershed of or discharged into any public water supply reservoir or stream tributary to that reservoir whose waters are classified as WS-I. No untreated domestic sewage or industrial waste by-products shall be discharged into any public water supply reservoir or stream classified as WS-II, WS-III, WS-IV, or WS-V. No hazardous waste, industrial by-products, treated or untreated domestic sewage shall be stored in the watershed of a Class I or Class II water supply reservoir. No hazardous waste or industrial by-products shall be stored in the watershed of a WS-II, WS-III, WS-IV, or WS-V stream unless precautions are taken to prevent its being spilled into or otherwise entering

the raw water supply.

History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523;
Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Amended Eff. February 1, 1987;
Transferred and Recodified from 10 NCAC 10D .1306 Eff. April 4, 1990;
Amended Eff. July 1, 1994; September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1210 SEWAGE DISPOSAL

Any residence, place of business or public assembly, located on a watershed shall be provided with a sanitary means of sewage disposal.

History Note: Authority G.S. 130A-315; 130A-320; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Transferred and Recodified from 10 NCAC 10D .1309 Eff. April 4, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1212 BURIAL OF CARCASSES

The carcass of any dead animal found within the watershed shall be buried by the owner or person in charge of the animal or the person owning or in charge of the land upon which the animal dies with a covering of at least three feet of earth or the carcass shall be burned or removed from the watershed and buried as required by G.S. 106-403. In no case shall dead animals be placed in the reservoir.

History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Transferred and Recodified 10 NCAC 10D .1307 Eff. April 4, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1213 BURIAL GROUND

No burial ground shall be established on any watershed within 1,500 feet upstream from a public water supply intake on an unimpounded stream or within 300 feet of any class I or class II reservoir.

History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523; Eff. January 1, 1977;
Readopted Eff. December 5, 1977;
Transferred and Recodified from 10 NCAC 10D .1308 Eff. April 4, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1214 DISPOSAL OF ANY SUBSTANCE

Any person who intends to dispose of or store any substance that may adversely affect the quality of the water, to the point of rendering the water unsuitable as a source for a public water system, shall notify the Division prior to disposal or storage. The notification shall be in writing and shall list any substances that will be disposed of or stored. No substances shall be disposed of or stored without the Division's approval. The owner of the water supply shall be responsible for maintaining surveillance of the reservoirs and watersheds to insure protection of the water quality and shall notify the Department of any activities that may endanger water quality.

History Note: Authority G.S. 130A-315; 130A-320; P.L. 93-523;
Eff. January 1, 1977;
Readopted Eff. December 5, 1977;

Transferred and Recodified from 10 NCAC 10D .1310 Eff. April 4, 1990;

Amended Eff. September 1, 1990;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

SECTION .1300 - OPERATION OF PUBLIC WATER SUPPLIES

Rules .1301-1303 of Title 15A Subchapter 18C of the North Carolina Administrative Code (T15A.18C .1301-.1303); has been transferred and recodified from Rules .1101-.1103 Title 10 Subchapter 10D of the North Carolina Administrative Code (T10.10D .1101-.1103), effective April 4, 1990.

15A NCAC 18C .1301 GENERAL REQUIREMENTS

(a) For the purposes of this Section,

- (1) A "facility" is defined as any individual operational unit or a combination of operational units that a public water system uses in the treatment or distribution of drinking water.
- (2) Any "operator" referenced in this Section shall hold a valid certificate issued by the North Carolina Water Treatment Facility Operators Certification Board. An "Operator in Responsible Charge (ORC)" designated for each facility shall hold a grade of certification corresponding to or higher than the classification of the facility.

(b) Treatment facility. The supplier of water shall have an Operator in Responsible Charge (ORC), as required by 15A NCAC 18D .0206. The ORC or certified treatment facility operator working under the direction of the ORC shall be familiar with the entire water system, including the chlorinators, piping and other appurtenances pertaining to the operation of the treatment plant and the distribution system.

(c) Distribution facility. The collection of distribution system samples and field measurements required on monthly operation reports, including residual disinfectant testing in the distribution system in accordance with Rule .1302(a)(2)(A) of this Section may be performed by a person under the ORC's direction, subject to the following provisions:

- (1) The standard operating procedures plan prepared in accordance with 15A NCAC 18D .0701(f) shall include procedures for sampling and for performing residual disinfectant tests and other field measurements.
- (2) In order to report low residual disinfectant test readings or other problems, the designee shall, at all times, be able to contact the ORC or certified operator working under the direction of the ORC, who shall take corrective action as needed to keep the system in compliance.

History Note: Authority G.S. 90A-29; 130A-315; P.L. 93-523; Eff. January 1, 1977;

Readopted Eff. December 5, 1977;

Amended Eff. October 1, 2009; July 1, 1994; September 1, 1990; June 30, 1980; September 1, 1979;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1302 TESTS, FORMS AND REPORTING

(a) Required tests. If a public water system uses disinfectants or other chemicals for the treatment of water, residual disinfectant tests and other applicable water quality tests required by this Subchapter shall be made during every oversight visit to the facility required by Rule .1303 of this Section. Residual disinfectant concentrations shall be maintained in accordance with 15A NCAC 18C .2002 and .2201 and shall be tested as follows:

- (1) Residual disinfectant tests at the entry point. For systems providing treatment, residual disinfectant concentrations shall be measured in the water entering the distribution system by the operator during every visit required by Rule .1303(a) of this Section.
- (2) Residual disinfectant tests in the distribution system shall be performed as follows:
 - (A) Residual disinfectant concentrations shall be measured weekly at locations that represent maximum residence time of the water in the distribution system or at other locations with high water age. These locations shall be designated on the sample siting plan required under 15A NCAC 18C .1534. The number of required weekly tests is shown in Table A below. Samples collected on the same day must be collected from different locations.

Table A: Measurement Requirements for Residual Disinfectant Concentrations and Chloramine Operational Parameters

Distribution System Classification according to 15A NCAC 18D .0205(b)	Minimum Number of Samples Per Week
D	1
C	3
A and B	5

- (B) Distribution systems classified as C or D in Table A may request the Department to reduce the requirements for measuring residual disinfectant concentrations in the distribution system at the locations that represent maximum residence time or other locations with high water age as required in Part (a)(2)(A) of this Rule. The request shall be in writing and shall demonstrate to the Department that the residual disinfectant concentrations measured at the entry point in accordance with Subparagraph (a)(1) of this Rule are sufficient in providing the minimum residual disinfectant concentrations required under 15A NCAC 18C .2002 and .2201. The Department shall consider the presence of continuous monitoring, size and configuration of the distribution system, magnitude of disinfectant degradation and results of performance studies.
- (3) Chloramine Operational Parameters. When ammonia and chlorine are applied disinfectants, the system shall measure analytical parameters pertinent to the operation as follows:
 - (A) Water entering the distribution system. Parameters to be measured shall, at a minimum, include total chlorine, monochloramine, free ammonia, and pH and shall be performed daily, while the treatment facility is in operation.
 - (B) Water in the distribution system. Parameters to be measured shall, at a minimum, include total chlorine, monochloramine, free ammonia, and pH and shall be measured no less often than denoted in Table A.
- (b) Forms, Reports and Records. A public water system shall report and retain records as follows:
 - (1) Test results shall be documented and reported monthly on forms and in a format provided by the Department and shall be signed by the ORC. Copies of report forms may be obtained from the Public Water Supply Section. The monthly report shall be submitted by the 10th day of the following month to the Public Water Supply Section.
 - (2) The forms and reports shall be in an electronic format provided by the Department for water systems owned or operated by local governments and all community water systems serving 1,000 or more service connections or 3,000 or more individuals, regardless of ownership, effective April 1, 2010. Community water systems serving less than 1,000 service connections and less than 3,000 individuals and all non-transient, non-community water systems shall report test results in an electronic format provided by the Department effective October 1, 2010. The Department may waive the requirement for electronic submission in accordance with G.S. 130A-329. Requests for waivers shall be submitted in writing to the Department no less than two months prior to the deadline.
 - (3) Records documenting compliance with Section .1300 shall be retained on the premises of the water system for a minimum of three years.

History Note: Authority G.S. 90A-29; 130A-315; P.L. 93-523; Eff. January 1, 1977; Readopted Eff. December 5, 1977; Amended Eff. October 1, 2009; July 1, 1994; September 1, 1990; February 1, 1987; June 30, 1980; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1303 FACILITY OVERSIGHT

(a) Treatment Facility Oversight. At a minimum, the supplier of water shall ensure that during each oversight visit required by this Rule the water system's treatment facility receives a routine visual inspection from the source to the

point where water enters the distribution system; equipment settings are adjusted and chemical feed tanks are filled as necessary; dates and quantities of chemicals added are recorded; and the physical and chemical tests required on plant monthly operation reports are performed. In addition, the supplier of water shall have an ORC, or a certified treatment facility operator working under the direction of the ORC, on site as frequently as necessary to ensure compliance with the requirements of this Section and Subchapter. At least one visit per week shall be performed by the ORC for the treatment facility or by an operator with a grade of certification corresponding to or higher than the classification of the facility. The supplier of water shall provide oversight at a public water system treatment facility while the facility is in operation, as follows:

- (1) Surface Water or Groundwater Under the Direct Influence (GWUDI) of Surface Water Treatment Facilities. Surface water or GWUDI systems shall provide an operator as required in 15A NCAC 18D .0206 and shall have the ORC or an operator with a grade of certification corresponding to or higher than the classification of the facility on-site at least 20 percent of the time the facility is in operation, as calculated on a weekly basis.
- (2) Ground Water Treatment Facilities. The requirements for ground water treatment facilities are as follows:
 - (A) Ground water treatment facilities with any individual parameter rating value of 10 or higher as classified by 15A NCAC 18D .0203 shall be visited by an operator daily.
 - (B) Ground water treatment facilities with all individual parameter rating values less than 10 as classified 15A NCAC 18D .0203 shall be visited by an operator as often as necessary to ensure compliance with the requirements of this Subchapter but no less often than denoted in Table B below. For the standard frequency of three times per week, no more than two consecutive days shall pass between operator oversight visits. For the standard frequency of two times per week, no more than three consecutive days shall pass between operator oversight visits.
- (3) Supplemental Treatment Facilities. The requirements for supplemental treatment facilities are as follows:
 - (A) A supplemental treatment facility, including booster chlorination, is a facility designed to treat water that has previously been treated to meet standards of the "North Carolina Drinking Water Act." Supplemental treatment facilities with any individual parameter rating value of 10 or higher as designated by 15A NCAC 18D .0203 shall be visited by an operator daily.
 - (B) Supplemental treatment facilities with all individual parameter rating values less than 10 as designated by 15A NCAC 18D .0203 shall be visited by an operator as often as necessary to ensure compliance with the requirements of this Subchapter but no less often than denoted in Table B below. For the standard frequency of three times per week, no more than two consecutive days shall pass between operator oversight visits. For the standard frequency of two times per week, no more than three consecutive days shall pass between operator oversight visits.

Table B: Standard Frequency of Oversight Visits for Ground Water and Supplemental Treatment Facilities

SYSTEM TYPE	POPULATION SIZE	STANDARD FREQUENCY OF OVERSIGHT VISITS
Community	> 10,000	Daily
	> 3,300 to 9,999	Five times per week
	501 to 3,300	Three times per week
	500 or fewer	Two times per week
Non-transient, non-community	> 1,000	Three times per week
	1,000 or fewer	Two times per week
Transient, non-community	Any population size	Once per week, unless an ORC is not required by 15A NCAC 18D .0206

(b) Distribution Facility Oversight. Distribution facilities have no specified standard frequency of oversight visits under this Section. The distribution facility shall be visited by the operator as frequently as necessary to operate the

facility, provide emergency response and ensure compliance with the requirements of this Section and Subchapter.

(c) Increased Frequency of Oversight. The requirements for increasing the frequency of oversight visits are:

- (1) A system that fails to maintain any operational parameter or has any failure of the treatment or distribution facility that would cause a violation of water quality or treatment standards of Section .1500 of this Subchapter shall be visited by the operator daily until the system has returned to compliance, as determined by the Department. Daily visits shall be required for all systems failing to maintain minimum residual disinfectant concentrations under Rules .2002 or .2201 of this Subchapter or maximum residual disinfectant levels under Rule .2008 of this Subchapter until compliant disinfection levels are restored, regardless of the standard frequency of oversight visits for that system.
- (2) The Department may require additional operator oversight visits for a system that has a violation of this Subchapter, an equipment malfunction, a customer complaint, an emergency or other situation that may affect the ability of the system to comply with the requirements of this Subchapter. In determining the frequency and duration of increased oversight visits, the Department shall consider the following:
 - (A) nature of the malfunction, complaint, emergency or other situation;
 - (B) degree of risk to the public health or welfare;
 - (C) size and type of population exposed;
 - (D) type of treatment and chemicals used by the water system;
 - (E) type, size, and configuration of the distribution system; and
 - (F) potential or actual damage to property or the environment.

(d) Reduced Frequency of Oversight. The Department may grant written approval to reduce the standard frequency of operator oversight visits of this Subchapter to not less than once per week if a system can document compliance with this Subchapter and any of the following:

- (1) Equivalent public health protection is provided through use of remotely controlled continuous monitoring and recording technology. The recorded data must be reviewed at a minimum of five days a week. This technology must be capable of contacting the operator 24 hours a day, seven days a week in case of operational failure, including a loss of signal.
- (2) Equivalent public health protection is provided by operator visits less frequent than those specified under Part (a)(2)(B) of this Rule based on a facility's overall contribution to the daily flow of the water system and the system's proposed alternative plan and schedule.
- (3) Equivalent public health protection is provided through use of process control devices and standard operating procedures to ensure that no chemical misfeeds can occur and include all of the following, at a minimum:
 - (A) wiring of chemical pumps to the well pumps such that they must operate simultaneously;
 - (B) devices to regulate chemical feeds such that overfeeding and underfeeding of chemicals is prevented;
 - (C) anti-siphoning devices installed to prevent siphonage of chemicals into the water system;
 - (D) demonstration that adequate chemical storage and supply is available to ensure continuous feed between visits; and
 - (E) equipment is calibrated in accordance with manufacturers' recommendations but in no case less than once per year.

History Note: Authority G.S. 90A-29; 130A-315; P.L. 93-523; Eff. January 1, 1977;

Readopted Eff. December 5, 1977;

Amended Eff. October 1, 2009; July 1, 1994; September 1, 1990; June 30, 1980; September 1, 1979;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1304 WATER SYSTEM OPERATION AND MAINTENANCE

(a) Water systems shall be operated and maintained in accordance with applicable approved engineering plans and specifications, Water System Management Plan and Operation and Maintenance Plan.

(b) Water systems shall be operated and maintained in accordance with 15A NCAC 18D, Rules Governing Water Treatment Facility Operators, Rule .0206 and G.S. 90A-29.

History Note: Authority G.S. 90A-29; 130A-315; P.L. 93-523; Temporary Adoption Eff. October 1, 1999; Eff. August 1, 2000; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1305 SOURCE WATER PROTECTION PLANNING

(a) In compliance with G.S. 130A-320, every supplier of water operating a public water system treating and furnishing water from a surface water source shall create and implement a Source Water Protection Plan. For purposes of this Rule, the Source Water Protection Plan required by G.S. 130A-320 shall be referred to as a Source Water Resiliency and Response Plan (SWRRP).

(b) The SWRRP shall include a list of potential contaminant sources (PCSs) that have potential to reach surface waters, both provided by the Department and supplemented by the water system if additional PCSs are known to exist by the supplier of water. The listed PCSs will be located in the following areas as defined in Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina, 15A NCAC 02B .0200, which is hereby incorporated by reference, including subsequent amendments and editions:

- (1) within the entire watershed for waters classified as WS-I;
- (2) within the critical area and 1,000 feet from perennial streambanks within the protected area for waters classified as WS-II and WS-III;
- (3) within the critical area and 1,000 feet from perennial streambanks within the protected area for waters classified as WS-IV;
- (4) within ½ mile from the normal pool elevation in which the intake is located, or to the ridge line of the watershed, whichever comes first, for a reservoir within waters classified as WS-V; and
- (5) within ½ mile, measured as a straight line, upstream from and draining to the intake located directly in the stream or river, or to the ridge line of the watershed, whichever comes first, for a direct-stream intake within waters classified as WS-V.

(c) Any community water system subject to this Rule shall certify completion and implementation of a SWRRP by December 31, 2022. The SWRRP shall contain the following elements:

- (1) identification and contact information of personnel responsible for emergency management, including water system, local, State, and federal emergency response personnel;
- (2) an evaluation of a water system's ability to take the following actions:
 - (A) close its water intake(s) in the event of contamination, including a determination of the duration of time the water intake(s) can remain closed while maintaining positive water pressure within the distribution system;
 - (B) isolate or divert contaminated water from its surface water intake(s);
 - (C) reduce demand by implementing conservation measures during a contamination event. Water Shortage Response Plans may be referenced to fulfill this requirement for water systems required to prepare a Water Shortage Response Plan under 15A NCAC 02E .0607, which is hereby incorporated by reference, including subsequent amendments and editions; and
 - (D) meet demand via alternate sources of supply in the event of contamination or loss of its primary water source.
- (3) identification of foreseeable natural and human-caused emergency events, including water shortages and outages;
- (4) a description of the emergency response strategies for each identified shortage or outage event and each potential contamination event associated with PCSs identified and listed in Paragraph (b) of this Rule;
- (5) standard operating procedures to close intakes and switch to an alternate intake during a contamination event, including procedures that outline exercises designed to practice closure and switching of the intake(s);
- (6) a description of public notification procedures; and
- (7) identification and evaluation of all facilities and equipment that upon failure would result in a water outage or violations of this Subchapter.

(d) For community water systems that are subject to this Rule and also required to complete a Risk and Resilience Assessment and an Emergency Response Plan under Section 2013 of America's Water Infrastructure Act of 2018

(AWIA), the system's Risk and Resilience Assessment and Emergency Response Plan created to comply with AWIA may be referred to as a SWRRP and used to satisfy the requirements of this Rule, if the PCS list was compiled in accordance with Paragraph (b) of this Rule. The schedule for certifying completion and implementation of the SWRRP pursuant to this Paragraph shall be as follows:

- (1) by September 30, 2020 for community water systems serving more than 100,000 people;
- (2) by June 30, 2021 for community water systems serving 50,000 to 99,999 people; and
- (3) by December 30, 2021 for community water systems serving 3,301 to 49,999 people.

(e) Non-transient, non-community water systems subject to this Rule shall certify completion and implementation of a SWRRP by December 31, 2022. The SWRRP shall contain the following elements:

- (1) identification and contact information of personnel responsible for emergency management, including water system, local, State, and federal emergency response personnel; and
- (2) an evaluation of a water system's ability to take the following actions:
 - (A) close its water intake(s) in the event of contamination, including a determination of the duration of time the water intake(s) can remain closed while maintaining positive water pressure within the distribution system;
 - (B) isolate or divert contaminated water from its surface water intake(s);
 - (C) reduce demand by implementing conservation measures during a contamination event; and
 - (D) meet demand via alternate sources of supply in the event of contamination or loss of its primary water source.

(f) Any public water system that begins treating and furnishing water from a surface water source on or after December 31, 2022 shall create and implement a SWRRP that satisfies the requirements of this Rule prior to the commencement of its operations.

(g) Any public water system required to create and implement a SWRRP in accordance with this Rule shall review and update its SWRRP at five-year intervals from its creation deadline, as specified in Paragraph (c), (d), (e), or (f) of this Rule.

(h) The SWRRP and any associated documentation used in its creation and implementation shall be available for review by Department staff upon request.

(i) The supplier of water shall certify that a SWRRP has been created and implemented, and that the water system's governing body has been advised of the SWRRP creation and implementation. The certification shall be submitted to the Department by the deadline specified in Paragraphs (c), (d), (e), or (f) of this Rule.

(j) The supplier of water shall certify that a SWRRP has been revised and that the water system's governing body has been advised of the revision. The certification shall be submitted to the Department by the revision deadline specified in Paragraph (g) of this Rule.

*History Note: Authority G.S. 130A-315; 130A-320(c);
Eff. January 1, 2019;
Amended Eff. April 1, 2020.*

SECTION .1400 - FLUORIDATION OF PUBLIC WATER SUPPLIES**15A NCAC 18C .1401 POLICY**

Upon receipt of an application from a community water system to fluoridate its water supply, the Department will approve the application provided the rules for fluoridation pursuant to this Section are followed.

*History Note: Authority G.S. 130A-316;
Eff. February 1, 1976;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1990; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1402 FORMAL APPLICATION

- (a) Fluoride shall not be added to a community water system until a formal application has been submitted to and written approval is granted by the Secretary of the Department.
- (b) Such approval will be considered upon written application and after adequate investigation has been made to determine if the policy adopted by the Division has been satisfied and the facilities, their accuracy and the proposed method of control are satisfactory and meet the requirements hereafter stated.
- (c) The application shall include a resolution by the unit of local government or the governing body operating the community water system. The resolution shall state that the local board of health has approved the proposed fluoridation procedure.

*History Note: Authority G.S. 130A-316;
Eff. February 1, 1976;
Readopted Eff. December 5, 1977;
Amended Eff. July 1, 1993; September 1, 1990; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1404 FEEDING EQUIPMENT

Accurate feeding equipment shall be provided for applying fluoride. Either gravimetric or volumetric dry-feed equipment or positive displacement liquid-feed equipment with accuracy within five percent shall be required.

*History Note: Authority G.S. 130A-316;
Eff. February 1, 1976;
Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1405 PROTECTION OF OPERATORS

- (a) Special precautions shall be taken to protect the operators from inhaling fluoride dust when handling this chemical and while charging the hoppers of the feeders.
- (b) Dry feeders shall be equipped with dust collectors consisting of bag filters operating under positive air pressure and vented to the outside air.
- (c) Each operator who handles fluoride shall be provided with his individual toxic dust respirator to be used only when handling the chemical.
- (d) When liquid or solution feed equipment is used, special precautions against siphonage and improper chemical mixing must be provided after consultation with and approval by the Department.

*History Note: Authority G.S. 130A-316;
Eff. February 1, 1976;
Readopted Eff. December 5, 1977;*

Amended Eff. September 1, 1990;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1406 CONTROL OF FLUORIDE PROCESS

- (a) Fluoride Levels. Fluoride levels shall not exceed the MCL set forth in Rule .1510 of this Subchapter. A supplier of water that is adding fluoride to the treated water shall maintain the following fluoride levels:
- (1) an operational control range for fluoride of 0.6 mg/l to 1.0 mg/l shall be established;
 - (2) the monthly average of the daily measurements at the entry point to the distribution system shall be within the operational control range; and
 - (3) 80 percent of the daily measurements at the entry point to the distribution system shall be within the operational control range.
- (b) A water treatment plant operator certified pursuant to 15A NCAC 18D shall conduct the necessary chemical analyses and supervise application of the fluoride.
- (c) Sample Location and Frequency.
- (1) Daily Monitoring. A supplier of water shall measure the fluoride concentration at least once per day at each entry point to the distribution system with fluoridated water.
 - (2) Split Samples. One entry point sample collected pursuant to Subparagraph (c)(1) of this Rule shall be split equally on a monthly basis. One portion shall be analyzed by water system personnel and the other portion analyzed by the North Carolina State Laboratory for Public Health or another laboratory certified to analyze drinking water samples for fluoride by the North Carolina State Laboratory of Public Health. A supplier of water that has all fluoride samples under this Rule analyzed by a laboratory certified to analyze drinking water samples for fluoride by the North Carolina State Laboratory for Public Health shall not be required to conduct split sampling.
 - (3) Distribution System Monitoring. The supplier of water of a public water system that has multiple entry points that are either not all fluoridated or the fluoride level at an entry point to the distribution system is not within the range set forth in Subparagraph (a)(1) of this Rule shall conduct sampling as follows:
 - (A) measure the fluoride concentration in the distribution system at least two times per month;
 - (B) one sample per month shall be a split sample and analyzed in accordance with Subparagraph (c)(2) of this Rule;
 - (C) sample sites shall be rotated throughout the distribution system at monitoring locations approved for coliform compliance sampling; and
 - (D) sample results shall be available for review by the Department upon request.
 - (4) Annual Raw Water Sample. A supplier of water shall measure the fluoride concentration of the raw water at least annually by a laboratory certified to analyze fluoride in drinking water by the North Carolina State Laboratory of Public Health.
 - (5) Discrepancies. A supplier of water shall compare the results of the split samples and shall consult with the North Carolina State Laboratory of Public Health to investigate and resolve all discrepancies greater than 15 percent within 30 days of receipt.
- (d) Analysis Methods. The fluoride content of water shall be determined in accordance with methods set forth in Rule .1508 of this Subchapter.
- (e) Monthly Reporting. Records of all fluoride analyses performed in accordance with Subparagraph (c)(1) of this Rule, shall be recorded on forms approved by the Department and submitted to the Department monthly. The forms shall specify the sample dates, times, locations, and results. Fluoride results performed by certified laboratories in accordance with Subparagraph (c)(1) of this Rule, shall be reported by the certified laboratory electronically in a format prescribed by the Department.
- (f) Reporting Exceedances. Any fluoride result above the MCL set forth in Rule .1510 of this Subchapter shall be reported to the Department as soon as possible, but in all cases within 24 hours after receipt of the analysis.
- (g) Fluoride Products. All fluoridation products used by a public water system shall meet the requirements of Rule .1537 of this Subchapter.
- (h) Discontinuation of Fluoridation. Prior to the discontinuation of fluoride addition, a supplier of water shall provide to the Department and the Department of Health and Human Services, Oral Health Section, copies of documentation by the unit of local government or the governing body operating the community water system that:

- (1) the resolution provided in the formal application to add fluoride has been rescinded or replaced; and
- (2) the local board of health has been notified.

*History Note: Authority G.S. 90A-29; 130A-316;
Eff. February 1, 1976;
Readopted Eff. December 5, 1977;
Amended Eff. April 1, 2014; July 1, 1994; September 1, 1990; December 17, 1979;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .1407 APPROVAL MAY BE RESCINDED

Failure to thoroughly and effectively carry out the requirements governing the application of fluoride, or for other good cause, shall be considered sufficient cause to rescind the approval of the Department and to withdraw the authorization granted for the permission to add fluoride to a community water system.

*History Note: Authority G.S. 130A-316;
Eff. February 1, 1976; Readopted Eff. December 5, 1977;
Amended Eff. September 1, 1990; September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

SECTION .1500 - WATER QUALITY STANDARDS**15A NCAC 18C .1502 MONITORING OF CONSECUTIVE PUBLIC WATER SYSTEMS**

(a) When a public water system supplies water to one or more other public water systems the Department may modify the monitoring requirements imposed by this Section to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the Department and concurred in by the Administrator of the U.S. Environmental Protection Agency.

(b) All public water systems which purchase water for resale and which do not provide any treatment except booster chlorination will be required to perform bacteriological monitoring in accordance with Rule .1534 of this Section.

(c) The Department may exempt a public water system that obtains treated water from another public water system serving more than 10,000 persons from conducting compliance monitoring for the organic chemicals under 15A NCAC 18C .1518(a), provided that the system from which the water is obtained has conducted the analyses required under 15A NCAC 18C .1518(a). Exempted public water systems which disinfect are required to monitor under 15A NCAC 18C .1516.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. June 1, 1988; Transferred and Recodified from 10 NCAC 10D .1628 Eff. April 4, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1505 TURBIDITY SAMPLING AND ANALYSIS

The requirements of this Rule shall apply only to public water systems that use water obtained in whole or in part from surface sources. The provisions of 40 C.F.R. 141.22 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. Any dates set forth in the federal rule shall be applicable.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 31, 1981; December 19, 1979; Transferred and Recodified from 10 NCAC 10D .1623 Eff. April 4, 1990; Amended Eff. April 1, 2014; August 1, 2002; January 1, 1991; September 1, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015

15A NCAC 18C .1506 MAXIMUM CONTAMINANT LEVELS FOR TURBIDITY

The requirements of this Rule shall apply to public water systems that use water obtained in whole or in part from surface water sources. The provisions of 40 C.F.R. 141.13 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. Any dates set forth in the federal rule shall be applicable.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .1614 Eff. April 4, 1990; Amended Eff. April 1, 2014; August 1, 2002; January 1, 1991; September 1, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1507 CORROSION CONTROL AND LEAD AND COPPER MONITORING

(a) Control and adjustment of pH shall be provided for community water systems having water with a pH below 6.5. This control and adjustment shall be approved by the Department pursuant to the rules in Section .0300 of this Subchapter. If the community water system is also required to install corrosion control treatment to comply with (c) of

this Rule, it shall meet the minimum pH level required pursuant to Paragraph (c) of this Rule.

(b) The provisions of 40 C.F.R. 141.42 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(c) The provisions of 40 C.F.R. 141, Subpart I - Control of Lead and Copper are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. October 1, 1982; February 27, 1982; Transferred and Recodified from 10 NCAC 10D .1621 Eff. April 4, 1990; Amended Eff. April 1, 2014; July 1, 1994; October 1, 1992; December 1, 1991; Readopted Eff. July 1, 2019.

15A NCAC 18C .1508 INORGANIC CHEMICAL SAMPLING AND ANALYSIS

The provisions of 40 C.F.R. 141.23 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter. In addition, two or more water systems that are adjacent, that are owned or operated by the same supplier of water, and that together serve 15 or more service connections or 25 or more persons shall submit samples every three years from each section of the water system that is supplied from a separate source.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 1, 1989; February 1, 1987; October 1, 1986; April 1, 1983; Transferred and Recodified from 10 NCAC 10D .1625 Eff. April 4, 1990; Amended Eff. April 1, 2014; July 1, 1994; April 1, 1992; December 1, 1991; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015; Amended Eff. July 1, 2019.

15A NCAC 18C .1509 SPECIAL MONITORING FOR SODIUM

The provisions of 40 C.F.R. 141.41 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(a) and (b) of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. February 27, 1982; Transferred and Recodified from 10 NCAC 10D .1636 Eff. April 4, 1990; Amended Eff. April 1, 2014; July 1, 1994; September 1, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015; Amended Eff. July 1, 2019.

15A NCAC 18C .1510 MAXIMUM CONTAMINANT LEVELS FOR INORGANIC CHEMICALS

(a) The provisions of 40 C.F.R. 141.11 are hereby incorporated by reference including any subsequent amendments and editions, except the maximum contaminant level for arsenic shall be regulated as set forth in Paragraph (c) of this Rule. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

(b) The provisions of 40 C.F.R. 141.62 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

(c) Effective January 1, 2002, the maximum contaminant level for arsenic applies to community and non-transient non- community water systems are as follows:

- (1) The maximum contaminant level for arsenic is 0.010 milligrams per liter, until such time as the USEPA revises the standard to a level lower than 0.010 milligrams per liter at which time the more stringent level shall apply.
- (2) Sampling, analytical requirements, and compliance calculations for arsenic shall be conducted as

- specified for contaminants in Rule .1508 of this Subchapter.
- (3) Certified laboratories must report quantifiable results down to at least 0.005 milligrams per liter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
 Eff. September 1, 1979;
 Amended Eff. October 1, 1986; October 1, 1982; April 1, 1982; March 31, 1981;
 Transferred and Recodified from 10 NCAC 10D .1616 Eff. April 4, 1990;
 Amended Eff. April 1, 1992;
 Temporary Amendment Eff. January 1, 2002;
 Amended Eff. April 1, 2014; April 1, 2003;
 Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1511 CONCENTRATION OF IRON

The requirements of this Rule shall apply only to community water systems. A community water system that has an iron concentration in excess of 0.30 mg/l shall provide treatment to control the water quality. Analysis of samples shall be made on an as needed basis determined by the Department and shall include the addition of a new well or other raw water source, an approval of a new community water system, an approval of an existing system not previously approved, or problems and complaints of water quality normally associated with iron concentration.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
 Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .1619 Eff. April 4, 1990;
 Amended Eff. July 1, 1994; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015; Amended Eff. July 1, 2019.

15A NCAC 18C .1512 CONCENTRATION OF MANGANESE

The requirements of this Rule shall apply only to community water systems. A community water system that has a manganese concentration in excess of 0.05 mg/l shall provide treatment to control the water quality. Analysis of samples shall be made on an as needed basis determined by the Department and shall include the addition of a new well or other raw water source, an approval of a new community water system, an approval of an existing system not previously approved, or problems and complaints of water quality normally associated with manganese concentration.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
 Eff. September 1, 1979;
 Amended Eff. September 9, 1980;
 Transferred and Recodified from 10 NCAC 10D .1620 Eff. April 4, 1990;
 Amended Eff. July 1, 1994;
 Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
 Amended Eff. November 1, 2020; July 1, 2019.

15A NCAC 18C .1515 ORGANIC CHEMICALS OTHER THAN TTHM, SAMPLING AND ANALYSIS

(a) The requirements of this Rule shall apply to community and non-transient non-community water systems. The provisions of 40 C.F.R. 141.24 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(b) If the result of an analysis made pursuant to Paragraph (a) of this Rule indicates that the level of any contaminant regulated under this Subchapter exceeds the maximum contaminant level, the supplier of water shall report to the Department within 48 hours of receipt of the analytical result.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
 Eff. September 1, 1979;
 Amended Eff. November 1, 1989; December 1, 1988; June 1, 1988; October 1, 1982;

*Transferred and Recodified from 10 NCAC 10D .1624 Eff. April 4, 1990;
Amended Eff. April 1, 2014; August 1, 2002; April 1, 1992; December 1, 1991; September 1, 1990;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .1516 SPECIAL MONITORING FOR UNREGULATED CONTAMINANTS

The provisions of 40 C.F.R. 141.40 are incorporated by reference including subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102(b) of this Subchapter.

*History Note: Authority G.S. 130A-313; 130A-315; P.L. 93-523; 40 C.F.R. 141;
Eff. June 1, 1988;
Amended Eff. November 1, 1989;
Transferred and Recodified from 10 NCAC 10D .1638 Eff. April 4, 1990; Amended Eff. April 1, 2014;
July
1, 1994; April 1, 1992; December 1, 1991; August 1, 1990;
Readopted Eff. July 1, 2019.*

15A NCAC 18C .1518 MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CONTAMINANTS

The provisions of 40 C.F.R. 141.61 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
Eff. June 1, 1988;
Transferred and Recodified from 10 NCAC 10D .1639 Eff. April 4, 1990;
Amended Eff. April 1, 2014; April 1, 1992;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

15A NCAC 18C .1519 MONITORING FREQUENCY FOR RADIOACTIVITY

The requirements of this Rule shall apply to community water systems and community adjacent water systems, as defined in G.S. 130A-315(b2). The provisions of 40 C.F.R. 141.26 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

*History Note: Authority G.S. 130A-313; 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979;
Amended Eff. March 1, 1989; September 9, 1980; December 19, 1979;
Transferred and Recodified from 10 NCAC 10D .1627 Eff. April 4, 1990;
Amended Eff. April 1, 2014; August 1, 2002; July 1, 1994; Pursuant to G.S. 150B-21.3A, rule is
necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .1520 MAXIMUM CONTAMINANT LEVELS FOR RADIONUCLIDES

The provisions of 40 C.F.R. 141.66 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
Eff. September 1, 1979;
Transferred and Recodified from 10 NCAC 10D .1617 Eff. April 4, 1990;
Amended Eff. April 1, 2014; August 1, 2002; July 1, 1994;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23,
2015.*

15A NCAC 18C .1521 MAXIMUM CONTAMINANT LEVEL GOALS FOR RADIONUCLIDES

The provisions of 40 C.F.R. 141.55 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .1618 Eff. April 4, 1990; Amended Eff. April 1, 2014; August 1, 2002; July 1, 1994; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1522 ANALYTICAL METHODS FOR RADIOACTIVITY

The provisions of 40 C.F.R. 141.25 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 31, 1981; March 31, 1980; Transferred and Recodified from 10 NCAC 10D .1626 Eff. April 4, 1990; Amended Eff. April 1, 2014; August 1, 2002; September 1, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1523 PUBLIC NOTIFICATION REQUIREMENTS

(a) The provisions of 40 C.F.R. 141, Subpart Q – Public Notification of Drinking Water Violations are incorporated by reference, including subsequent amendments and editions. As authorized by 40 C.F.R. 141.205(c)(2), the Department has determined that multi-lingual notice shall be given if 30 percent or more of the consumers served by the system are non- English speaking. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(b) Special notification for distribution system samples. The requirements of this Paragraph shall be in addition to the public notice requirements set forth in Paragraph (a) of this Rule and to the reporting requirements contained in Rule .1525 of this Subchapter. If a distribution sample that is required to be reported to the Division is taken from the plumbing of a school or daycare, place of residence, or location supplying permanent or temporary housing, the supplier of water shall notify the billing customer at the sampled address if any individual water sample exceeds an action level, maximum contaminant level, or maximum residual disinfectant level established in this Subchapter or if any individual sample is positive for E. coli or any other fecal indicator, as follows:

- (1) For a contaminant listed as Tier 1 in Appendix A to 40 C.F.R. 141, Subpart Q, notice shall be provided within 24 hours of receipt of analytical results. If the initial contact is by telephone, written notice by mail or direct delivery shall also be provided within 48 hours of analytical results. The written notice shall include the analytical results and appropriate health effects language as required by Appendix B to 40 C.F.R. 141, Subpart Q.
- (2) For a contaminant listed as Tier 2 or Tier 3 in Appendix A to 40 C.F.R. 141, Subpart Q, notice shall be provided within 48 hours of receipt of analytical results. Written notice shall be provided by mail or direct delivery and shall include the analytical results and appropriate health effects language as required by Appendix B to 40 C.F.R. 141, Subpart Q.
- (3) The supplier of water shall submit a copy of the written notice and certification of delivery to the Department within 10 days of completing notification.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. January 1, 1990; Transferred and Recodified from 10 NCAC 10D .1642 Eff. April 4, 1990; Amended Eff. April 1, 2014; October 1, 2006; August 1, 2002; April 1, 1992; December 1, 1991; January 1, 1991; October 1, 1990; Readopted Eff. July 1, 2019.

15A NCAC 18C .1524 REPORTING FOR UNREGULATED CONTAMINANT MONITORING RESULTS

The provisions of 40 C.F.R. 141.35 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. June 1, 1988;
Amended Eff. November 1, 1989;
Transferred and Recodified from 10 NCAC 10D .1640 Eff. April 4, 1990;
Readopted Eff. July 1, 2019.

15A NCAC 18C .1525 REPORTING REQUIREMENTS

(a) The requirements of this Rule shall apply to all public water systems. The provisions of 40 C.F.R. 141.31 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter. Any dates set forth in the federal rule shall be applicable.

(b) If a certified laboratory analyzes a compliance sample for a supplier of water, the certified laboratory shall report the results to both the Department and to the supplier of water or his or her designated representative within the periods set forth in 40 C.F.R. 141.31, except that electronic reporting conducted in accordance with 40 C.F.R. 141.31(a) shall be completed within seven days of completion of the analysis. The laboratory reporting to the Department shall include analytical results for any maximum contaminant level exceedance within the timeframes applicable to the system owner. Reporting shall be in a format, including electronic reporting, established by the Department and shall be filled out completely. If a certified laboratory fails to report compliance sample results in accordance with this Paragraph, the supplier of water shall report results to the Department as required by this Rule.

History Note: Authority G.S. 130A-315; 130A-324; 130A-329; 40 C.F.R. 141; Eff. September 1, 1979;
Amended Eff. February 1, 1987; October 1, 1984; March 31, 1981; March 31, 1980;
Transferred and Recodified from 10 NCAC 10D .1631 Eff. April 4, 1990;
Amended Eff. April 1, 2014; August 1, 2002; January 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.

15A NCAC 18C .1526 RECORD MAINTENANCE

The provisions of 40 C.F.R. 141.33 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979;
Transferred and Recodified from 10 NCAC 10D .1632 Eff. April 4, 1990;
Amended Eff. April 1, 2014; August 1, 2002;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1527 CERTIFIED LABORATORIES

(a) The provisions of 40 C.F.R. 141.28 are incorporated by reference, including subsequent amendments and editions, with the following exceptions:

- (1) laboratories analyzing samples pursuant to this Subchapter shall be certified for that analytical method by the State Laboratory of Public Health in the Department of Health and Human Services; and
- (2) measurements for alkalinity; bromide; fluoride; calcium; daily chlorite samples at the entrance to the distribution system; conductivity; orthophosphate; pH; residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide; magnesium; silica; Specific Ultraviolet Absorbance (SUVA); temperature; Total Organic Carbon (TOC); and turbidity may be performed by any person who holds a valid certificate issued by the North Carolina Water Treatment Facility Operators Board of Certification (NCWTFOBOC). Measurements may also be performed by a person who has been instructed in the measurement procedure by a person who holds a valid certificate issued by the NCWTFOBOC or by a certified laboratory.

(b) Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 31, 1981; Transferred and Recodified from 10 NCAC 10D .1629 Eff. April 4, 1990; Amended Eff. April 1, 1992; September 1, 1990; Readopted Eff. July 1, 2019.

15A NCAC 18C .1528 ALTERNATE ANALYTICAL TECHNIQUES

The provisions of 40 C.F.R. 141.27 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 31, 1981; Transferred and Recodified from 10 NCAC 10D .1630 Eff. April 4, 1990; Readopted Eff. July 1, 2019.

15A NCAC 18C .1529 POINT-OF-ENTRY, BOTTLED WATER, AND OTHER TREATMENT DEVICES

(a) The provisions of 40 C.F.R. 141 Subpart J – Use of Non-Centralized Treatment Devices are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(b) Public water systems shall not use bottled water or point-of-use devices to achieve compliance with a maximum contaminant level. Bottled water or point-of-use devices may be used on a temporary basis until compliance with the maximum contaminant level is achieved.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. June 1, 1988; Transferred and Recodified from 10 NCAC 10D .1641 Eff. April 4, 1990; Amended Eff. September 1, 1990; Readopted Eff. July 1, 2019.

15A NCAC 18C .1530 CONSTRUCTION

This Section shall be construed as enabling the State of North Carolina to undertake primary responsibility for the enforcement of the federal act.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .1611 Eff. April 4, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1531 SITING REQUIREMENTS

(a) Any person constructing or modifying a public water system shall to the extent practicable, avoid locating all or part of a new or expanded facility at a site which:

- (1) is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or
- (2) except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist.

(b) Additional requirements concerning the siting of raw water intakes shall be found in 15A NCAC 18C .0602.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 31, 1980;

*Transferred and Recodified from 10 NCAC 10D .1612 Eff. April 4, 1990;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1532 VARIANCES AND EXEMPTIONS

The provisions of 40 C.F.R. 141.4 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979;
Transferred and Recodified from 10 NCAC 10D .1634 Eff. April 4, 1990;
Amended Eff. January 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .1534 COLIFORM SAMPLING

(a) The provisions of 40 C.F.R. 141.21 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. The provisions are incorporated with the following exceptions:

- (1) the provision of 40 C.F.R. 141.21(a)(2) concerning the reduction of monitoring frequency for community water systems serving 25 to 1,000 persons is not adopted;
- (2) the provision of 40 C.F.R. 141.21(b)(3) concerning collection of large volume repeat samples in containers of any size is not adopted; and
- (3) the provision of 40 C.F.R. 141.21(c)(2) concerning waiver of the 24-hour limit for re-sampling is not adopted.

(b) An adjacent water system shall submit samples monthly from each section of the water system supplied from a separate source. The minimum number of samples each month per section is based on the population served by the section and shall be determined by the table in 40 C.F.R. 141.21(a)(2).

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.21;
Eff. January 1, 1991;
Amended Eff. April 1, 2014; February 1, 1992;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1535 MAXIMUM CONTAMINANT LEVELS FOR COLIFORM BACTERIA

(a) The provisions of 40 C.F.R. 141.63 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(b) The provisions of 40 C.F.R. 141.52 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.52; 40 C.F.R. 141.63;
Eff. January 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .1536 TREATMENT TECHNIQUES

The provisions of 40 C.F.R. 141. Subpart K are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;
Eff. April 1, 1992;
Amended Eff. April 1, 2014;*

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1537 DRINKING WATER TREATMENT CHEMICALS AND SYSTEM COMPONENTS

(a) The standards established by the American National Standards Institute/NSF International, codified as ANSI/NSF Standard 60 and ANSI/NSF Standard 61, are incorporated by reference including subsequent amendments and editions. ANSI/NSF Standard 60 applies to drinking water treatment chemicals. ANSI/NSF Standard 61 applies to drinking water system components. Copies may be obtained for public inspection as set forth in Rule .0503 of this Subchapter.

(b) A water supply product used in a public water system shall meet the standards incorporated by reference in Paragraph (a) of this Rule. A product certified by an organization having a third-party certification program accredited by the American National Standards Institute to test and certify such products may be used in a public water system.

(c) A supplier of water shall maintain a list of all water supply products used in a public water system for inspection by the Department. Prior to using a product not previously listed, a supplier of water shall either determine the product is certified as required by Paragraph (b) of this Rule or notify the Department of the type, name, and manufacturer of a product.

(d) A supplier of water shall not introduce or permit the introduction of a water supply product into a public water system that does not meet the requirements of this Rule.

History Note: Authority G.S. 130A-315; P.L. 93-523;

Eff. July 1, 1994;

Amended Eff. April 1, 2014;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;

Amended Eff. July 1, 2019.

15A NCAC 18C .1538 CONSUMER CONFIDENCE REPORT

The provisions of 40 C.F.R. 141, Subpart O - Consumer Confidence Reports are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

History Note: Authority G.S. 130A-313; 130A-315; P.L. 93-523; 40 C.F.R. 141;

Eff. August 1, 2000;

Amended Eff. April 1, 2014;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;

Amended Eff. July 1, 2019.

15A NCAC 18C .1539 REVISED TOTAL COLIFORM RULE

The provisions of 40 C.F.R. 141, Subpart Y - Revised Total Coliform Rule are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102(a) and (b) of this Subchapter.

History Note: Authority G.S. 130A-315;

Eff. July 1, 2015.

SECTION .1600 - VARIANCES AND EXEMPTIONS**15A NCAC 18C .1601 REQUIREMENTS FOR A VARIANCE**

(a) The Secretary may grant one or more variances to any public water system within the state from any requirement respecting a maximum contaminant level of an applicable rule of 15A NCAC 18C Section .1500 upon a finding that:

- (1) Because of characteristics of the raw water sources which are reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulations despite application of the best technology, treatment techniques, or other means, which the Secretary, with the concurrence of the administrator, finds are generally available (taking costs into consideration); and
- (2) The granting of a variance will not result in an unreasonable risk to the health of persons served by the system.

(b) The Secretary may grant one or more variances to any public water system within the state from any requirement of a specified treatment technique of an applicable rule of 15A NCAC 18C Section .1500 upon finding that the public water system applying for the variance has demonstrated that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such systems.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142;

Eff. September 1, 1979;

Amended Eff. December 19, 1979;

Transferred and Recodified from 10 NCAC 10D .2501 Eff. April 4, 1990;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1602 VARIANCE REQUEST

A supplier of water may request a variance for a public water system by submitting a written request to the Secretary. Suppliers of water may submit a joint request for variances when they seek similar variances under similar circumstances. A request for a variance or variances shall include the following information:

- (1) the nature and duration of variance requested;
- (2) relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the rules of 15A NCAC 18C Section .1500;
- (3) for any request made under .1601(a) of this Section:
 - (a) explanation in full and evidence of the best available treatment technology and techniques;
 - (b) economic and legal factors relevant to ability to comply;
 - (c) analytical results of raw water quality relevant to ability to comply;
 - (d) a proposed compliance schedule, including the date each step toward compliance will be achieved; Such schedule shall include as a minimum the following dates:
 - (i) date by which arrangement for alternative raw water source or improvement of existing raw water source will be completed,
 - (ii) date of initiation of the connection of the alternative raw water source or improvement of existing raw water source,
 - (iii) date by which final compliance is to be achieved;
 - (e) a plan for the provision of safe drinking water in the case of an excessive rise in the contaminant level for which the variance is requested;
 - (f) a plan for interim control measures during the effective period of variance;
- (4) for any request made under .1601(b) of this Section, a statement that the system will perform monitoring and other reasonable requirements prescribed by the Secretary as a condition to the variance;
- (5) other information, if any, believed to be pertinent by the applicant;
- (6) such other information as the Secretary may require.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142;

Eff. September 1, 1979;

Transferred and Recodified from 10 NCAC 10D .2502 Eff. April 4, 1990;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1603 CONSIDERATION OF A VARIANCE REQUEST

(a) The Secretary shall act on any variance request submitted pursuant to .1602 of this Section within 90 days of receipt of the request.

(b) In consideration of whether the public water system is unable to comply with a contaminant level required by 15A NCAC 18C Section .1500 because of the nature of the raw water source, the Secretary shall consider such factors as the following:

- (1) the availability and effectiveness of treatment methods for the contaminant for which the variance is requested;
- (2) cost and other economic considerations such as implementing treatment, improving the quality of the source water or using an alternate source.

(c) In consideration of whether a public water system should be granted a variance to a required treatment technique because such treatment is unnecessary to protect the public health, the Secretary shall consider such factors as the following:

- (1) quality of the water source including water quality data and pertinent sources of pollution,
- (2) source protection measures employed by the public water system.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979;

Transferred and Recodified from 10 NCAC 10D .2503 Eff. April 4, 1990;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1604 DISPOSITION OF A VARIANCE REQUEST

(a) If the Secretary decides to deny the application for a variance, the applicant shall be notified of the intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial. Within 30 days after the receipt of such notice, the applicant may request a hearing for the purpose of contesting the proposed denial. Such hearing shall be conducted in the manner set forth in G.S. 150B-22 through 150B-37. If no hearing is requested by the applicant within the 30-day period, the application shall be denied.

(b) If the Secretary proposes to grant a variance request submitted pursuant to .1602 of this Section, the applicant shall be notified of the decision in writing. Such notice shall identify the variance, the facility covered, and shall specify the period of time for which the variance will be effective:

- (1) For the type of variance specified in .1601(a) of this Section, such notice shall provide that the variance will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Secretary that the system has failed to comply with any requirements of a final schedule issued pursuant to .1605 of this Section.
- (2) For the type of variance specified in .1601(b) of this Section, such notice shall provide that the variance may be terminated at any time upon a finding that the nature of the raw water source is such that the specified treatment technique for which the variance was granted is necessary to protect the health of persons or upon a finding that the public water system has failed to comply with monitoring and other requirements prescribed by the Secretary as a condition to the granting of the variance.

(c) For a variance specified in .1601(a)(1) of this Section, the Department shall propose a schedule for:

- (1) compliance (including increments of progress) by the public water system with each contaminant level requirement covered by the variance, and
- (2) implementation by the public water system of such control measures as the Department may require for each contaminant covered by the variance.

(d) The proposed schedule for compliance shall specify dates by which steps towards compliance are to be taken, including at the minimum, where applicable:

- (1) date by which arrangement for an alternative raw water source or improvement of existing raw water source will be completed,
- (2) date of initiation of the connection for the alternative raw water source or improvement of the existing raw water source,

- (3) date by which final compliance is to be achieved.
- (e) The proposed schedule may, if the public water system has no access to an alternative raw water source, and can effect or anticipate no adequate improvement of the existing raw water source, specify an indefinite time period for compliance until a new and effective treatment technology is developed at which time a new compliance schedule shall be prescribed by the Secretary.
- (f) The proposed schedule for implementation of interim control measures during the period of variance shall specify interim treatment techniques, methods and equipment, and dates by which steps toward meeting the interim control measures are to be met.
- (g) The schedule shall be prescribed by the secretary within one year after the granting of the variance, subsequent to provision of opportunity for hearing pursuant to .1605 of this Section.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .2504 Eff. April 4, 1990; Amended Eff. September 1, 1991; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1605 PUBLIC HEARINGS ON VARIANCES AND SCHEDULES

- (a) Before a variance or a schedule proposed by the Secretary pursuant to Rule.1604 of this Section may take effect, the Secretary shall provide notice and opportunity for public hearing on the variance or schedule. Such notice may cover the granting of more than one variance, and a hearing held pursuant to such notice shall include each of the variances covered by that notice.
- (b) Public notice of an opportunity for hearing on a variance or schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed variance or schedule and shall include the following minimum requirements:
- (1) posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system;
 - (2) mailing of a notice to the Public Water Supply Section, Division of Water Resources and to other appropriate state or local agencies at the Department's discretion; and
 - (3) such notice shall include a summary of the proposed variance or schedule and shall inform interested persons that they may request a public hearing on the proposed variance or schedule.
- (c) Requests for hearing may be submitted by any interested person. Frivolous or insubstantial requests for hearing may be denied by the Secretary. Requests shall be submitted to the Secretary within 30 days after issuance of the public notice provided for in Paragraph (b) of this Rule. Such requests shall include the following information:
- (1) the name, address and telephone number of the individual, organization or other entity requesting a hearing;
 - (2) a brief statement of the interest of the individual, organization or other entity making the request in the proposed variance or schedule and of information that the requestor intends to submit at such hearing; and
 - (3) the signature of the individual making the request or if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.
- (d) Any hearing held pursuant to a request submitted by an individual, organization or other entity or on the Secretary's own motion shall be conducted in the manner set forth in G.S. 150B-22 through 150B-37.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .2505 Eff. April 4, 1990; Amended Eff. April 1, 2014; September 1, 1991; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1606 VARIANCES FOR FLUORIDE

(a) The following shall be the best technology, treatment techniques or other means generally available for achieving compliance with the maximum contaminant level for fluoride:

- (1) Activated alumina absorption, centrally applied,
- (2) Reverse osmosis, centrally applied.

(b) The Division shall require a community water system to install and/or use any treatment method identified in (a) of this Rule as a condition for granting a variance unless it is determined that such a treatment method is not available and effective for fluoride control for the system. A treatment method shall not be available and effective for a water system if the method would not be technically appropriate and technically feasible. If upon application for a variance it is determined that no treatment method is available and effective, then the water system shall be entitled to a variance. A determination of availability and effectiveness of treatment methods shall be based upon studies by the water system and other relevant information. A finding shall be made by the Division whether the information supports a decision that a treatment method is not available and effective before requiring installation and use of the treatment method.

(c) The Division shall issue a compliance schedule that may require the water system to examine the following treatment methods to determine the probability that any method will significantly reduce the level of fluoride and to determine whether any method is technically feasible and economically reasonable and that the fluoride reduction obtained will be commensurate with the costs incurred with installation and use of the treatment methods:

- (1) Modification of lime softening;
- (2) Alum coagulation;
- (3) Electrodialysis;
- (4) Anion exchange resins;
- (5) Well field management;
- (6) Alternate source; and
- (7) Regionalization.

(d) If the Division determines that a treatment method identified in (c) of this Rule or any other treatment method is technically feasible, economically reasonable, and will achieve fluoride reductions commensurate with the costs incurred with the installation and use of such treatment method for the system, the Division shall require the system to install and/or use that treatment method in connection with a compliance schedule. The determination shall be based upon studies by the system and other relevant information.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. October 1, 1986; Transferred and Recodified from 10 NCAC 10D .2512 Eff. April 4, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1607 VARIANCES AND EXEMPTIONS FOR CHEMICALS, LEAD AND COPPER, AND RADIONUCLIDES

(a) The provisions of 40 C.F.R. 142.62 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

(b) The provisions of 40 C.F.R. 142.65 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 142; Eff. June 1, 1988; Transferred and Recodified from 10 NCAC 10D .2514 Eff. April 4, 1990; Amended Eff. April 1, 2014; August 1, 2002; October 1, 1992; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1608 REQUIREMENTS FOR AN EXEMPTION

The Secretary may exempt any public water system in the state from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable rule of this Subchapter upon a finding that:

- (1) Due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement;
- (2) The public water system was in operation on the effective date of federal promulgation of such contaminant level or treatment technique requirement; and
- (3) The granting of the exemption will not result in an unreasonable risk to health.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979; Amended Eff. December 19, 1979; Transferred and Recodified from 10 NCAC 10D .2506 Eff. April 4, 1990; Amended Eff. July 1, 1993; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1609 EXEMPTION REQUEST

A supplier of water may request an exemption for a public water system by submitting a written request to the Secretary. Suppliers of water may submit a joint request for exemptions when they seek similar exemptions under similar circumstances. Any request for an exemption or exemptions shall include the following information:

- (1) the nature and duration of exemption requested;
- (2) relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of the drinking water regulations;
- (3) explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance;
- (4) other information, if any, believed by the applicant to be pertinent to the application;
- (5) a proposed compliance schedule, including the date when each step toward compliance will be achieved;
- (6) such other information as the Secretary may require.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .2507 Eff. April 4, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1610 CONSIDERATION OF AN EXEMPTION REQUEST

(a) The Secretary shall act on any exemption request submitted pursuant to .1609 of this Section within 90 days of receipt of the request.

(b) In consideration of whether the public water system is unable to comply due to compelling factors, the Secretary shall consider such factors as the following:

- (1) construction, installation, or modification of treatment equipment or systems;
- (2) the time needed to put into operation a new treatment facility to replace an existing system which is not in compliance;
- (3) economic feasibility of compliance.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .2508 Eff. April 4, 1990; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1611 DISPOSITION OF AN EXEMPTION REQUEST

(a) If the Secretary decides to deny the application for an exemption, the applicant shall be notified of the intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial. Within 30 days after the receipt of such notice, the applicant may request a hearing for the purpose of contesting the proposed denial. Such

hearing shall be conducted in the manner set forth in G.S. 150B-22 through 150B-37. If no hearing is requested by the applicant within the 30-day period, the application shall be denied.

(b) If the Secretary grants an exemption request submitted pursuant to .1609 of this Section, the applicant shall be notified of the decision in writing. Such notice shall identify the facility covered and shall specify the termination date of the exemption. Such notice shall provide that the exemption will be terminated when the system comes into compliance with the applicable rule, and may be terminated upon a finding by the Secretary that the system has failed to comply with any requirements of a final schedule issued pursuant to .1613 of this Section.

(c) The Secretary shall propose a schedule for:

- (1) compliance (including increments of progress) by the public water system with each contaminant level requirement and treatment technique requirement covered by the exemption, and
- (2) implementation by the public water system of such control measures as the Secretary may require for each contaminant covered by the exemption.

(d) The schedule shall be prescribed by the secretary within one year after the granting of the exemption, subsequent to provision of opportunity for hearing pursuant to .1612 of this Section.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142;

Eff. September 1, 1979;

Transferred and Recodified from 10 NCAC 10D .2509 Eff. April 4, 1990;

Amended Eff. September 1, 1991;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1612 PUBLIC HEARINGS ON EXEMPTION SCHEDULES

(a) Before a schedule proposed by the Secretary pursuant to Rule.1611 of this Section may take effect, the Secretary shall provide notice and opportunity for public hearing on the schedule. Such notice may cover the proposal of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(b) Public notice of an opportunity for hearing on an exemption schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed schedule, and shall include the following minimum requirements:

- (1) posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing a notice in the newspaper or newspapers of general circulation in the area served by the public water system;
- (2) mailing of a notice to the Public Water Supply Section, Division of Water Resources and to other appropriate state or local agencies at the Secretary's discretion; and
- (3) such notices shall include a summary of the proposed schedule and shall inform interested persons that they may request a public hearing on the proposed schedule.

(c) Requests for hearing may be submitted by any interested person. Frivolous or insubstantial requests for hearing may be denied by the Secretary. Requests shall be submitted to the Secretary within 30 days after issuance of the public notices provided for in Paragraph (b) of this Rule. Such requests shall include the following information:

- (1) the name, address and telephone number of the individual, organization or other entity requesting a hearing;
- (2) a brief statement of the interest of the individual, organization or other entity making the request in the proposed schedule and of information that the requestor intends to submit at such hearing; and
- (3) the signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) Any hearing held pursuant to a request submitted by an individual, organization or other entity or on the Secretary's own motion shall be conducted in the manner set forth in G.S. 150B-22 through 150B-37.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142;

Eff. September 1, 1979;

Transferred and Recodified from 10 NCAC 10D .2510 Eff. April 4, 1990;

Amended Eff. April 1, 2014; December 1, 1991;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1613 FINAL SCHEDULE

(a) Within a reasonable time after the termination of a hearing conducted in the manner set forth in G.S. 150B-22 through 150B-37, the Secretary shall, based upon consideration of the hearing record as a whole, revise the proposed schedule as necessary and prescribe the final schedule for compliance and interim measures for the public water system granted an exemption under .1609 of this Section.

(b) Such schedule shall require compliance by the public water system with each contaminant level and treatment technique requirement prescribed by:

- (1) regulations in 15A NCAC 18C Section .1500 adopted on or before September 1, 1979, by no later than January 1, 1981; and
- (2) amendments to 15A NCAC 18C adopted after September 1, 1979, by no later than seven years after the effective date of the revised National Primary Drinking Water Regulations.

(c) If the public water system has entered into an enforceable agreement to become a part of a regional public water system, as determined by the Secretary, such schedule shall require compliance by the public water system with each contaminant level and treatment technique requirement prescribed by:

- (1) regulations in 15A NCAC 18C Section .1500 adopted on or before September 1, 1979, by no later than January 1, 1983; and
- (2) amendments to 15A NCAC 18C Section .1500 adopted after September 1, 1979, by no later than nine years after the effective date of the revised National Primary Drinking Water Regulations.

History Note: Authority G.S. 130A-315; 130A-321; P.L. 93-523; 40 C.F.R. 142; Eff. September 1, 1979; Amended Eff. December 19, 1979; Transferred and Recodified from 10 NCAC 10D .2511 Eff. April 4, 1990; Amended Eff. September 1, 1991; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1614 BOTTLED WATER AND POINT-OF-USE DEVICES

The provisions of 40 C.F.R. 142.57 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 142; Eff. June 1, 1988; Transferred and Recodified from 10 NCAC 10D .2513 Eff. April 4, 1990; Amended Eff. April 1, 2014; October 1, 1992; December 1, 1988; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

SECTION .1800 - LOCAL PLAN APPROVAL**15A NCAC 18C .1801 LOCAL APPROVAL PROGRAM**

This Section implements G.S. 130A-317(d) which authorizes the certification of local programs for approval of the construction or alteration of the distribution system of a community water system. For purposes of this Section, distribution system means the network of pipes, valves, hydrants and related appurtenances but does not include pumps, storage tanks, treatment devices, wells or other facilities.

*History Note: Authority G.S. 130A-317; 1985 S.L., c. 697, s. 3; Eff. January 1, 1986;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1802 APPLICATION FOR CERTIFICATION

Application for certification shall be made to the Public Water Supply Section, Division of Water Resources, 1634 Mail Service Center, Raleigh North Carolina 27699-1634. Application shall be submitted in triplicate and shall designate the office or agency which will administer the program.

*History Note: Authority G.S. 130A-317; S.L. 1985-697, s. 3;
Eff. January 1, 1986;
Amended Eff. April 1, 2014; December 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1803 CERTIFICATION

The Department shall certify a local approval program which satisfies the requirements of G.S. 130A-317(d). The requirements of G.S. 130A-317(d)(4) are satisfied when a local approval program provides by ordinance or local law for enforcement provisions equivalent to G.S. 130A-18 and G.S. 130A-25. The requirements of G.S. 130A-317(d)(5) are satisfied when a local approval program has a minimum staff and other resources of: a designer who is a professional engineer registered in this state and whose duty is to devote the time necessary for an effective local approval program; a technical staff, budget, equipment and facilities sufficient to support a design engineering office; and an organizational structure sufficient to carry out this purpose.

*History Note: Authority G.S. 130A-317; 1985 S.L., c. 697, s. 3;
Eff. January 1, 1986;
Amended Eff. February 1, 1987;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1804 NOTICE

(a) A local approval program shall submit an annual notice to the Department, identifying each approval of construction or alteration of the distribution system of a community water system. The local approval program shall retain a copy of the application and approved engineering plans and shall provide a copy to the Department upon request.

(b) The local approval program shall provide notice to the department within 10 days of any change in staff, budget, or other resources that may affect the program's ability to carry out the plan review program.

(c) Upon completion of the construction or alteration of the distribution system, the applicant shall submit a statement to the local approval program, signed by a registered professional engineer, stating that construction was completed in accordance with approved plans and specifications and revised only in accordance with 15A NCAC 18C .0306. The statement shall be based upon observations during and upon completion of construction by the engineer or a representative of the engineer's office who is supervised by the engineer. The local approval program shall provide a copy of the statement to the Department upon request.

*History Note: Authority G.S. 130A-317; 1985 S.L., c. 697, s. 3;
Eff. January 1, 1986;*

Amended Eff. December 1, 1988;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;

Amended Eff. July 1, 2019.

15A NCAC 18C .1805 DEPARTMENTAL ENFORCEMENT

If the Department determines that a community water system is violating local approval requirements and the local approval program has not enforced its requirements, the Department may, after written notice, to the local program, enforce the requirements in accordance with provisions of G.S. 130A-17 through 130A-28.

History Note: Authority G.S. 130A-317; 1985 S.L., c. 697, s. 3;

Eff. January 1, 1986;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

SECTION .1900 - ADMINISTRATIVE PENALTIES**15A NCAC 18C .1901 DEFINITIONS**

As used in the following rules, the term:

- (1) "Delegate" means any person to whom the Department has delegated authority in writing to act in its stead in relation to civil penalties;
- (2) "Hearing officer" means the presiding officer in a contested case hearing;
- (3) "Respondent" means the person against whom a penalty has been assessed.

*History Note: Authority G.S. 130A-22(f);
Eff. September 1, 1979;
Amended Eff. May 1, 1987;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1902 ADMINISTRATIVE PENALTIES

The following rules provide the procedures and standards governing the assessment, remission, mitigation and appeal of administrative penalties imposed by the Department or its delegates under G.S. 130A-22(b) for violations of the North Carolina Drinking Water Act, Article 10 of Chapter 130A and 15A NCAC 18C.

*History Note: Authority G.S. 130A-22(f);
Eff. September 1, 1979;
Amended Eff. April 1, 2014; October 1, 1984;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1903 WHO MAY ASSESS PENALTIES

Administrative penalties may be assessed by the Department or its delegate.

*History Note: Authority G.S. 130A-22(f);
Eff. September 1, 1979;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1904 WHEN PENALTIES MAY BE ASSESSED

Administrative penalties may be assessed against any person for violations as described in G.S. 130A-325.

*History Note: Authority G.S. 130A-22(f);
Eff. September 1, 1979;
Amended Eff. October 1, 1984;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1905 AMOUNT OF PENALTY ASSESSMENT

- (a) An administrative penalty may not exceed the amount which may be assessed for violations as prescribed in G.S. 130A-22(b).
- (b) Each day of a continuing violation shall constitute a separate violation.
- (c) Each violation of a specific provision of Article 10 of Chapter 130A, the rules issued thereunder, and any order pursuant thereto, shall be a separate violation.

*History Note: Authority G.S. 130A-22(f);
Eff. September 1, 1979;
Amended Eff. October 1, 1984;*

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1906 CONSIDERATIONS IN ASSESSING ADMINISTRATIVE PENALTIES

In determining the amount of the assessment, the Department or its delegates shall consider the following criteria and shall cite the provisions that are applicable:

- (1) nature of the violation and the degree and extent of the harm, including the following:
 - (a) for a violation of the North Carolina Drinking Water Act, Article 10 of Chapter 130A, and the rules in this Subchapter:
 - (i) type of violation,
 - (ii) type of contaminant involved,
 - (iii) duration,
 - (iv) cause (whether resulting from a negligent, reckless or intentional act, or omission),
 - (v) potential effect on public health and the environment,
 - (vi) effectiveness of responsive measures taken by the violator,
 - (vii) damage to private property, and
 - (viii) size of the water system and population exposed;
 - (b) for a violation of an order issued under the North Carolina Drinking Water Act, Article 10 of Chapter 130A:
 - (i) subject matter of order,
 - (ii) duration,
 - (iii) cause (whether resulting from a negligent, reckless or intentional act, or omission),
 - (iv) type of violation, if any,
 - (v) potential effect on public health and the environment, and
 - (vi) effectiveness of responsive measures taken by violator;
 - (c) for refusing to allow an authorized representative of the Commission for Public Health, any local board of health, or the Department a right of entry as provided for in G.S. 130A-17:
 - (i) type of other violation, if any,
 - (ii) duration of refusal, and
 - (iii) potential effect on public health and the environment;
 - (d) for failure to give adequate public notice as required by G.S. 130A-324:
 - (i) inadequacy of type of notice,
 - (ii) misleading in nature,
 - (iii) delay in providing notice, and
 - (iv) potential effect on public health from failure to give adequate notice;
- (2) cost of rectifying any damage; and
- (3) the violator's previous record in complying or not complying with the North Carolina Drinking Water Act, Article 10 of Chapter 130A and the rules in this Subchapter.

History Note: Authority G.S. 130A-22(f); 130A-17; 130A-324; Eff. September 1, 1979; Amended Eff. April 1, 2014; October 1, 1984; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1907 PROCEDURE FOR ASSESSMENT

- (a) Depending on the violation involved, the Department or its delegates may issue a notice of penalty assessment immediately or grant the violator a period of time within which to cease the violation.
- (b) For all violations for which a penalty is assessed, a notice of such action shall be sent to the respondent by registered or certified mail. The notice shall describe the nature of the violation with reasonable particularity, the amount of the penalty for each violation, that each day of a continuing violation constitutes a separate violation, advise that the penalty is now due or that it will become due at the end of a specified time, and advise the respondent of his rights of appeal.
- (c) The Department or its delegates may modify a penalty upon finding that additional or different facts should have

been considered in determining the amount of the assessment.

History Note: Authority G.S. 130A-22(f);

Eff. September 1, 1979;

Amended Eff. May 1, 1987;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1908 IMMEDIATE HAZARD

If violation of the rules or law presents an imminent hazard to the public health as determined by the Secretary, an order may be issued pursuant to G.S. 130A-322.

History Note: Authority G.S. 130A-22(f);

Eff. September 1, 1979;

Amended Eff. October 1, 1984;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1909 PAYMENTS: HEARING

(a) Within 30 days after receipt of notification of a penalty assessment, the respondent must tender payment, or submit in writing a request for an administrative hearing. All appeals shall be made in accordance with G.S. 150B.

(b) Payment may be tendered in conjunction with a hearing request and in such case, the payment will be accepted as conditional upon final action.

(c) This Rule shall not preclude informal conferences concerning the penalty assessed.

(d) Whenever an administrative hearing is scheduled, to avoid undue costs and delay, the respondent will be required to state all the issues in dispute and the Department will be required to hold only one administrative hearing.

(e) The Department will acknowledge the receipt of all payments.

History Note: Authority G.S. 130A-22(f);

Eff. September 1, 1979;

Amended Eff. May 1, 1987;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1910 STAY OF PENALTY ASSESSMENT

When an administrative hearing is requested for a purpose other than remission or mitigation of the penalty assessed, the penalty will be stayed as of the date of said request until service of the final decision or other settlement of the matter.

History Note: Authority G.S. 130A-22(f);

Eff. September 1, 1979;

Amended Eff. May 1, 1987;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1911 WAIVER OF ADMINISTRATIVE HEARING

A respondent waives his right to a hearing when he:

- (1) submits a written waiver to the Department or its delegates of his right to an administrative hearing
- (2) fails to request a hearing within 30 days of receipt of notice of penalty assessment as provided for in Rule .1909 of this Subchapter, or
- (3) fails to attend a scheduled administrative hearing.

History Note: Authority G.S. 130A-22(f);

Eff. September 1, 1979;

Amended Eff. May 1, 1987;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .1912 REFERRAL

If any administrative penalty as finally assessed is not paid within 60 days after receipt of notice of penalty assessment where no administrative hearing was requested or within 60 days after service of a written copy of the decision as provided for in G.S. 150B-36 where an administrative hearing was requested, the Secretary shall request the Attorney General to commence an action to recover the amount of the assessment.

*History Note: Authority G.S. 130A-22(f);
Eff. September 1, 1979;
Amended Eff. September 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .1913 RIGHT OF ENTRY AND INSPECTION

(a) Any supplier of water or other person subject to drinking water regulations shall, at any time, allow the Secretary, or a designated representative, upon presenting appropriate credentials and a written notice of inspection, to enter any establishment, facility or other property of such supplier or other person to determine whether such supplier or other person has acted or is acting in compliance with the requirements of the North Carolina Drinking Water Act (G.S. 130A- 311 through 130A-328) or the rules of 15A NCAC 18C. Such inspection may include inspection, at reasonable times, of records, files, papers, processes, controls and facilities, or testing of any feature of a public water system, including its raw water source.

(b) If entry is refused, then the Secretary or designated representative may obtain an administrative search warrant pursuant to the requirements of G.S. 15-27.2.

*History Note: Authority G.S. 130A-22(f);
Eff. December 19, 1979;
Amended Eff. October 1, 1984;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

SECTION .2000 - FILTRATION AND DISINFECTION**15A NCAC 18C .2001 GENERAL REQUIREMENTS**

The provisions of 40 C.F.R. 141.70 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.70;
Eff. January 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .2002 DISINFECTION

(a) The provisions of 40 C.F.R. 141.72 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter. These provisions are adopted with the following exceptions:

- (1) Water entering the distribution system. In 40 C.F.R. 141.72 (a)(2), (a)(3), and (b)(2), "0.2 mg/l" of residual disinfectant concentration shall be replaced with "0.2 mg/l measured as free chlorine when chlorine is the only applied disinfectant and 1.0 mg/l measured as total chlorine when ammonia and chlorine are applied disinfectants."
- (2) Water in the distribution system at coliform sampling sites. In 40 C.F.R. 141.72(a)(4) and (b)(3), "undetectable" shall be replaced with "less than 0.2 mg/l measured as free chlorine when chlorine is the only applied disinfectant and less than 1.0 mg/l measured as total chlorine when ammonia and chlorine are applied disinfectants."

(b) Water in the distribution system at maximum residence time sites. For samples collected at maximum residence time sites or at other locations with high water age as required by Rule .1302(a)(2) of this Subchapter, residual disinfectant concentrations shall be at detectable levels as set forth and calculated in 40 C.F.R. 141.72(a)(4) and (b)(3).

(c) All surface water treatment facilities shall include chemical disinfection for a minimum 0.5 log *Giardia* inactivation.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.72;
Eff. January 1, 1991;
Amended Eff. April 1, 2014; October 1, 2009;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .2003 FILTER BACKWASH RECYCLING RULE

(a) The requirements of this Rule shall apply to a public water system that uses a surface water source or a groundwater source under the direct influence of surface water. The provisions of 40 C.F.R. 141.73 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. Any dates set forth in the federal rule shall be applicable.

(b) The requirements of this Rule shall apply to a public water system that uses a surface water source or a groundwater source under the direct influence of surface water; uses direct or conventional filtration processes; and recycles spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes. The provisions of 40 C.F.R. 141.76 are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. Any dates set forth in the federal rule shall be applicable.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.73; 40 C.F.R. 141.76;
Eff. January 1, 1991;
Amended Eff. April 1, 2014; August 1, 2002;*

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .2004 ANALYTICAL AND MONITORING REQUIREMENTS

The provisions of 40 C.F.R. 141.74 are hereby adopted by reference in accordance with G.S. 150B-21.6 including subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. These provisions are adopted with the following exceptions:

- (1) The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in lieu of continuously monitoring, but for no more than five working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequency of every four hours that water is being treated.
- (2) In 40 C.F.R. 141.74, "0.2 mg/l" of residual disinfectant concentration shall be replaced with "0.2 mg/l measured as free chlorine when chlorine is the singular applied disinfectant and 1.0 mg/l measured as total chlorine when ammonia and chlorine are applied disinfectants."

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.74;
Eff. January 1, 1991;
Amended Eff. April 1, 2014; October 1, 2009;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .2005 CRITERIA FOR AVOIDING FILTRATION

The provisions of 40 C.F.R. 141.71 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.71;
Eff. January 1, 1991;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015;
Amended Eff. July 1, 2019.*

15A NCAC 18C .2006 REPORTING AND RECORD KEEPING REQUIREMENTS

The provisions of 40 C.F.R. 141.75 are hereby adopted by reference in accordance with G.S. 150B-21.6 including subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. These provisions are adopted with the following exception: In 40 C.F.R. 141.75, "0.2 mg/l" of residual disinfectant concentration shall be replaced with "0.2 mg/l measured as free chlorine when chlorine is the singular applied disinfectant and 1.0 mg/l measured as total chlorine when ammonia and chlorine are applied disinfectants."

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141.75;
Eff. January 1, 1991;
Amended Eff. April 1, 2014; October 1, 2009;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .2007 ENHANCED FILTRATION AND DISINFECTION

- (a) Public water systems shall respond to the Department in writing to significant deficiencies outlined in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.
- (b) Public water systems shall take necessary steps to address significant deficiencies identified in sanitary survey reports if such deficiencies are within the control of the public water system and its governing body.
- (c) Sanitary survey means an onsite review by the Department of the water source (identifying sources of

contamination using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water.

(d) Significant deficiency means a defect in a system's design, operation, or maintenance, as well as any failures or malfunctions of its treatment, storage, or distribution system, that is causing or has the potential to cause the introduction of contamination into water delivered to customers.

(e) When a public water system is required to conduct a comprehensive performance evaluation (CPE) pursuant to this Subchapter, the CPE shall include:

- (1) assessment of water treatment plant performance;
- (2) evaluation of major unit processes;
- (3) identification and prioritization of performance limiting factors;
- (4) assessment of the applicability of comprehensive technical assistance; and
- (5) a written CPE report.

The public water system shall participate in a comprehensive technical assistance (CTA) activity when the Department determines, based on the CPE results, there is a potential for improved water treatment performance and the public water system is able to receive and implement technical assistance.

During the CTA phase, the public water system shall use the CPE results to identify and systematically address factors limiting performance of its water treatment plant; further, the public water system shall implement process control priority-setting techniques, and maintain long-term involvement in training staff and administrators.

(f) The provisions of 40 C.F.R. 141, Subpart P - Enhanced Filtration and Disinfection - (Systems Serving 10,000 or More People), and Subpart T - Enhanced Filtration and Disinfection - (Systems Serving Fewer than 10,000 People) and the provisions of 40 C.F.R. 141, Subpart W- Enhanced Treatment for Cryptosporidium are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141 Eff. August 1, 2000; Amended Eff. April 1, 2014; October 1, 2009; November 1, 2005; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .2008 DISINFECTANTS AND DISINFECTION BYPRODUCTS

(a) The provisions of 40 C.F.R. 141.53 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(b) The provisions of 40 C.F.R. 141.54 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(c) The provisions of 40 C.F.R. 141.64 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(d) The provisions of 40 C.F.R. 141.65 are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

(e) The provisions of 40 C.F.R. 141, Subpart L- Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors, and the provisions of 40 C.F.R. 141, Subparts U-Initial Distribution System Evaluations and Subpart V - Stage 2 Disinfection Byproducts Requirements are incorporated by reference, including subsequent amendments and editions. Copies may be obtained as set forth in Rule .0102(b) of this Subchapter.

History Note: Authority G.S. 130A-313; 130A-315; P.L. 93-525; 40 C.F.R. 141; Eff. August 1, 2000; Amended Eff. April 1, 2014; October 1, 2009; August 1, 2002; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015; Amended Eff. July 1, 2019.

SECTION .2100 - OPERATING PERMITS**15A NCAC 18C .2101 PERMITS**

- (a) Operating permits are required for all community water systems as of January 1, 1992.
- (b) Permits shall be valid from January 1 through December 31 of each year.
- (c) Community water systems which are constructed or which begin operation after January 1, 1992 shall obtain a permit prior to providing water to any connections. The permit shall be effective on the date that water service to the first customer begins and shall be valid until December 31 of each year issued. The annual fee shall be prorated on a monthly basis for permits obtained after January 1 of each year.

*History Note: Authority G.S. 130A-328;
Temporary Adoption Eff. January 22, 1992 for a Period of 180 Days to Expire on July 19, 1992;
Eff. April 1, 1992;
Amended Eff. July 1, 1993;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .2102 APPLICATION FOR PERMIT

- (a) An application for the issuance or renewal of an operating permit for a community water system shall be made on forms provided by the Department. An application shall include the following information:
- (1) name and identification number of the community water system;
 - (2) name, address, and social security number or tax identification number of the supplier of water;
 - (3) name, address, and certification number of the certified operator in responsible charge of the community water system;
 - (4) name of each certified laboratory which provides analyses of water samples; and
 - (5) population served by the community water system.
- (b) The fee for issuance or renewal of an operating permit is set forth in G.S. 130A-328.
- (c) Payment shall be made by check, payable to the Department of Environment and Natural Resources and shall accompany the application.
- (d) Applications for operating permits shall not be processed prior to the receipt of the required fees.
- (e) An operating permit shall be renewed annually.
- (f) The supplier of water who holds a current operating permit shall inform the Department of any change of address or transfer of ownership within 30 days of the change.

*History Note: Authority G.S. 130A-328;
Temporary Adoption Eff. January 22, 1992 for a Period of 180 Days to Expire on July 19, 1992;
Eff. April 1, 1992;
Amended Eff. April 1, 2014; July 1, 1993;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .2104 RENEWAL FEES

Payment for permit renewal shall be due 60 days prior to the expiration of the prior year's permit. Failure to pay the fee by the permit expiration date shall result in assessment of an administrative penalty pursuant to G.S. 130A-22(b) equal to one-half of the fee set forth in G.S. 130A-328. Failure to pay the fee and the administrative penalty within 45 days after permit expiration shall result in an additional administrative penalty of ten dollars (\$10.00) per day for each day that the fee and the penalty are not paid.

*History Note: Authority G.S. 130A-328;
Temporary Adoption Eff. January 22, 1992 for a Period of 180 Days to Expire on July 19, 1992;
Eff. April 1, 1992;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

15A NCAC 18C .2105 REVOCATION

- (a) The Department may revoke or suspend an operating permit when it is found that a supplier of water has:
- (1) Failed to pay the annual fee;
 - (2) Failed to submit a complete permit application or provided fraudulent or misleading information in a permit application; or
 - (3) Failed to comply with rules governing community water systems set forth in 15A NCAC 18C.
- (b) Action to revoke or suspend an operating permit shall not preclude the Department from seeking other remedies authorized by Part 2, Article 1 of Chapter 130A of the General Statutes.

*History Note: Authority G.S. 130A-328;
Temporary Adoption Eff. January 22, 1992 for a Period of 180 Days to Expire on July 19, 1992;
Eff. April 1, 1992;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.*

SECTION .2200 - GROUND WATER SYSTEMS**15 A NCAC 18C .2201 APPLICABILITY AND RESIDUAL DISINFECTANT CONCENTRATIONS**

(a) Applicability. The provisions of this Section apply to all ground water systems. A ground water system is defined as any public water system that uses ground water including a consecutive system receiving finished ground water. A ground water system does not include public water systems that combine all of their ground water with surface water or with ground water under the direct influence of surface water prior to treatment under Subpart H.

(b) Disinfection. Systems providing chemical disinfection in accordance with 15A NCAC 18C .0402(j) shall measure residual disinfectant concentrations. The locations and concentrations shall be as follows:

- (1) Water entering the distribution system. The residual disinfectant concentration shall not be less than 0.2 mg/l measured as free chlorine when chlorine is the singular applied disinfectant and shall not be less than 1.0 mg/l measured as total chlorine when ammonia and chlorine are applied disinfectants for more than two consecutive daily visits for systems that are collecting grab samples and not more than four hours for systems that perform continuous monitoring.
- (2) Water in the distribution system at Coliform Sampling Sites. The residual disinfectant concentration shall not be less than 0.2 mg/l measured as free chlorine when chlorine is the singular applied disinfectant and shall not be less than 1.0 mg/l measured as total chlorine when ammonia and chlorine are applied disinfectants.
- (3) Water in the distribution system at Maximum Residence Time Sites. Systems shall measure residual disinfectant concentrations at maximum residence time sites or at other locations with high water age. The residual disinfectant concentrations at these locations shall be at detectable levels as set forth and calculated in 40 C.F.R. 141.72(a)(4) and (b)(3).

History Note: Authority G.S. 130A-315; P.L. 93-523;

Eff. October 1, 2009;

Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015.

15A NCAC 18C .2202 GROUND WATER RULE

The provisions of 40 C.F.R. 141, Subpart S – Ground Water Rule are hereby incorporated by reference including any subsequent amendments and editions. Copies are available for public inspection as set forth in Rule .0102 of this Subchapter. The provisions are incorporated with the following exceptions:

- (1) Fecal indicator for source water monitoring. When systems are required to conduct triggered source water monitoring or assessment source water monitoring under 40 C.F.R. 141.402 (a) and (b) respectively, any of the following three fecal indicators can be used: E. coli, enterococci, or coliphage.
- (2) Corrective Action Alternatives. Ground water systems that are required to implement corrective action in accordance with 40 C.F.R. 141.403(a)(6) must determine that alternatives (a)(6)(i), (a)(6)(ii), and (a)(6)(iii) are not feasible before implementing alternative (a)(6)(iv). The rationale for selection of alternative (a)(6)(iv) must be documented in accordance with Rule .0307(b)(10) of this Subchapter.
- (3) Assessment Source Water Monitoring. The Department shall use information from the Public Water Supply Section's database and from its Source Water Assessment Program to identify sources subject to assessment source water monitoring. Systems notified by the Department must commence assessment source water monitoring for the sources identified. The system shall conduct assessment source water monitoring for any source that receives physical or chemical treatment and possesses any one of the following characteristics:
 - (a) Any source subject to the requirements of G.S. 130A-317(b) and rules in this Subchapter for which the public water system did not receive approval from the Department for construction or alteration.
 - (b) Source is deemed by the Source Water Assessment Program to have a Higher Inherent Vulnerability Rating and the system has historical total or fecal coliform MCL violations during the compliance periods between January 1, 2005 and December 31, 2008.

- (c) Source is deemed by the Source Water Assessment Program to have a Higher Inherent Vulnerability Rating and the system has total or fecal coliform monitoring violations cited for more than 25 percent of the compliance periods between January 1, 2005 and December 31, 2008.
- (4) Any system shall perform assessment source water monitoring as directed by the Department in response to deficiencies identified by a sanitary survey that are related to source or treatment. Assessment source water monitoring shall be conducted in accordance with the requirements specified in 40 C.F.R. 141.402(b)(1) through (6) using any of the following three fecal indicators: E. coli, enterococci, or coliphage.

History Note: Authority G.S. 130A-315; 130A-317; P.L. 93-523; 40 C.F.R. 141 Subpart S; Eff. October 1, 2009; Amended Eff. April 1, 2014; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. November 23, 2015

TITLE 40: PROTECTION OF THE ENVIRONMENT
FEDERAL REGULATIONS PERTAINING TO HEALTH OF THE ENVIORNMENT
DRINKING WATER REGULATIONS

Title 40: Protection of Environment

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

Updated February 1, 2020

AUTHORITY: 42 U.S.C. 300f, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-4, 300j-9, and 300j-11.

SOURCE: 40 FR 59570, Dec. 24, 1975, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes to part 141 appear at 69 FR 18803, Apr. 9, 2004.

NOTE: For community water systems serving 75,000 or more persons, monitoring must begin 1 year following promulgation and the effective date of the MCL is 2 years following promulgation. For community water systems serving 10,000 to 75,000 persons, monitoring must begin within 3 years from the date of promulgation and the effective date of the MCL is 4 years from the date of promulgation. Effective immediately, systems that plan to make significant modifications to their treatment processes for the purpose of complying with the TTHM MCL are required to seek and obtain State approval of their treatment modification plans. This note affects §§141.2, 141.6, 141.12, 141.24 and 141.30. For additional information see 44 FR 68641, Nov. 29, 1979

Subpart A—General

§141.2 Definitions.

As used in this part, the term:

Act means the Public Health Service Act, as amended by the Safe Drinking Water Act, Public Law 93-523.

Action level, is the concentration of lead or copper in water specified in §141.80(c) which determines, in some cases, the treatment requirements contained in subpart I of this part that a water system is required to complete.

Bag filters are 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 outside.

Bank filtration is a water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water 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).

Best available technology or **BAT** means the best technology, treatment techniques, or other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration). For the purposes of setting MCLs for synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

Compliance period means a three-year calendar year period within a compliance cycle. Each compliance cycle has three three-year compliance periods. Within the first compliance cycle, the first compliance period runs from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; the third from January 1, 1999 to December 31, 2001.

Comprehensive performance evaluation (CPE) is a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's capability to achieve compliance and emphasizes approaches that can

be implemented without significant capital improvements. For purpose of compliance with subparts P and T of this part, the comprehensive performance evaluation must consist of at least the following components: Assessment of plant performance; evaluation of major unit processes; identification and prioritization of performance limiting factors; assessment of the applicability of comprehensive technical assistance; and preparation of a CPE report.

Confluent growth means a continuous bacterial growth covering the entire filtration area of a membrane filter, or a portion thereof, in which bacterial colonies are not discrete.

Consecutive system is a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

Contaminant means any physical, chemical, biological, or radiological substance or matter in water.

Conventional filtration treatment means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial particulate removal.

Corrosion inhibitor means a substance capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.

CT or C_Tcalc is the product of “residual disinfectant concentration” (C) in mg/1 determined before or at the first customer, and the corresponding “disinfectant contact time” (T) in minutes, *i.e.*, “C” × “T”. If a public water system applies disinfectants at more than one point prior to the first customer, it must determine the CT of each disinfectant sequence before or at the first customer to determine the total percent inactivation or “total inactivation ratio.” In determining the total inactivation ratio, the public water system must determine the residual disinfectant concentration of each disinfection sequence and corresponding contact time before any subsequent disinfection application point(s). “CT_{99.9}” is the CT value required for 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts. CT_{99.9} for a variety of disinfectants and conditions appear in tables 1.1-1.6, 2.1, and 3.1 of §141.74(b)(3).

$$\frac{CT_{calc}}{CT_{99.9}}$$

is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as

$$\sum \frac{(CT_{calc})}{(CT_{99.9})}$$

is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3-log inactivation of *Giardia lamblia* cysts.

Diatomaceous earth filtration means a process resulting in substantial particulate removal in which (1) a precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum), and (2) while the water is filtered by passing through the cake on the septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake.

Direct filtration means a series of processes including coagulation and filtration but excluding sedimentation resulting in substantial particulate removal.

Disinfectant means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

Disinfectant contact time (“T” in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration (“C”) is measured. Where only one “C” is measured, “T” is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or at where residual disinfectant concentration (“C”) is measured. Where more than one “C” is measured, “T” is (a) for the first measurement of “C”, the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first “C” is measured and (b) for subsequent measurements of “C”, the time in minutes that it takes for water to move from the previous “C” measurement point to the “C” measurement point for which the particular “T” is being calculated. Disinfectant contact time in pipelines must be calculated based on “plug flow” by dividing the internal volume of the pipe by the maximum hourly flow rate through that pipe. Disinfectant contact time within mixing basins and storage reservoirs must be determined by tracer studies or an equivalent demonstration.

Disinfection means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

Disinfection profile is a summary of *Giardia lamblia* inactivation through the treatment plant. The procedure for developing a disinfection profile is contained in §141.172 (Disinfection profiling and benchmarking) in subpart P and §§141.530-141.536 (Disinfection profile) in subpart T of this part.

Domestic or other non-distribution system plumbing problem means a coliform contamination problem in a public water system with more than one service connection that is limited to the specific service connection from which the coliform-positive sample was taken.

Dose equivalent means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

Dual sample set is a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purposes of conducting an IDSE under subpart U of this part and determining compliance with the TTHM and HAA5 MCLs under subpart V of this part.

Effective corrosion inhibitor residual, for the purpose of subpart I of this part only, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

Enhanced coagulation means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

Enhanced softening means the improved removal of disinfection byproduct precursors by precipitative softening.

Filter profile is a graphical representation of individual filter performance, based on continuous turbidity measurements or total particle counts versus time for an entire filter run, from startup to backwash inclusively, that includes an assessment of filter performance while another filter is being backwashed.

Filtration means a process for removing particulate matter from water by passage through porous media.

Finished water is 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 control chemicals).

First draw sample means a one-liter sample of tap water, collected in accordance with §141.86(b)(2), that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.

Flocculation means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

Flowing stream is a course of running water flowing in a definite channel.

GAC10 means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with subpart V MCLs under §141.64(b)(2) shall be 120 days.

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.

Ground water under the direct influence of surface water (GWUDI) means any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the State. The State determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation.

Gross alpha particle activity means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

Gross beta particle activity means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

Haloacetic acids (five) (HAA5) mean the sum of the concentrations in milligrams per liter of the Haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

Halogen means one of the chemical elements chlorine, bromine or iodine.

Initial compliance period means the first full three-year compliance period which begins at least 18 months after promulgation, except for contaminants listed at §141.61(a) (19)-(21), (c) (19)-(33), and §141.62(b) (11)-(15), initial compliance period means the first full three-year compliance period after promulgation for systems with 150 or more service connections (January 1993-December 1995), and first full three-year compliance period after the effective date of the regulation (January 1996-December 1998) for systems having fewer than 150 service connections.

Lake/reservoir refers to 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.

Large water system, for the purpose of subpart I of this part only, means a water system that serves more than 50,000 persons.

Lead service line means a service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line.

Legionella means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

Level 1 assessment is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. It is conducted by the system operator or owner. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage);

source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

Level 2 assessment is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. A Level 2 assessment provides a more detailed examination of the system (including the system's monitoring and operational practices) than does a Level 1 assessment through the use of more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. It is conducted by an individual approved by the State, which may include the system operator. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system. The system must comply with any expedited actions or additional actions required by the State in the case of an *E. coli* MCL violation.

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

Man-made beta particle and photon emitters means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

Maximum contaminant level means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

Maximum contaminant level goal or MCLG means the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are non-enforceable health goals.

Maximum residual disinfectant level (MRDL) means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a PWS is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels under Section 1412 of the Safe Drinking Water Act. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in §141.65, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Maximum residual disinfectant level goal (MRDLG) means the maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLGs are non-enforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

Maximum Total Trihalomethane Potential (MTP) means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25 °C or above.

Medium-size water system, for the purpose of subpart I of this part only, means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

Membrane filtration is 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.

Near the first service connection means at one of the 20 percent of all service connections in the entire system that are nearest the water supply treatment facility, as measured by water transport time within the distribution system.

Non-community water system means a public water system that is not a community water system. A non-community water system is either a “transient non-community water system (TWS)” or a “non-transient non-community water system (NTNCWS).”

Non-transient non-community water system or NTNCWS means a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year.

Optimal corrosion control treatment, for the purpose of subpart I of this part only, means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations.

Performance evaluation sample means a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance specified by the Agency. The true value of the concentration of the reference material is unknown to the laboratory at the time of the analysis.

Person means an individual; corporation; company; association; partnership; municipality; or State, Federal, or tribal agency.

Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.

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

Point of disinfectant application is the point where the disinfectant is applied and water downstream of that point is not subject to recontamination by surface water runoff.

Point-of-entry treatment device (POE) is a treatment device applied to the drinking water entering a house or building for the purpose of reducing contaminants in the drinking water distributed throughout the house or building.

Point-of-use treatment device (POU) is a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap.

Presedimentation is 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.

Public water system means a system for the provision to the public of water for human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term

includes: any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Such term does not include any “special irrigation district.” A public water system is either a “community water system” or a “non-community water system.”

Rem means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A “millirem (mrem)” is $\frac{1}{1000}$ of a rem.

Repeat compliance period means any subsequent compliance period after the initial compliance period.

Residual disinfectant concentration (“C” in CT calculations) means the concentration of disinfectant measured in mg/l in a representative sample of water.

Sanitary defect is a defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place.

Sanitary survey means an onsite review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

Seasonal system is a non-community water system that is not operated as a public water system on a year-round basis and starts up and shuts down at the beginning and end of each operating season.

Sedimentation means a process for removal of solids before filtration by gravity or separation.

Service connection, as used in the definition of *public water system*, does not include a connection to a system that delivers water by a constructed conveyance other than a pipe if:

- 1) The water is used exclusively for purposes other than residential uses (consisting of drinking, bathing, and cooking, or other similar uses);
- 2) The State determines that alternative water to achieve the equivalent level of public health protection provided by the applicable national primary drinking water regulation is provided for residential or similar uses for drinking and cooking; or
- 3) The State determines that the water provided for residential or similar uses for drinking, cooking, and bathing is centrally treated or treated at the point of entry by the provider, a pass-through entity, or the user to achieve the equivalent level of protection provided by the applicable national primary drinking water regulations.

Service line sample means a one-liter sample of water collected in accordance with §141.86(b)(3), that has been standing for at least 6 hours in a service line.

Single family structure, for the purpose of subpart I of this part only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

Slow sand filtration means a process involving passage of raw water through a bed of sand at low velocity (generally less than 0.4 m/h) resulting in substantial particulate removal by physical and biological mechanisms.

Small water system, for the purpose of subpart I of this part only, means a water system that serves 3,300 persons or fewer.

Special irrigation district means an irrigation district in existence prior to May 18, 1994 that provides primarily agricultural service through a piped water system with only incidental residential or similar use where the system or the residential or similar users of the system comply with the exclusion provisions in section 1401(4)(B)(i)(II) or (III).

Standard sample means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

State means the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State or Tribal government does not have primary enforcement responsibility pursuant to section 1413 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

Subpart H systems means public water systems using surface water or ground water under the direct influence of surface water as a source that are subject to the requirements of subpart H of this part.

Supplier of water means any person who owns or operates a public water system.

Surface water means all water which is open to the atmosphere and subject to surface runoff.

SUVA means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV_{254}) (in m^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/L).

System with a single service connection means a system which supplies drinking water to consumers via a single service line.

Too numerous to count means that the total number of bacterial colonies exceeds 200 on a 47-mm diameter membrane filter used for coliform detection.

Total Organic Carbon (TOC) means total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

Total trihalomethanes (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

Transient non-community water system or **TWS** means a non-community water system that does not regularly serve at least 25 of the same persons over six months per year.

Trihalomethane (THM) means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

Two-stage lime softening is 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 is 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.

Virus means a virus of fecal origin which is infectious to humans by waterborne transmission.

Waterborne disease outbreak means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the appropriate local or State agency.

Wholesale system is 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.

[40 FR 59570, Dec. 24, 1975]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.2, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov. https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=b9ae94054a844085db5d036aaca4b2b&mc=true&n=pt40.25.141&r=PART&ty=HTML#se40.25.141_11

§141.4 Variances and exemptions.

- (a) Variances or exemptions from certain provisions of these regulations may be granted pursuant to sections 1415 and 1416 of the Act and subpart K of part 142 of this chapter (for small system variances) by the entity with primary enforcement responsibility, except that variances or exemptions from the MCLs for total coliforms and *E. coli* and variances from any of the treatment technique requirements of subpart H of this part may not be granted.
- (b) EPA has stayed the effective date of this section relating to the total coliform MCL of §141.63(a) for systems that demonstrate to the State that the violation of the total coliform MCL is due to a persistent growth of total coliforms in the distribution system rather than fecal or pathogenic contamination, a treatment lapse or deficiency, or a problem in the operation or maintenance of the distribution system. This is stayed until March 31, 2016, at which time the total coliform MCL is no longer effective.

NOTE TO PARAGRAPH (a): As provided in §142.304(a), small system variances are not available for rules addressing microbial contaminants, which would include subparts H, P, S, T, W, and Y of this part.

[78 FR 10346, Feb. 13, 2013]

Subpart B – Maximum Contaminant Levels

§141.11 Maximum contaminant levels for inorganic chemicals.

- (a) The maximum contaminant level for arsenic applies only to community water systems. The analyses and determination of compliance with the 0.05 milligrams per liter maximum contaminant level for arsenic use the requirements of §141.23.
- (b) The maximum contaminant level for arsenic is 0.05 milligrams per liter for community water systems until January 23, 2006.
- (c) [Reserved]
- (d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:
 - (1) Such water will not be available to children under 6 months of age; and
 - (2) The non-community water system is meeting the public notification requirements under §141.209, including continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and
 - (3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and
 - (4) No adverse health effects shall result.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 56 FR 3578, Jan. 30, 1991; 56 FR 26548, June 7, 1991; 56 FR 30274, July 1, 1991; 56 FR 32113, July 15, 1991; 60 FR 33932, June 29, 1995; 65 FR 26022, May 4, 2000; 66 FR 7061, Jan. 22, 2001]

§141.13 Maximum contaminant levels for turbidity.

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

- (a) One turbidity unit (TU), as determined by a monthly average pursuant to §141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:
 - (1) Interfere with disinfection;

- (2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or
 - (3) Interfere with microbiological determinations.
- (b) Five turbidity units based on an average for two consecutive days pursuant to §141.22.

[40 FR 59570, Dec. 24, 1975]

EDITORIAL NOTE: At 54 FR 27527, June 29, 1989, §141.13 was amended by adding introductory text; however, the amendment could not be incorporated because introductory text already exists.

Subpart C—Monitoring and Analytical Requirements

§141.21 Coliform sampling.

(a) *Routine monitoring.*

- (1) Public water systems must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. These plans are subject to State review and revision.
- (2) The monitoring frequency for total coliforms for community water systems is based on the population served by the system, as follows:

Total Coliform Monitoring Frequency for Community Water Systems

POPULATION SERVED	MINIMUM NUMBER OF SAMPLES PER MONTH
25 to 1,000 ¹	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90

96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

¹Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

If a community water system serving 25 to 1,000 persons has no history of total coliform contamination in its current configuration and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and is free of sanitary defects, the State may reduce the monitoring frequency specified above, except that in no case may the State reduce the monitoring frequency to less than one sample per quarter. The State must approve the reduced monitoring frequency in writing.

- (3)** The monitoring frequency for total coliforms for non-community water systems is as follows:
 - (i)** A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public, except that the State may reduce this monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. Beginning June 29, 1994, the State cannot reduce the monitoring frequency for a non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 persons or fewer to less than once/year.
 - (ii)** A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, except the State may reduce this monitoring frequency, in writing, for any month the system serves 1,000 persons or fewer. The State cannot reduce the monitoring frequency to less than once/year. For systems using ground water under the direct influence of surface water, paragraph (a)(3)(iv) of this section applies.
 - (iii)** A non-community water system using surface water, in total or in part, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, regardless of the number of persons it serves.
 - (iv)** A non-community water system using ground water under the direct influence of surface water, as defined in §141.2, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section. The system must begin

monitoring at this frequency beginning six months after the State determines that the ground water is under the direct influence of surface water.

- (4) The public water system must collect samples at regular time intervals throughout the month, except that a system which uses only ground water (except ground water under the direct influence of surface water, as defined in §141.2), and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.
 - (5) A public water system that uses surface water or ground water under the direct influence of surface water, as defined in §141.2, and does not practice filtration in compliance with Subpart H must collect at least one sample near the first service connection each day the turbidity level of the source water, measured as specified in §141.74(b)(2), exceeds 1 NTU. This sample must be analyzed for the presence of total coliforms. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection. Sample results from this coliform monitoring must be included in determining compliance with the MCL for total coliforms in §141.63.
 - (6) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the MCL for total coliforms in §141.63. Repeat samples taken pursuant to paragraph (b) of this section are not considered special purpose samples, and must be used to determine compliance with the MCL for total coliforms in §141.63.
- (b) **Repeat monitoring.** (1) If a routine sample is total coliform-positive, the public water system must collect a set of repeat samples within 24 hours of being notified of the positive result. A system which collects more than one routine sample/month must collect no fewer than three repeat samples for each total coliform-positive sample found. A system which collects one routine sample/month or fewer must collect no fewer than four repeat samples for each total coliform-positive sample found. The State may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. In the case of an extension, the State must specify how much time the system has to collect the repeat samples.
- (2) The system must collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the State may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.
 - (3) The system must collect all repeat samples on the same day, except that the State may allow a system with a single service connection to collect the required set of repeat samples over a four-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one routine sample/month).
 - (4) If one or more repeat samples in the set is total coliform-positive, the public water system must collect an additional set of repeat samples in the manner specified in paragraphs (b) (1) - (3) of this section. The additional samples must be collected within 24 hours of being notified of the positive result, unless the State extends the limit as provided in paragraph (b)(1) of this section. The system must repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in §141.63 has been exceeded and notifies the State.
 - (5) If a system collecting fewer than five routine samples/month has one or more total coliform-positive samples and the State does not invalidate the sample(s) under paragraph (c) of this section, it must collect at least five routine samples during the next month the system provides water to the public, except that the State may waive this requirement if the conditions of paragraph (b)(5) (i) or (ii) of this section are met. The State cannot waive the requirement for a system to collect repeat samples in paragraphs (b) (1) - (4) of this section.
 - (i) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State, or an agent approved by the State, performs a site visit

before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

- (ii) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State has determined why the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem. The State cannot waive the requirement to collect five routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. Under this paragraph, a system must still take at least one routine sample before the end of the next month it serves water to the public and use it to determine compliance with the MCL for total coliforms in §141.63, unless the State has determined that the system has corrected the contamination problem before the system took the set of repeat samples required in paragraphs (b) (1) - (4) of this section, and all repeat samples were total coliform-negative.
- (6) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.
- (7) Results of all routine and repeat samples not invalidated by the State must be included in determining compliance with the MCL for total coliforms in §141.63.
- (c) **Invalidation of total coliform samples.** A total coliform-positive sample invalidated under this paragraph (c) does not count towards meeting the minimum monitoring requirements of this section.
 - (1) The State may invalidate a total coliform-positive sample only if the conditions of paragraph (c)(1) (i), (ii), or (iii) of this section are met.
 - (i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.
 - (ii) The State, on the basis of the results of repeat samples collected as required by paragraphs (b) (1) through (4) of this section, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The State cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., a State cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the public water system has only one service connection).
 - (iii) The State has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under paragraphs (b) (1) - (4) of this section, and use them to determine compliance with the MCL for total coliforms in §141.63. To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision must be documented in writing, and approved and signed by the supervisor of the State official who recommended the decision. The State must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

- (2) A laboratory must invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the Multiple-Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence (P-A) Coliform Test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system must continue to re-sample within 24 hours and have the samples analyzed until it obtains a valid result. The State may waive the 24-hour time limit on a case-by-case basis.

(d) **Sanitary surveys.**

- (1)
- (i) Public water systems which do not collect five or more routine samples/month must undergo an initial sanitary survey by June 29, 1994, for community public water systems and June 29, 1999, for non-community water systems. Thereafter, systems must undergo another sanitary survey every five years, except that non-community water systems using only protected and disinfected ground water, as defined by the State, must undergo subsequent sanitary surveys at least every ten years after the initial sanitary survey. The State must review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the system needs to undertake to improve drinking water quality.
 - (ii) In conducting a sanitary survey of a system using ground water in a State having an EPA-approved wellhead protection program under section 1428 of the Safe Drinking Water Act, information on sources of contamination within the delineated wellhead protection area that was collected in the course of developing and implementing the program should be considered instead of collecting new information, if the information was collected since the last time the system was subject to a sanitary survey.
- (1) Sanitary surveys must be performed by the State or an agent approved by the State. The system is responsible for ensuring the survey takes place.
- (2) Sanitary surveys conducted by the State under the provisions of §142.16(o)(2) of this chapter may be used to meet the sanitary survey requirements of this section.

(e) **Fecal coliforms/*Escherichia coli* (*E. coli*) testing.**

- (1) If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for *E. coli* in lieu of fecal coliforms. If fecal coliforms or *E. coli* are present, the system must notify the State by the end of the day when the system is notified of the test result, unless the system is notified of the result after the State office is closed, in which case the system must notify the State before the end of the next business day.
- (2) The State has the discretion to allow a public water system, on a case-by-case basis, to forgo fecal coliform or *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. coli*-positive. Accordingly, the system must notify the State as specified in paragraph (e)(1) of this section and the provisions of §141.63(b) apply.

(f) **Analytical methodology.**

- (1) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.
- (2) Public water systems need only determine the presence or absence of total coliforms; a determination of total coliform density is not required.
- (3) Public water systems must conduct total coliform analyses in accordance with one of the analytical methods in the following table or one of the alternative methods listed in appendix A to subpart C of this part.

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-ColiBlue24 [®] 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, 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., EPA West, Room B102, Washington DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

¹Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used. In addition, the following online versions may also be used: 9221 A, B, D-99, 9222 A, B, C-97, and 9223 B-97. Standard Methods Online are available at <http://www.standardmethods.org>. 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 may be used.

²The time from sample collection to initiation of analysis may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 deg. C during transit.

³Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform, using lactose broth, is less than 10 percent.

⁴If inverted tubes are used to detect gas production, the media should cover these tubes at least one-half to two-thirds after the sample is added.

⁵No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.

⁶MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., *et. al.*, 1993, Appl. Environ. Microbiol. 59:3534-3544. Also available from the Office of Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460, EPA/600/J-99/225. Verification of colonies is not required.

⁷Six-times formulation strength may be used if the medium is filter-sterilized rather than autoclaved.

⁸The ONPG-MUG Test is also known as the Autoanalysis Collect System.

⁹A description of the Colisure Test, Feb 28, 1994, may be obtained from IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. The Colisure Test may be read after an incubation time of 24 hours.

¹⁰A description of the E*Colite[®] Test, "Presence/Absence for Coliforms and *E. Coli* in Water," Dec 21, 1997, is available from Charm Sciences, Inc., 36 Franklin Street, Malden, MA 02148-4120.

¹¹A description of the m-ColiBlue24[®] Test, Aug 17, 1999, is available from the Hach Company, 100 Dayton Avenue, Ames, IA 50010.

¹²EPA strongly recommends that laboratories evaluate the false-positive and negative rates for the method(s) they use for monitoring total coliforms. EPA also encourages laboratories to establish false-positive and false-negative rates within their own laboratory and sample matrix (drinking water or source water) with the intent that if the method they choose has an unacceptable false-positive or negative rate, another method can be used. The Agency suggests that laboratories perform these studies on a minimum of 5% of all total coliform-positive samples, except for those methods where verification/confirmation is already required, e.g., the M-Endo and LES Endo Membrane Filter Tests, Standard Total Coliform Fermentation Technique, and Presence-Absence Coliform Test. Methods for establishing false-positive and negative-rates may be based on lactose fermentation, the rapid test for β -galactosidase and cytochrome oxidase, multi-test identification systems, or equivalent confirmation tests. False-positive and false-negative information is often available in published studies and/or from the manufacturer(s).

¹³The ReadyCult[®] Coliforms 100 Presence/Absence Test is described in the document, "ReadyCult[®] Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichla coli* in Finished Waters", November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGgA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone number is (800) 222-0342, e-mail address is: adellenbusch@emscience.com.

¹⁴Membrane Filter Technique using Chromocult[®] Coliform Agar is described in the document, "Chromocult[®] Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichla coli* in Finished Waters", November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGgA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone number is (800) 222-0342, e-mail address is: adellenbusch@emscience.com.

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, Fax (707) 545-7901, Internet address <http://www.cpiinternational.com>.

(4) [Reserved]

(5) Public water systems must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique or Presence-Absence (PA) Coliform Test is used to test for total coliforms, shake the lactose-positive presumptive tube or P-A vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator stick into brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliforms, respectively. For EPA-approved analytical methods which use a membrane filter, transfer the total coliform-positive culture by one of the following methods: remove the membrane containing the total coliform colonies from the substrate with a sterile forceps and carefully curl and insert the membrane into a tube of EC medium (the laboratory may first remove a small portion of selected colonies for verification), swab the entire membrane filter surface with a sterile cotton swab and transfer the inoculum to EC medium (do not leave the cotton swab in the EC medium), or inoculate individual total coliform-positive colonies into EC Medium. Gently shake the inoculated tubes of EC medium to insure adequate mixing and incubate in a waterbath at 44.5 ± 0.2 °C for 24 ± 2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test. The preparation of EC medium is described in Method 9221E (paragraph 1a) in Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), and 20th edition (1998); the cited method in any one of these three editions may be used. Public water systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required.

(6) Public water systems must conduct analysis of *Escherichia coli* in accordance with one of the following analytical methods or one of the alternative methods listed in appendix A to subpart C of this part.

(i) EC medium supplemented with 50 $\mu\text{g/mL}$ of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 mL of EC medium, as described in paragraph (f)(5) of this section, is supplemented with 50 $\mu\text{g/mL}$ of MUG before

autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in paragraph (f)(5) of this section for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at 44.5 ± 0.2 °C for 24 ± 2 hours, and then observe fluorescence with an ultraviolet light (366 nm) in the dark. If fluorescence is visible, *E. coli* are present.

- (ii) Nutrient agar supplemented with 100 µg/mL of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used for determining if a total coliform-positive sample, as determined by a membrane filter technique, contains *E. coli*. Alternatively, the 18th edition (1992) may be used if the membrane filter containing a total coliform-positive colony(ies) is transferred to nutrient agar, as described in Method 9221B (paragraph 3) of Standard Methods (18th edition), supplemented with 100 µg/mL of MUG. If the 18th edition is used, incubate the agar plate at 35 °C for 4 hours and then observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, *E. coli* are present.
 - (iii) Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article “National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with Presence-Absence Techniques” (Edberg et al.), Applied and Environmental Microbiology, Volume 55, pp. 1003-1008, April 1989. (Note: The Autoanalysis Colilert System is an MMO-MUG test). If the MMO-MUG test is total coliform-positive after a 24-hour incubation, test the medium for fluorescence with a 366-nm ultraviolet light (preferably with a 6-watt lamp) in the dark. If fluorescence is observed, the sample is *E. coli*-positive. If fluorescence is questionable (cannot be definitively read) after 24 hours’ incubation, incubate the culture for an additional four hours (but not to exceed 28 hours total), and again test the medium for fluorescence. The MMO-MUG Test with hepes buffer in lieu of phosphate buffer is the only approved formulation for the detection of *E. coli*.
 - (iv) *The Colisure Test*. A description of the Colisure Test may be obtained from the Millipore Corporation, Technical Services Department, 80 Ashby Road, Bedford, MA 01730.
 - (v) The membrane filter method with MI agar, a description of which is cited in footnote 6 to the table in paragraph (f)(3) of this section.
 - (vi) E*Colite[®] Test, a description of which is cited in footnote 10 to the table at paragraph (f)(3) of this section.
 - (vii) m-ColiBlue24[®] Test, a description of which is cited in footnote 11 to the table in paragraph (f)(3) of this section.
 - (viii) ReadyCult[®] Coliforms 100 Presence/Absence Test, a description of which is cited in footnote 13 to the table at paragraph (f)(3) of this section.
 - (ix) Membrane Filter Technique using Chromocult[®] Coliform Agar, a description of which is cited in footnote 14 to the table at paragraph (f)(3) of this section.
 - (x) Colitag[®], a description of which is cited in footnote 15 to the table at paragraph (f)(3) of this section.
- (7) As an option to paragraph (f)(6)(iii) of this section, a system with a total coliform-positive, MUG-negative, MMO-MUG test may further analyze the culture for the presence of *E. coli* by transferring a 0.1 ml, 28-hour MMO-MUG culture to EC Medium + MUG with a pipet. The formulation and incubation conditions of EC Medium + MUG, and observation of the results are described in paragraph (f)(6)(i) of this section.
- (8) The following materials are incorporated by reference in this section with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the analytical methods cited in Standard Methods for the Examination of Water and Wastewater (18th, 19th, and 20th editions) may be obtained from the American Public Health Association *et al.*; 1015 Fifteenth Street, NW., Washington, DC 20005-2605. Copies of the MMO-MUG Test, as set forth in the article “National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method” (Edberg *et al.*) may be obtained from the American Water Works Association

Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. Copies of the MMO-MUG Test as set forth in the article “National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method” (Edberg *et al.*) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. A description of the Colisure Test may be obtained from the Millipore Corp., Technical Services Department, 80 Ashby Road, Bedford, MA 01730. Copies may be inspected at EPA's Drinking Water Docket; 401 M St., SW.; Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(g) Response to violation.

- (1)** A public water system which has exceeded the MCL for total coliforms in §141.63 must report the violation to the State no later than the end of the next business day after it learns of the violation, and notify the public in accordance with subpart Q.
- (2)** A public water system which has failed to comply with a coliform monitoring requirement, including the sanitary survey requirement, must report the monitoring violation to the State within ten days after the system discovers the violation, and notify the public in accordance with subpart Q.

(h) The provisions of paragraphs (a) and (d) of this section are applicable until March 31, 2016. The provisions of paragraphs (b), (c), (e), (f), and (g) of this section are applicable until all required repeat monitoring under paragraph (b) of this section and fecal coliform or *E. coli* testing under paragraph (e) of this section that was initiated by a total coliform-positive sample taken before April 1, 2016 is completed, as well as analytical method, reporting, recordkeeping, public notification, and consumer confidence report requirements associated with that monitoring and testing. Beginning April 1, 2016, the provisions of subpart Y of this part are applicable, with systems required to begin regular monitoring at the same frequency as the system-specific frequency required on March 31, 2016.

[54 FR 27562, June 29, 1989]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.21, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

§141.22 Turbidity sampling and analytical requirements.

The requirements in this section apply to unfiltered systems until December 30, 1991, unless the State has determined prior to that date, in writing pursuant to section 1412(b)(7)(iii), that filtration is required. The requirements in this section apply to filtered systems until June 29, 1993. The requirements in this section apply to unfiltered systems that the State has determined, in writing pursuant to section 1412(b)(7)(C)(iii), must install filtration, until June 29, 1993, or until filtration is installed, whichever is later.

- (a)** Samples shall be taken by suppliers of water for both community and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purposes of making turbidity measurements to determine compliance with §141.13. If the State determines that a reduced sampling frequency in a non-community will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain an active residual disinfectant in the distribution system, and in those cases where the State has indicated in writing that no unreasonable risk to health existed under the circumstances of this option. Turbidity measurements shall be made as directed in §141.74(a)(1).
- (b)** If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the State within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the State and notify the public as directed in §141.31 and subpart Q.
- (c)** Sampling for non-community water systems shall begin within two years after the effective date of this part.

- (d) The requirements of this §141.22 shall apply only to public water systems which use water obtained in whole or in part from surface sources.
- (e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57344, Aug. 27, 1980; 47 FR 8998, Mar. 3, 1982; 47 FR 10998, Mar. 12, 1982; 54 FR 27527, June 29, 1989; 59 FR 62466, Dec. 5, 1994; 65 FR 26022, May 4, 2000]

§141.23 Inorganic chemical sampling and analytical requirements.

Community water systems shall conduct monitoring to determine compliance with the maximum contaminant levels specified in §141.62 in accordance with this section. Non-transient, non-community water systems shall conduct monitoring to determine compliance with the maximum contaminant levels specified in §141.62 in accordance with this section. Transient, non-community water systems shall conduct monitoring to determine compliance with the nitrate and nitrite maximum contaminant levels in §§141.11 and 141.62 (as appropriate) in accordance with this section.

(a) Monitoring shall be conducted as follows:

- (1) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point) beginning in the initial compliance period. The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
- (2) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point) beginning in the initial compliance period. The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

NOTE: FOR PURPOSES OF THIS PARAGRAPH, SURFACE WATER SYSTEMS INCLUDE SYSTEMS WITH A COMBINATION OF SURFACE AND GROUND SOURCES.

- (3) If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.*, when water is representative of all sources being used).
- (4) The State may reduce the total number of samples which must be analyzed by allowing the use of compositing. Composite samples from a maximum of five samples are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory.
 - (i) If the concentration in the composite sample is greater than or equal to one-fifth of the MCL of any inorganic chemical, then a follow-up sample must be taken within 14 days at each sampling point included in the composite. These samples must be analyzed for the contaminants which exceeded one-fifth of the MCL in the composite sample. Detection limits for each analytical method and MCLs for each inorganic contaminant are the following:

Detection Limits for Inorganic Contaminants

CONTAMINANT	MCL (MG/L)	METHODOLOGY	DETECTION LIMIT (MG/L)
Antimony	0.006	Atomic Absorption; Furnace	0.003
		Atomic Absorption; Platform	0.0008 ⁵
		ICP-Mass Spectrometry	0.0004

		Hydride-Atomic Absorption	0.001
Arsenic	0.010 ⁶	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform—Stabilized Temperature	0.0005 ⁷
		Atomic Absorption; Gaseous Hydride	0.001
		ICP-Mass Spectrometry	0.0014 ⁸
Asbestos	7 MFL ¹	Transmission Electron Microscopy	0.01 MFL
Barium	2	Atomic Absorption; furnace technique	0.002
		Atomic Absorption; direct aspiration	0.1
		Inductively Coupled Plasma	0.002 (0.001)
Beryllium	0.004	Atomic Absorption; Furnace	0.0002
		Atomic Absorption; Platform	0.00002 ⁵
		Inductively Coupled Plasma ²	0.0003
		ICP-Mass Spectrometry	0.0003
Cadmium	0.005	Atomic Absorption; furnace technique	0.0001
		Inductively Coupled Plasma	0.001
Chromium	0.1	Atomic Absorption; furnace technique	0.001
		Inductively Coupled Plasma	0.007 (0.001)
Cyanide	0.2	Distillation, Spectrophotometric ³	0.02
		Distillation, Automated, Spectrophotometric ³	0.005
		Distillation, Amenable, Spectrophotometric ⁴	0.02
		Distillation, Selective Electrode ^{3 4}	0.05
		UV, Distillation, Spectrophotometric ⁹	0.0005
		Micro Distillation, Flow Injection, Spectrophotometric ³	0.0006
		Ligand Exchange with Amperometry ⁴	0.0005
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	xl	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0006 ⁵
		Inductively Coupled Plasma ²	0.005
		ICP-Mass Spectrometry	0.0005
		Manual Cadmium Reduction	0.01
		Automated Hydrazine Reduction	0.01
		Automated Cadmium Reduction	0.05

Nitrate	10 (as N)	Ion Selective Electrode	1
		Ion Chromatography	0.01
		Capillary Ion Electrophoresis	0.076
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
		Capillary Ion Electrophoresis	0.103
Selenium	0.05	Atomic Absorption; furnace	0.002
		Atomic Absorption; gaseous hydride	0.002
Thallium	0.002	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0007 ⁵
		ICP-Mass Spectrometry	0.0003

¹MFL = million fibers per liter >10 µm.

²Using a 2X preconcentration step as noted in Method 200.7. Lower MDLs may be achieved when using a 4X preconcentration.

³Screening method for total cyanides.

⁴ Measures “free” cyanides when distillation, digestion, or ligand exchange is omitted.

⁵Lower MDLs are reported using stabilized temperature graphite furnace atomic absorption.

⁶The value for arsenic is effective January 23, 2006. Unit then, the MCL is 0.05 mg/L.

⁷The MDL reported for EPA method 200.9 (Atomic Absorption; Platform—Stabilized Temperature) was determined using a 2x concentration step during sample digestion. The MDL determined for samples analyzed using direct analyses (*i.e.*, no sample digestion) will be higher. Using multiple depositions, EPA 200.9 is capable of obtaining MDL of 0.0001 mg/L.

⁸Using selective ion monitoring, EPA Method 200.8 (ICP-MS) is capable of obtaining a MDL of 0.0001 mg/L.

⁹Measures total cyanides when UV-digestor is used, and “free” cyanides when UV-digestor is bypassed.

- (ii) If the population served by the system is >3,300 persons, then compositing may only be permitted by the State at sampling points within a single system. In systems serving ≤3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.
 - (iii) If duplicates of the original sample taken from each sampling point used in the composite sample are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the State within 14 days after completing analysis of the composite sample, provided the holding time of the sample is not exceeded.
- (5) The frequency of monitoring for asbestos shall be in accordance with paragraph (b) of this section: the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide,

fluoride, mercury, nickel, selenium and thallium shall be in accordance with paragraph (c) of this section; the frequency of monitoring for nitrate shall be in accordance with paragraph (d) of this section; and the frequency of monitoring for nitrite shall be in accordance with paragraph (e) of this section.

- (b) The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos specified in §141.62(b) shall be conducted as follows:
- (1) Each community and non-transient, non-community water system is required to monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period starting January 1, 1993.
 - (2) If the system believes it is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply to the State for a waiver of the monitoring requirement in paragraph (b)(1) of this section. If the State grants the waiver, the system is not required to monitor.
 - (3) The State may grant a waiver based on a consideration of the following factors:
 - (i) Potential asbestos contamination of the water source, and
 - (ii) The use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.
 - (4) A waiver remains in effect until the completion of the three-year compliance period. Systems not receiving a waiver must monitor in accordance with the provisions of paragraph (b)(1) of this section.
 - (5) A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
 - (6) A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of paragraph (a) of this section.
 - (7) A system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
 - (8) A system which exceeds the maximum contaminant levels as determined in §141.23(i) of this section shall monitor quarterly beginning in the next quarter after the violation occurred.
 - (9) The State may decrease the quarterly monitoring requirement to the frequency specified in paragraph (b)(1) of this section provided the State has determined that the system is reliably and consistently below the maximum contaminant level. In no case can a State make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface (or combined surface/ground) water system takes a minimum of four quarterly samples.
 - (10) If monitoring data collected after January 1, 1990 are generally consistent with the requirements of §141.23(b), then the State may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.
- (c) The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in §141.62 for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be as follows:
- (1) Groundwater systems shall take one sample at each sampling point during each compliance period. Surface water systems (or combined surface/ground) shall take one sample annually at each sampling point.
 - (2) The system may apply to the State for a waiver from the monitoring frequencies specified in paragraph (c)(1) of this section. States may grant a public water system a waiver for monitoring of cyanide, provided that the State determines that the system is not vulnerable due to lack of any industrial source of cyanide.
 - (3) A condition of the waiver shall require that a system shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (*i.e.*, nine years)
 - (4) The State may grant a waiver provided surface water systems have monitored annually for at least three years and groundwater systems have conducted a minimum of three rounds of monitoring. (At least one sample shall have been taken since January 1, 1990). Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the maximum contaminant level.

Systems that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.

- (5) In determining the appropriate reduced monitoring frequency, the State shall consider:
 - (i) Reported concentrations from all previous monitoring;
 - (ii) The degree of variation in reported concentrations; and
 - (iii) Other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.
 - (6) A decision by the State to grant a waiver shall be made in writing and shall set forth the basis for the determination. The determination may be initiated by the State or upon an application by the public water system. The public water system shall specify the basis for its request. The State shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.
 - (7) Systems which exceed the maximum contaminant levels as calculated in §141.23(i) of this section shall monitor quarterly beginning in the next quarter after the violation occurred.
 - (8) The State may decrease the quarterly monitoring requirement to the frequencies specified in paragraphs (c)(1) and (c)(2) of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case can a State make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
 - (9) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the State. The system must also comply with the initial sampling frequencies specified by the State to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.
- (d) All public water systems (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrate in §141.62.
- (1) Community and non-transient, non-community water systems served by groundwater systems shall monitor annually beginning January 1, 1993; systems served by surface water shall monitor quarterly beginning January 1, 1993.
 - (2) For community and non-transient, non-community water systems, the repeat monitoring frequency for groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is ≥ 50 percent of the MCL. The State may allow a groundwater system to reduce the sampling frequency to annually after four consecutive quarterly samples are reliably and consistently less than the MCL.
 - (3) For community and non-transient, non-community water systems, the State may allow a surface water system to reduce the sampling frequency to annually if all analytical results from four consecutive quarters are < 50 percent of the MCL. A surface water system shall return to quarterly monitoring if any one sample is ≥ 50 percent of the MCL.
 - (4) Each transient non-community water system shall monitor annually beginning January 1, 1993.
 - (5) After the initial round of quarterly sampling is completed, each community and non-transient non-community system which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.
- (e) All public water systems (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrite in §141.62(b).
- (1) All public water systems shall take one sample at each sampling point in the compliance period beginning January 1, 1993 and ending December 31, 1995.
 - (2) After the initial sample, systems where an analytical result for nitrite is < 50 percent of the MCL shall monitor at the frequency specified by the State.
 - (3) For community, non-transient, non-community, and transient non-community water systems, the repeat monitoring frequency for any water system shall be quarterly for at least one year following any one sample in which the concentration is ≥ 50 percent of the MCL. The State may allow a system to

reduce the sampling frequency to annually after determining the system is reliably and consistently less than the MCL.

- (4) Systems which are monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.
- (f) Confirmation samples:
- (1) Where the results of sampling for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium indicate an exceedance of the maximum contaminant level, the State may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point.
 - (2) Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within 24 hours of the system's receipt of notification of the analytical results of the first sample. Systems unable to comply with the 24-hour sampling requirement must immediately notify persons served by the public water system in accordance with §141.202 and meet other Tier 1 public notification requirements under subpart Q of this part. Systems exercising this option must take and analyze a confirmation sample within two weeks of notification of the analytical results of the first sample.
 - (3) If a State-required confirmation sample is taken for any contaminant, then the results of the initial and confirmation sample shall be averaged. The resulting average shall be used to determine the system's compliance in accordance with paragraph (i) of this section. States have the discretion to delete results of obvious sampling errors.
- (g) The State may require more frequent monitoring than specified in paragraphs (b), (c), (d) and (e) of this section or may require confirmation samples for positive and negative results at its discretion.
- (h) Systems may apply to the State to conduct more frequent monitoring than the minimum monitoring frequencies specified in this section.
- (i) Compliance with §141.11 or §141.62(b) (as appropriate) shall be determined based on the analytical result(s) obtained at each sampling point.
- (1) For systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium is determined by a running annual average at any sampling point. If the average at any sampling point is greater than the MCL, then the system is out of compliance. If anyone sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any sample below the method detection limit shall be calculated at zero for the purpose of determining the annual average. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.
 - (2) For systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium if the level of a contaminant is greater than the MCL. If confirmation samples are required by the State, the determination of compliance will be based on the annual average of the initial MCL exceedance and any State-required confirmation samples. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.
 - (3) Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate and/or nitrite exceed the MCLs in the initial sample, a confirmation sample is required in accordance with paragraph (f)(2) of this section, and compliance shall be determined based on the average of the initial and confirmation samples.
 - (4) Arsenic sampling results will be reported to the nearest 0.001 mg/L.
- (j) Each public water system shall monitor at the time designated by the State during each compliance period.
- (k) Inorganic analysis:
- (1) Analysis for the following contaminants shall be conducted in accordance with the methods in the following table, or the alternative methods listed in appendix A to subpart C of this part, or their equivalent as determined by EPA. Criteria for analyzing arsenic, barium, beryllium, cadmium, calcium, chromium, copper, lead, nickel, selenium, sodium, and thallium with digestion or directly

without digestion, and other analytical test procedures are contained in *Technical Notes on Drinking Water Methods*, EPA-600/R-94-173, October 1994. This document is available from the National Service Center for Environmental Publications (NSCEP), P.O. Box 42419, Cincinnati, OH 45242-0419 or <http://www.epa.gov/nscep/>.

CONTAMINANT	METHODOLOGY ¹³	EPA	ASTM ³	SM ⁴ (18TH, 19TH ED.)	SM ⁴ (20TH ED.)	SM OZLINE ²²	OTHER
1. Alkalinity	Titrimetric		D1067-92, 02 B	2320 B	2320 B	2320 B-97	
	Electrometric titration					I-1030-85 ⁵	
2. Antimony	Inductively Coupled Plasma (ICP)—Mass Spectrometry	200.8 ²					
	Hydride-Atomic Absorption		D3697-92, 02				
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Furnace			3113 B		3113 B-99	
3. Arsenic¹⁴	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Furnace		D2972-97, 03 C	3113 B		3113 B-99	
	Hydride Atomic Absorption		D1972-97, 03 B	3114 B		3114 B-97	
4. Asbestos	Transmission Electron Microscopy	100.1 ⁹					
	Transmission Electron Microscopy	100.2 ¹⁰					
5. Barium	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Direct			3111D		3111 D-99	
	Atomic Absorption; Furnace			3113 B		3113 B-99	
6. Beryllium	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Furnace		D3645-97, 03 B	3113 B		3113 B-99	
7. Cadmium	Inductively Coupled Plasma	200.7 ²					
	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Furnace			3113 B		3113 B-99	
8. Calcium	EDTA titrimetric		D511-93, 03 A	3500-Ca D	3500-Ca B	3500-Ca B-97	
	Atomic Absorption; Direct Aspiration		D511-93, 03 B	3111 B		3111 B-99	
	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	

	Ion Chromatography		D6919-03				
9. Chromium	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Furnace			3113 B		3113 B-99	
10. Copper	Atomic Absorption; Furnace		D1688-95, 02 C	3113 B		3113 B-99	
	Atomic Absorption; Direct Aspiration		D1688-95, 02 A	3111 B		3111 B-99	
	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	
	ICP-Mass spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
11. Conductivity	Conductance		D1125-95 (Reapproved 1999) A	2510 B	2510 B	2510 B-97	
12. Cyanide	Manual Distillation followed by		D2036-98 A	4500-CN ⁻ C	4500-CN ⁻ C		
	Spectrophotometric, Amenable		D2036-98 B	4500-CN ⁻ G	4500-CN ⁻ G	4500-CN ⁻ G-99	
	Spectro-photometric Manual		D2036-98 A	4500-CN ⁻ E	4500-CN ⁻ E	4500-CN ⁻ E-99	I-3300-85 ⁵
	Spectro-photometric Semi-automated	335.4 ⁶					
	Selective Electrode			4500-CN ⁻ F	4500-CN ⁻ F	4500-CN ⁻ F-99	
	UV, Distillation, Spectrophotometric						Kelada-01 ¹⁷
	Micro Distillation, Flow Injection, Spectrophotometric						QuikChem 10-204-00-1-X ¹⁸
	Ligand Exchange and Amperometry ²¹		D6888-04				OIA-1677, DW ²⁰
13. Fluoride	Ion Chromatography	300.0 ⁶ , 300.1 ¹⁹	D4327-97, 03	4110 B	4110 B	4110 B-00	
	Manual Distill.; Color. SPADNS			4500-F ⁻ B, D	4500-F ⁻ B, D	4500-F ⁻ B, D-97	
	Manual Electrode		D1179-93, 99 B	4500-F ⁻ C	4500-F ⁻ C	4500-F ⁻ C-97	
	Automated Electrode						380-75WE ¹¹
	Automated Alizarin			4500-F ⁻ E	4500-F ⁻ E	4500-F ⁻ E-97	129-71W ¹¹
	Capillary Ion Electrophoresis						D6508, Rev. 2 ²³
14.	Atomic Absorption; Furnace		D3559-96, 03 D	3113 B		3113 B-99	

Lead	ICP-Mass spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Differential Pulse Anodic Stripping Voltametry						Method 1001 ¹⁶
15. Magnesium	Atomic Absorption		D511-93, 03 B	3111 B		3111 B-99	
	ICP	200.7 ²		3120 B	3120 B	3120 B-99	
	Complexation Titrimetric Methods		D511-93, 03 A	3500-Mg E	3500-Mg B	3500-Mg B-97	
	Ion Chromatography		D6919-03				
16. Mercury	Manual, Cold Vapor	245.1 ²	D3223-97, 02	3112 B		3112 B-99	
	Automated, Cold Vapor	245.2 ¹					
	ICP-Mass Spectrometry	200.8 ²					
17. Nickel	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Direct			3111 B		3111 B-99	
	Atomic Absorption; Furnace			3113 B		3113 B-99	
18. Nitrate	Ion Chromatography	300.0 ⁶ , 300.1 ¹⁹	D4327-97, 03	4110 B	4110 B	4110 B-00	B-1011 ⁸
	Automated Cadmium Reduction	353.2 ⁶	D3867-90 A	4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F-00	
	Ion Selective Electrode			4500-NO ₃ ⁻ D	4500-NO ₃ ⁻ D	4500-NO ₃ ⁻ D-00	601 ⁷
	Manual Cadmium Reduction		D3867-90 B	4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E-00	
	Capillary Ion Electrophoresis		D6508-00.				
19. Nitrite	Ion Chromatography	300.0 ⁶ , 300.1 ¹⁹	D4327-97, 03	4110 B	4110 B	4110 B-00	B-1011 ⁸
	Automated Cadmium Reduction	353.2 ⁶	D3867-90 A	4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F-00	
	Manual Cadmium Reduction		D3867-90 B	4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E-00	
	Spectrophotometric			4500-NO ₂ ⁻ B	4500-NO ₂ ⁻ B	4500-NO ₂ ⁻ B-00	
	Capillary Ion Electrophoresis		D6508-00				
20. Ortho-phosphate	Colorimetric, Automated, Ascorbic Acid	365.1 ⁶		4500-P F	4500-P F		
	Colorimetric, ascorbic acid, single reagent		D515-88 A	4500-P E	4500-P E		
	Colorimetric						I-1601-85 ⁵

	Phosphomolybdate; Automated-segmented flow; Automated Discrete						I-2601-90 ⁵ I-2598-85 ⁵
	Ion Chromatography	300.0 ⁶ , 300.1 ¹⁹	D4327-97, 03	4110 B	4110 B	4110 B-00	
	Capillary Ion Electrophoresis		D6508-00				
21. pH	Electrometric	150.1, 150.2 ¹	D1293-95, 99	4500-H ⁺ B	4500-H ⁺ B	4500-H ⁺ B-00	
22. Selenium	Hydride-Atomic Absorption		D3859-98, 03 A	3114 B		3114 B-97	
	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					
	Atomic Absorption; Furnace		D3859-98, 03 B	3113 B		3113 B-99	
23. Silica	Colorimetric, Molybdate Blue						I-1700-85 ⁵
	Automated-segmented Flow						I-2700-85 ⁵
	Colorimetric		D859-94, 00				
	Molybdosilicate			4500-Si D	4500-SiO ₂ C	4500-SiO ₂ C-97	
	Heteropoly blue			4500-Si E	4500-SiO ₂ D	4500-SiO ₂ D-97	
	Automated for Molybdate-reactive Silica			4500-Si F	4500-SiO ₂ E	4500-SiO ₂ E-97	
	Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99	
24. Sodium	Inductively Coupled Plasma	200.7 ²					
	Atomic Absorption; Direct Aspiration			3111 B		3111 B-99	
	Ion Chromatography		D6919-03				
25. Temperature	Thermometric			2550	2550	2550-00	
26. Thallium	ICP-Mass Spectrometry	200.8 ²					
	Atomic Absorption; Platform	200.9 ²					

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1-11, 16-20, and 22-23 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 3334, Washington, DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

¹“Methods for Chemical Analysis of Water and Wastes,” EPA/600/4-79/020, March 1983. Available at NTIS, PB84-128677.

²“Methods for the Determination of Metals in Environmental Samples—Supplement I,” EPA/600/R-94/111, May 1994. Available at NTIS, PB95-125472.

³*Annual Book of ASTM Standards*, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, <http://www.astm.org>; *Annual Book of ASTM Standards 1994*, Vols. 11.01 and 11.02; *Annual Book of ASTM Standards 1996*, Vols. 11.01 and 11.02; *Annual Book of ASTM Standards 1999*, Vols. 11.01 and 11.02; *Annual Book of ASTM Standards 2003*, Vols. 11.01 and 11.02.

⁴*Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 800 I Street NW., Washington, DC 20001-3710; *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992); *Standard Methods for the Examination of Water and Wastewater*, 19th edition (1995); *Standard Methods for the Examination of Water and Wastewater*, 20th edition (1998). The following methods from this edition cannot be used: 3111 B, 3111 D, 3113 B, and 3114 B.

⁵U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425; Methods for Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediment, Open File Report 93-125, 1993; Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd edition, 1989.

⁶“Methods for the Determination of Inorganic Substances in Environmental Samples,” EPA/600/R-93/100, August 1993. Available as Technical Report PB94-120821 at National Technical Information Service (NTIS), 5301 Shawnee Road, Alexandria, VA 22312. <http://www.ntis.gov>.

⁷The procedure shall be done in accordance with the Technical Bulletin 601 “Standard Method of Test for Nitrate in Drinking Water,” July 1994, PN 221890-001, Analytical Technology, Inc. Copies may be obtained from ATI Orion, 529 Main Street, Boston, MA 02129.

⁸Method B-1011. “Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography,” August, 1987. Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Milford, MA 01757, Telephone: 508/482-2963, Fax: 508/482-4056.

⁹Method 100.1, “Analytical Method for Determination of Asbestos Fibers in Water,” EPA/600/4-83/043, EPA, September 1983. Available at NTIS, PB83-260471.

¹⁰Method 100.2, “Determination of Asbestos Structure Over 10- μ m in Length in Drinking Water,” EPA/600/R-94/134, June 1994. Available at NTIS, PB94-201902.

¹¹Industrial Method No. 129-71W, “Fluoride in Water and Wastewater,” December 1972, and Method No. 380-75WE, “Fluoride in Water and Wastewater,” February 1976, Technicon Industrial Systems. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.

¹²Unfiltered, no digestion or hydrolysis.

¹³Because MDLs reported in EPA Methods 200.7 and 200.9 were determined using a 2x preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (*i.e.*, no sample digestion) will be higher. For direct analysis of cadmium and arsenic by Method 200.7, and arsenic by Method 3120 B, sample preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis of antimony, lead, and thallium by Method 200.9; antimony and lead by Method 3113 B; and lead by Method D3559-90D, unless multiple in-furnace depositions are made.

¹⁴If ultrasonic nebulization is used in the determination of arsenic by Method 200.8, the arsenic must be in the pentavalent state to provide uniform signal response. For direct analysis of arsenic with Method 200.8 using ultrasonic nebulization, samples and standards must contain 1 mg/L of sodium hypochlorite.

¹⁵[Reserved]

¹⁶The description for Method Number 1001 for lead is available from Palintest, LTD, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018. Or from the Hach Company, P.O. Box 389, Loveland, CO 80539.

¹⁷The description for the Kelada-01 Method, “Kelada Automated Test Methods for Total Cyanide, Acid Dissociable Cyanide, And Thiocyanate,” Revision 1.2, August 2001, EPA # 821-B-01-009 for cyanide is available from the National Technical Information Service (NTIS), PB 2001-108275, 5285 Port Royal Road, Springfield, VA 22161. The toll free telephone number is 800-553-6847. **Note:** A 450-W UV lamp may be used in this method instead of the 550-W lamp specified if it provides performance within the quality control (QC) acceptance criteria of the method in a given instrument. Similarly, modified flow cell configurations and flow conditions may be used in the method, provided that the QC acceptance criteria are met.

¹⁸The description for the QuikChem Method 10-204-00-1-X, “Digestion and distillation of total cyanide in drinking and wastewaters using MICRO DIST and determination of cyanide by flow injection analysis,” Revision 2.1, November 30, 2000, for cyanide is available from Lachat Instruments, 6645 W. Mill Rd., Milwaukee, WI 53218. Telephone: 414-358-4200.

¹⁹“Methods for the Determination of Organic and Inorganic Compounds in Drinking Water,” Vol. 1, EPA 815-R-00-014, August 2000. Available as Technical Report PB2000-106981 at National Technical Information Service (NTIS), 5301 Shawnee Road, Alexandria, VA 22312. <http://www.ntis.gov>.

²⁰Method OIA-1677, DW “Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry,” January 2004. EPA-821-R-04-001, Available from ALPKEM, A Division of OI Analytical, P.O. Box 9010, College Station, TX 77842-9010.

²¹Sulfide levels below those detected using lead acetate paper may produce positive method interferences. Test samples using a more sensitive sulfide method to determine if a sulfide interference is present, and treat samples accordingly.

²²Standard Methods Online, American Public Health Association, 800 I Street NW., Washington, DC 20001, available at <http://www.standardmethods.org>. 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 may be used.

- (2) Sample collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this section shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the table below:

CONTAMINANT	PRESERVATIVE ¹	CONTAINER ²	TIME ³
Antimony	HNO ³	P or G	6 months
Arsenic	Conc HNO ₃ to pH <2	P or G	6 months
Asbestos	4 °C	P or G	48 hours ⁴
Barium	HNO ³	P or G	6 months
Beryllium	HNO ³	P or G	6 months
Cadmium	HNO ³	P or G	6 months
Chromium	HNO ³	P or G	6 months
Cyanide	4 °C, NaOH	P or G	14 days
Fluoride	None	P or G	1 month
Mercury	HNO ³	P or G	28 days
Nickel	HNO ³	P or G	6 months
Nitrate	4 °C	P or G	48 hours ⁵
Nitrate-Nitrite ⁶	H ² SO ⁴	P or G	28 days
Nitrite	4 °C	P or G	48 hours
Selenium	HNO ³	P or G	6 months
Thallium	HNO ³	P or G	6 months

¹For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time of collection. When chilling is indicated the sample must be shipped and stored at 4 °C or less. Acidification of nitrate or metals samples may be with a concentrated acid or a dilute (50% by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EPA Methods 200.7 or 200.8 or 200.9 are followed.

²P = plastic, hard or soft; G = glass, hard or soft.

³In all cases samples should be analyzed as soon after collection as possible. Follow additional (if any) information on preservation, containers or holding times that is specified in method.

⁴Instructions for containers, preservation procedures and holding times as specified in Method 100.2 must be adhered to for all compliance analyses including those conducted with Method 100.1.

⁵If the sample is chlorinated, the holding time for an unacidified sample kept at 4 °C is extended to 14 days.

⁶Nitrate-Nitrite refers to a measurement of total nitrate.

(3) Analysis under this section shall only be conducted by laboratories that have been certified by EPA or the State. Laboratories may conduct sample analysis under provisional certification until January 1, 1996. To receive certification to conduct analyses for antimony, arsenic, asbestos, barium, beryllium,

cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite and selenium and thallium, the laboratory must:

- (i) Analyze Performance Evaluation (PE) samples provided by EPA, the State or by a third party (with the approval of the State or EPA) at least once a year.
- (ii) For each contaminant that has been included in the PE sample and for each method for which the laboratory desires certification achieves quantitative results on the analyses that are within the following acceptance limits:

CONTAMINANT	ACCEPTANCE LIMIT
Antimony	±30 at ≥0.006 mg/l
Arsenic	±30 at ≥0.003 mg/L
Asbestos	2 standard deviations based on study statistics.
Barium	±15% at ≥0.15 mg/l
Beryllium	±15% at ≥0.001 mg/l
Cadmium	±20% at ≥0.002 mg/l
Chromium	±15% at ≥0.01 mg/l
Cyanide	±25% at ≥0.1 mg/l
Fluoride	±10% at ≥1 to 10 mg/l
Mercury	±30% at ≥0.0005 mg/l
Nickel	±15% at ≥0.01 mg/l
Nitrate	±10% at ≥0.4 mg/l
Nitrite	±15% at ≥0.4 mg/l
Selenium	±20% at ≥0.01 mg/l
Thallium	±30% at ≥0.002 mg/l

- (l) Analyses for the purpose of determining compliance with §141.11 shall be conducted using the requirements specified in paragraphs (l) through (q) of this section.
 - (1) Analyses for all community water systems utilizing surface water sources shall be completed by June 24, 1978. These analyses shall be repeated at yearly intervals
 - (2) Analyses for all community water systems utilizing only ground water sources shall be completed by June 24, 1979. These analyses shall be repeated at three-year intervals.

- (3) For non-community water systems, whether supplied by surface or ground sources, analyses for nitrate shall be completed by December 24, 1980. These analyses shall be repeated at intervals determined by the State.
- (4) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.
- (m) If the result of an analysis made under paragraph (l) of this section indicates that the level of any contaminant listed in §141.11 exceeds the maximum contaminant level, the supplier of the water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.
- (n) When the average of four analyses made pursuant to paragraph (m) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the State pursuant to §141.31 and give notice to the public pursuant to subpart Q. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.
- (o) The provisions of paragraphs (m) and (n) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of the mean of two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the State pursuant to §141.31 and shall notify the public pursuant to subpart Q.
- (p) For the initial analyses required by paragraph (l) (1), (2) or (3) of this section, data for surface waters acquired within one year prior to the effective date and data for ground waters acquired within 3 years prior to the effective date of this part may be substituted at the discretion of the State.
- (q) [Reserved]

[56 FR 3579, Jan. 30, 1991]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.23, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

§141.24 Organic chemicals, sampling and analytical requirements.

- (a) – (d) [Reserved]
- (e) Analyses for the contaminants in this section shall be conducted using the methods listed in the following table, or the alternative methods listed in appendix A to subpart C of this part, or their equivalent as determined by EPA.
 - (1) The following documents are incorporated by reference. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room 3334, Washington, DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 1-202-741-6030, or go to: www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Method 508A and 515.1 are in *Methods for the Determination of Organic Compounds in Drinking Water*, EPA/600/4-88-039, December 1988, Revised, July 1991. Methods 547, 550 and 550.1 are in *Methods for the Determination of Organic Compounds in Drinking Water—Supplement I*, EPA/600-4-90-020, July 1990. Methods 548.1, 549.1, 552.1 and 555 are in *Methods for the Determination of Organic Compounds in Drinking Water—Supplement II*, EPA/600/R-92-129, August 1992. Methods 502.2, 504.1, 505, 506, 507, 508, 508.1, 515.2, 524.2 525.2, 531.1, 551.1 and 552.2 are in *Methods for the Determination of Organic Compounds in Drinking Water--Supplement III*, EPA/600/R-95-131, August 1995. Method 1613 is titled "Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope-Dilution HRGC/HRMS," EPA/821-B-94-005, October 1994. These documents are available from the National Technical Information Service, NTIS PB91-231480, PB91-146027, PB92-207703, PB95-261616 and PB95-104774, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll free number is: 800-553-6847. Method 6651 shall be followed in accordance with *Standard Methods*

for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association (APHA); any of these three editions may be used. Method 6610 shall be followed in accordance with *Standard Methods for the Examination of Water and Wastewater*, (18th Edition Supplement) (1994), or with the 19th edition (1995) or 20th edition (1998) of *Standard Methods for the Examination of Water and Wastewater*; any of these publications may be used. The APHA documents are available from APHA, 1015 Fifteenth Street NW., Washington, DC 20005. Other required analytical test procedures germane to the conduct of these analyses are contained in *Technical Notes on Drinking Water Methods*, EPA/600/R-94-173, October 1994, NTIS PB95-104766. EPA Methods 515.3 and 549.2 are available from U.S. Environmental Protection Agency, National Exposure Research Laboratory (NERL)-Cincinnati, 26 West Martin Luther King Drive, Cincinnati, OH 45268. ASTM Method D 5317-93, 98 (Reapproved 2003) is available in the *Annual Book of ASTM Standards*, (1999), Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, any edition containing the cited version of the method may be used. EPA Method 515.4, "Determination of Chlorinated Acids in Drinking Water by Liquid-Liquid Microextraction, Derivatization and Fast Gas Chromatography with Electron Capture Detection," Revision 1.0, April 2000, EPA/815/B-00/001 and EPA 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, July 2003, EPA 815-B-03-002, can be accessed and downloaded directly online at www.epa.gov/safewater/methods/sourcalt.html. Syngenta Method AG-625, "Atrazine in Drinking Water by Immunoassay," February 2001, is available from Syngenta Crop Protection, Inc., 410 Swing Road, P.O. Box 18300, Greensboro, NC 27419. Telephone: 336-632-6000. Method 531.2 "Measurement of N-methylcarbamoyloximes and N-methylcarbamates in Water by Direct Aqueous Injection HPLC with Postcolumn Derivatization," Revision 1.0, September 2001, EPA 815-B-01-002, can be accessed and downloaded directly online at <http://www.epa.gov/safewater/methods/sourcalt.html>.

CONTAMINANT	EPA METHOD	STANDARD METHODS	ASTM	OTHER
1. Benzene	502.2, 524.2			
2. Carbon tetrachloride	502.2, 524.2, 551.1			
3. Chlorobenzene	502.2, 524.2			
4. 1,2-Dichlorobenzene	502.2, 524.2			
5. 1,4-Dichlorobenzene	502.2, 524.2			
6. 1,2-Dichloroethane	502.2, 524.2			
7. cis-Dichloroethylene	502.2, 524.2			
8. trans-Dichloroethylene	502.2, 524.2			
9. Dichloromethane	502.2, 524.2			

10. 1,2-Dichloropropane	502.2, 524.2			
11. Ethylbenzene	502.2, 524.2			
12. Styrene	502.2, 524.2			
13. Tetrachloroethylene	502.2, 524.2, 551.1			
14. 1,1,1-Trichloroethane	502.2, 524.2, 551.1			
15. Trichloroethylene	502.2, 524.2, 551.1			
16. Toluene	502.2, 524.2			
17. 1,2,4 – Trichlorobenzene	502.2, 524.2			
18. 1,1 - Dichloroethylene	502.2, 524.2			
19. 1,1,2 – Trichloroethane	502.2, 524.2, 551.1			
20. Vinyl chloride	502.2, 524.2			
21. Xylenes (total)	502.2, 524.2			
22. 2,3,7,8 – TCDD (dioxin)	1613			
23. 2,4-D⁴ (as acids, salts, and esters)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
24. 2,4,5-TP⁴ (Silvex)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
25. Alachlor²	507, 525.2, 508.1, 505, 551.1			
26. Atrazine²	507, 525.2, 508.1, 505, 551.1			Syngenta ⁵ AG-625
27. Benzo(a)pyrene	525.2, 550, 550.1			
28. Carbofuran	531.1, 531.2	6610		
29. Chlordane	508, 525.2, 508.1, 505			

30. Dalapon	552.1 515.1, 552.2, 515.3, 515.4, 552.3			
31. Di(2-ethylhexyl)adipate	506, 525.2			
32. Di(2-ethylhexyl)phthalate	506, 525.2			
33. Dibromochloropropane (DBCP)	504.1, 551.1			
34. Dinoseb⁴	515.2, 555, 515.1, 515.3, 515.4			
35. Diquat	549.2			
36. Endothall	548.1			
37. Endrin	508, 525.2, 508.1, 505, 551.1			
38. Ethylene dibromide (EDB)	504.1, 551.1			
39. Glyphosate	547	6651		
40. Heptachlor	508, 525.2, 508.1, 505, 551.1			
41. Heptachlor Epoxide	508, 525.2, 508.1, 505, 551.1			
42. Hexachlorobenzene	508, 525.2, 508.1, 505, 551.1			
43. Hexachlorocyclopentadiene	508, 525.2, 508.1, 505, 551.1			
44. Lindane	508, 525.2, 508.1, 505, 551.1			
45. Methoxychlor	508, 525.2, 508.1, 505, 551.1			
46. Oxamyl	531.1, 531.2	6610		
47. PCBs³ (as decachlorobiphenyl)	508A			
48. PCBs³ (as Aroclors)	508.1, 508, 525.2, 505			
49. Pentachlorophenol	515.2, 525.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved)	

			2003)	
50. Picloram⁴	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
51. Simazine²	507, 525.2, 508.1, 505, 551.1			
52. Toxaphene	508, 508.1, 525.2, 505			
53. Total Trihalomethanes	502.2, 524.2, 551.1			

¹[Reserved]

²Substitution of the detector specified in Method 505, 507, 508 or 508.1 for the purpose of achieving lower detection limits is allowed as follows. Either an electron capture or nitrogen phosphorous detector may be used provided all regulatory requirements and quality control criteria are met.

³PCBs are qualitatively identified as Aroclors and measured for compliance purposes as decachlorobiphenyl. Users of Method 505 may have more difficulty in achieving the required detection limits than users of Methods 508.1, 525.2 or 508.

⁴Accurate determination of the chlorinated esters requires hydrolysis of the sample as described in EPA Methods 515.1, 515.2, 515.3, 515.4 and 555 and ASTM Method D5317-93.

⁵This method may not be used for the analysis of atrazine in any system where chlorine dioxide is used for drinking water treatment. In samples from all other systems, any result for atrazine generated by Method AG-625 that is greater than one-half the maximum contaminant level (MCL) (in other words, greater than 0.0015mg/L or 1.5 µg/L) must be confirmed using another approved method for this contaminant and should use additional volume of the original sample collected for compliance monitoring. In instances where a result from Method AG-625 triggers such confirmatory testing, the confirmatory result is to be used to determine compliance.

(2) [Reserved]

(f) Beginning with the initial compliance period, analysis of the contaminants listed in §141.61(a) (1) through (21) for the purpose of determining compliance with the maximum contaminant level shall be conducted as follows:

(1) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

(2) Surface water systems (or combined surface/ground) shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

(3) If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.*, when water representative of all sources is being used).

(4) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in §141.61(a) (2) through (21) during each compliance period, beginning in the initial compliance period.

- (5) If the initial monitoring for contaminants listed in §141.61(a) (1) through (8) and the monitoring for the contaminants listed in §141.61(a) (9) through (21) as allowed in paragraph (f)(18) has been completed by December 31, 1992, and the system did not detect any contaminant listed in §141.61(a) (1) through (21), then each ground and surface water system shall take one sample annually beginning with the initial compliance period.
- (6) After a minimum of three years of annual sampling, the State may allow groundwater systems with no previous detection of any contaminant listed in §141.61(a) to take one sample during each compliance period.
- (7) Each community and non-transient non-community ground water system which does not detect a contaminant listed in §141.61(a) (1) through (21) may apply to the State for a waiver from the requirements of paragraphs (f)(5) and (f)(6) of this section after completing the initial monitoring. (For purposes of this section, detection is defined as ≥ 0.0005 mg/l.) A waiver shall be effective for no more than six years (two compliance periods). States may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene.
- (8) A State may grant a waiver after evaluating the following factor(s):
 - (ii) Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the State reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted.
 - (iii) If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.
 - (A) Previous analytical results.
 - (B) The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities.
 - (C) The environmental persistence and transport of the contaminants.
 - (D) The number of persons served by the public water system and the proximity of a smaller system to a larger system.
 - (E) How well the water source is protected against contamination, such as whether it is a surface or groundwater system. Groundwater systems must consider factors such as depth of the well, the type of soil, and wellhead protection. Surface water systems must consider watershed protection.
- (9) As a condition of the waiver a groundwater system must take one sample at each sampling point during the time the waiver is effective (*i.e.*, one sample during two compliance periods or six years) and update its vulnerability assessment considering the factors listed in paragraph (f)(8) of this section. Based on this vulnerability assessment the State must reconfirm that the system is non-vulnerable. If the State does not make this reconfirmation within three years of the initial determination, then the waiver is invalidated and the system is required to sample annually as specified in paragraph (5) of this section.
- (10) Each community and non-transient non-community surface water system which does not detect a contaminant listed in §141.61(a) (1) through (21) may apply to the State for a waiver from the requirements of (f)(5) of this section after completing the initial monitoring. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Systems meeting this criterion must be determined by the State to be non-vulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the State (if any).
- (11) If a contaminant listed in §141.61(a) (2) through (21) is detected at a level exceeding 0.0005 mg/l in any sample, then:
 - (i) The system must monitor quarterly at each sampling point which resulted in a detection.
 - (ii) The State may decrease the quarterly monitoring requirement specified in paragraph (f)(11)(i) of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the State make this determination unless a

groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

- (iii) If the State determines that the system is reliably and consistently below the MCL, the State may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter(s) which previously yielded the highest analytical result.
 - (iv) Systems which have three consecutive annual samples with no detection of a contaminant may apply to the State for a waiver as specified in paragraph (f)(7) of this section.
 - (v) Groundwater systems which have detected one or more of the following two-carbon organic compounds: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene shall monitor quarterly for vinyl chloride. A vinyl chloride sample shall be taken at each sampling point at which one or more of the two-carbon organic compounds was detected. If the results of the first analysis do not detect vinyl chloride, the State may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one sample during each compliance period. Surface water systems are required to monitor for vinyl chloride as specified by the State.
- (12) Systems which violate the requirements of §141.61(a) (1) through (21), as determined by paragraph (f) (15) of this section, must monitor quarterly. After a minimum of four consecutive quarterly samples which show the system is in compliance as specified in paragraph (f) (15) of this section the system and the State determines that the system is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and times specified in paragraph (f) (11) (iii) of this section.
- (13) The State may require a confirmation sample for positive or negative results. If a confirmation sample is required by the State, the result must be averaged with the first sampling result and the average is used for the compliance determination as specified by paragraph (f)(15). States have discretion to delete results of obvious sampling errors from this calculation.
- (14) The State may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.
- (i) If the concentration in the composite sample is greater than or equal to 0.0005 mg/l for any contaminant listed in §141.61(a), then a follow-up sample must be taken within 14 days at each sampling point included in the composite, and be analyzed for that contaminant.
 - (ii) If duplicates of the original sample taken from each sampling point used in the composite sample are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the State within 14 days after completing analysis of the composite sample, provided the holding time of the sample is not exceeded.
 - (iii) If the population served by the system is >3,300 persons, then compositing may only be permitted by the State at sampling points within a single system. In systems serving ≤3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.
 - (iv) Compositing samples prior to GC analysis.
 - (A) Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.
 - (B) The samples must be cooled at 4 °C during this step to minimize volatilization losses.
 - (C) Mix well and draw out a 5-ml aliquot for analysis.
 - (D) Follow sample introduction, purging, and desorption steps described in the method.
 - (E) If less than five samples are used for compositing, a proportionately small syringe may be used.
 - (v) Compositing samples prior to GC/MS analysis.
 - (A) Inject 5-ml or equal larger amounts of each aqueous sample (up to 5 samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.
 - (B) The total volume of the sample in the purging device must be 25 ml.

- (C) Purge and desorb as described in the method.
- (15) Compliance with §141.61(a) (1) through (21) shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.
- (i) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point
 - (ii) Systems monitoring annually or less frequently whose sample result exceeds the MCL must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.
 - (iii) If any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.
 - (iv) If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.
 - (v) If a sample result is less than the detection limit, zero will be used to calculate the annual average.
- (16) [Reserved]
- (17) Analysis under this section shall only be conducted by laboratories that are certified by EPA or the State according to the following conditions (laboratories may conduct sample analysis under provisional certification until January 1, 1996):
- (i) To receive certification to conduct analyses for the contaminants in §141.61(a) (2) through (21) the laboratory must:
 - (A) Analyze Performance Evaluation (PE) samples provided by EPA, the State, or by a third party (with the approval of the State or EPA) at least once a year by each method for which the laboratory desires certification.
 - (B) Achieve the quantitative acceptance limits under paragraphs (f) (17) (i) (C) and (D) of this section for at least 80 percent of the regulated organic contaminants included in the PE sample.
 - (C) Achieve quantitative results on the analyses performed under paragraph (f)(17)(i)(A) of this section that are within $\pm 20\%$ of the actual amount of the substances in the Performance Evaluation sample when the actual amount is greater than or equal to 0.010 mg/l.
 - (D) Achieve quantitative results on the analyses performed under paragraph (f)(17)(i)(A) of this section that are within $\pm 40\%$ percent of the actual amount of the substances in the Performance Evaluation sample when the actual amount is less than 0.010 mg/l.
 - (E) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in appendix B of part 136.
 - (ii) To receive certification to conduct analyses for vinyl chloride, the laboratory must:
 - (A) Analyze Performance Evaluation (PE) samples provided by EPA, the State, or by a third party (with the approval of the State or EPA) at least once a year by each method for which the laboratory desires certification.
 - (B) Achieve quantitative results on the analyses performed under paragraph (f)(17)(ii)(A) of this section that are within $\pm 40\%$ percent of the actual amount of vinyl chloride in the Performance Evaluation sample.
 - (C) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in appendix B of part 136.
 - (D) Obtain certification for the contaminants listed in §141.61(a)(2) through (21).
- (18) States may allow the use of monitoring data collected after January 1, 1988, required under section 1445 of the Act for purposes of initial monitoring compliance. If the data are generally consistent with the other requirements of this section, the State may use these data (*i.e.*, a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement of paragraph (f)(4) of this section. Systems which use grandfathered samples and did not detect any contaminant listed §141.61(a)(2) through (21) shall begin monitoring annually in accordance with paragraph (f)(5) of this section beginning with the initial compliance period.
- (19) States may increase required monitoring where necessary to detect variations within the system.

- (20) Each certified laboratory must determine the method detection limit (MDL), as defined in appendix B to part 136, at which it is capable of detecting VOCs. The acceptable MDL is 0.0005 mg/l. This concentration is the detection concentration for purposes of this section.
- (21) Each public water system shall monitor at the time designated by the State within each compliance period.
- (22) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the State. The system must also comply with the initial sampling frequencies specified by the State to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.
- (g) [Reserved]
- (h) Analysis of the contaminants listed in §141.61(c) for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows, with the exception that no monitoring is required for aldicarb, aldicarb sulfoxide or aldicarb sulfone:
 - (1) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
 - (2) Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

NOTE: FOR PURPOSES OF THIS PARAGRAPH, SURFACE WATER SYSTEMS INCLUDE SYSTEMS WITH A COMBINATION OF SURFACE AND GROUND SOURCES.

- (3) If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.*, when water representative of all sources is being used).
- (4) **Monitoring frequency:** (i) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in §141.61(c) during each compliance period beginning with the initial compliance period.
 - (ii) Systems serving more than 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of two quarterly samples in one year during each repeat compliance period.
 - (iii) Systems serving less than or equal to 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of one sample during each repeat compliance period.
- (5) Each community and non-transient water system may apply to the State for a waiver from the requirement of paragraph (h)(4) of this section. A system must reapply for a waiver for each compliance period.
- (6) A State may grant a waiver after evaluating the following factor(s): Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the State reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.
 - (i) Previous analytical results.
 - (ii) The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Non-point sources include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.

- (iii) The environmental persistence and transport of the pesticide or PCBs.
 - (iv) How well the water source is protected against contamination due to such factors as depth of the well and the type of soil and the integrity of the well casing.’
 - (v) Elevated nitrate levels at the water supply source.
 - (vi) Use of PCBs in equipment used in the production, storage, or distribution of water (*i.e.*, PCBs used in pumps, transformers, etc.).
- (7) If an organic contaminant listed in §141.61(c) is detected (as defined by paragraph (h)(18) of this section) in any sample, then:
- (i) Each system must monitor quarterly at each sampling point which resulted in a detection.
 - (ii) The State may decrease the quarterly monitoring requirement specified in paragraph (h)(7)(i) of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the State make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
 - (iii) After the State determines the system is reliably and consistently below the maximum contaminant level the State may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.
 - (iv) Systems which have 3 consecutive annual samples with no detection of a contaminant may apply to the State for a waiver as specified in paragraph (h)(6) of this section
 - (v) If the monitoring results in detection of one or more of certain related contaminants (heptachlor and heptachlor epoxide), then subsequent monitoring shall analyze for all related contaminants.
- (8) Systems which violate the requirements of §141.61(c) as determined by paragraph (h) (11) of this section must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the State determines the system is reliably and consistently below the MCL, as specified in paragraph (h) (11) of this section, the system shall monitor at the frequency specified in paragraph (h)(7)(iii) of this section.
- (9) The State may require a confirmation sample for positive or negative results. If a confirmation sample is required by the State, the result must be averaged with the first sampling result and the average used for the compliance determination as specified by paragraph (h) (11) of this section. States have discretion to delete results of obvious sampling errors from this calculation.
- (10) The State may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.
- (i) If the concentration in the composite sample detects one or more contaminants listed in §141.61(c), then a follow-up sample must be taken within 14 days at each sampling point included in the composite, and be analyzed for that contaminant.
 - (ii) If duplicates of the original sample taken from each sampling point used in the composite sample are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the State within 14 days after completion of the composite analysis or before the holding time for the initial sample is exceeded whichever is sooner.
 - (iii) If the population served by the system is >3,300 persons, then compositing may only be permitted by the State at sampling points within a single system. In systems serving ≤3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.
- (11) Compliance with §141.61(c) shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.
- (i) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.
 - (ii) Systems monitoring annually or less frequently whose sample result exceeds the regulatory detection level as defined by paragraph (h)(18) of this section must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

- (iii) If any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.
 - (iv) If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.
 - (v) If a sample result is less than the detection limit, zero will be used to calculate the annual average.
- (12) [Reserved]
- (13) Analysis for PCBs shall be conducted as follows using the methods in paragraph (e) of this section:
- (i) Each system which monitors for PCBs shall analyze each sample using either Method 508.1, 525.2, 508 or 505. Users of Method 505 may have more difficulty in achieving the required Aroclor detection limits than users of Methods 508.1, 525.2 or 508.
 - (ii) If PCBs (as one of seven Aroclors) are detected (as designated in this paragraph) in any sample analyzed using Method 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

AROCLOR	DETECTION LIMIT (MG/L)
1016	0.00008
1221	0.02
1232	0.0005
1242	0.0003
1248	0.0001
1254	0.0001
1260	0.0002

- (iii) Compliance with the PCB MCL shall be determined based upon the quantitative results of analyses using Method 508A.
- (14) If monitoring data collected after January 1, 1990, are generally consistent with the requirements of §141.24(h), then the State may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.
- (15) The State may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctuations in concentration due to seasonal use, changes in water source).
- (16) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.
- (17) Each public water system shall monitor at the time designated by the State within each compliance period.
- (18) Detection as used in this paragraph shall be defined as greater than or equal to the following concentrations for each contaminant.

CONTAMINANT	DETECTION LIMIT (MG/L)
Aalachlor	.0002
Aldicarb	.0005
Aldicarb sulfoxide	.0005
Aldicarb sulfone	.0008

Atrazine	.0001
Benzo[a]pyrene	.00002
Carbofuran	.0009
Chlordane	.0002
Dalapon	.001
1,2-Dibromo-3-chloropropane (DBCP)	.00002
Di (2-ethylhexyl) adipate	.0006
Di (2-ethylhexyl) phthalate	.0006
Dinoseb	.0002
Diquat	.0004
2,4-D	.0001
Endothall	.009
Endrin	.00001
Ethylene dibromide (EDB)	.00001
Glyphosate	.006
Heptachlor	.00004
Heptachlor epoxide	.00002
Hexachlorobenzene	.0001
Hexachlorocyclopentadiene	.0001
Lindane	.00002
Methoxychlor	.0001
Oxamyl	.002
Picloram	.0001
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)	.0001
Pentachlorophenol	.00004
Simazine	.00007
Toxaphene	.001
2,3,7,8-TCDD (Dioxin)	.000000005
2,4,5-TP (Silvex)	.0002

- (19) Analysis under this section shall only be conducted by laboratories that have received certification by EPA or the State and have met the following conditions:
- (i) To receive certification to conduct analyses for the contaminants in §141.61(c) the laboratory must:

- (A) Analyze Performance Evaluation (PE) samples provided by EPA, the State, or by a third party (with the approval of the State or EPA) at least once a year by each method for which the laboratory desires certification.
- (B) For each contaminant that has been included in the PE sample achieve quantitative results on the analyses that are within the following acceptance limits:

CONTAMINANT	ACCEPTANCE LIMITS (PERCENT)
DBCP	±40
EDB	±40.
Alachlor	±45.
Atrazine	±45.
Benzo[a]pyrene	2 standard deviations.
Carbofuran	±45.
Chlordane	±45.
Dalapon	2 standard deviations.
Di(2-ethylhexyl)adipate	2 standard deviations.
Di(2-ethylhexyl)phthalate	2 standard deviations.
Dinoseb	2 standard deviations.
Diquat	2 standard deviations.
Endothall	2 standard deviations.
Endrin	±30.
Glyphosate	2 standard deviations.
Heptachlor	±45.
Heptachlor epoxide	±45.
Hexachlorobenzene	2 standard deviations.
Hexachloro- cyclopentadiene	2 standard deviations.
Lindane	±45.
Methoxychlor	±45.
Oxamyl	2 standard deviations.
PCBs (as Decachlorobiphenyl)	0-200.
Picloram	2 standard deviations.
Simazine	2 standard deviations.
Toxaphene	±45.
Aldicarb	2 standard deviations.
Aldicarb sulfoxide	2 standard deviations.

Aldicarb sulfone	2 standard deviations.
Pentachlorophenol	±50.
2,3,7,8-TCDD (Dioxin)	2 standard deviations.
2,4-D	±50.
2,4,5-TP (Silvex)	±50.

- (ii) [Reserved]
- (20) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the State. The system must also comply with the initial sampling frequencies specified by the State to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.

(Approved by the Office of Management and Budget under control number 2040-0090)
[40 FR 59570, Dec. 24, 1975]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.24, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

§141.25 Analytical methods for radioactivity.

- (a) Analysis for the following contaminants shall be conducted to determine compliance with §141.66 (radioactivity) in accordance with the methods in the following table, or the alternative methods listed in appendix A to subpart C this part, or their equivalent determined by EPA in accordance with §141.27.

Contaminant	Methodology	Reference (Method of Page Number)								
		EPA ¹	EPA ²	EPA ³	EPA ⁴	SM ⁵	ASTM ⁶	USGS ⁷	DOE ⁸	Other
Naturally Occurring:										
Gross alpha ¹¹ and beta	Evaporation	900	p. 1	00-01	p. 1	302, 7110 B, 7110 B-00		R-1120-76		
Gross alpha ¹¹	Coprecipitation			00-02		7110 C, 7110 C-00				
Radium 226	Radon emanation	903.1	p. 16	Ra-04	p. 19	305, 7500-Ra C, 7500-Ra C-01	D3454-97	R-1141-76	Ra-04	NY ⁹ ,
	Radiochemical	903	p. 13	Ra-03		304, 7500-Ra B, 7500-Ra B-01	D2460-97	R-1140-76		GA ¹⁴
Radium 228	Radiochemical	904	p. 24	Ra-05	p. 19	7500-Ra D, 7500-Ra D-01		R-1142-76		NY ⁹ , NJ ¹⁰ , GA ¹⁴
Uranium ¹²	Radiochemical	908				7500-U B, 7500-U B-00				
	Fluorometric	908.1				7500-U C (17th	D2907-97	R-1180-76, R-	U-04	

						Ed.)		1181-76		
	ICP-MS	200.813				3125	D5673-03			
	Alpha Spectrometry			00-07	p. 33	7500-U C (18th, 19th, or 20th Ed.), 7500-U C-00	D3972-97, 02	R-1182-76	U-02	
	Laser Phosphorimetry						D5174-97, 02			
Man-Made:										
Radioactive	Radiochemical	901	p. 4			7500-Cs B, 7500-Cs B-00	D2459-72	R-1111-76		
Cesium	Gamma Ray Spectrometry	901.1			p. 92	7120, 7120-97	D3649-91, 98a	R-1110-76	4.5.2.3	
Iodine	Radiochemical	902	p. 6			7500-I B, 7500-I B-00				
Radioactive Iodine			p. 9			7500-I C, 7500-I C-00				
						7500-I D, 7500-I D-00	D3649-91, 98a			
	Gamma Ray Spectrometry	901.1			p. 92	7120, 7120-97	D4785-93, 00a		4.5.2.3	
Radioactive Strontium 89, 90	Radiochemical	905	p. 29	Sr-04	p. 65	303, 7500-Sr B, 7500-Sr B-01		R-1160-76	Sr-01, Sr-02	
Tritium	Liquid Scintillation	906	p. 34	H-02	p. 87	306, 7500- ³ H B, 7500- ³ H B-00	D4107-91, 98 (Reapproved 2002)	R-1171-76		
Gamma Emitters	Gamma Ray Spectrometry	901.1			p. 92	7120, 7120-97	D3649-91, 98a	R-1110-76	Ga-01-R	
		902				7500-Cs B, 7500-Cs B-00	D4785-93, 00a			
		901				7500-I B, 7500-I B-00				

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 and 13 through 14 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 3334, Washington, DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

¹“Prescribed Procedures for the Measurement of Radioactivity in Drinking Water,” EPA 600/4-80-032, August 1980. Available at the U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847), PB 80-224744.

²“Interim Radiochemical Methodology for Drinking Water,” EPA 600/4-75-008 (revised), March 1976. Available NTIS, *ibid.*

³“Radiochemistry Procedures Manual,” EPA 520/5-84-006, December 1987. Available NTIS, *ibid.*

⁴“Radiochemical Analytical Procedures for Analysis of Environmental Samples,” March 1979. Available at NTIS, *ibid.* EMSL LV 053917.

⁵“Standard Methods for the Examination of Water and Wastewater,” 13th, 17th, 18th, 19th or 20th edition, 1971, 1989, 1992, 1995, 1998. Available at American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Methods 7110B, 7500-Ra B, 7500-Ra C, 7500-Ra D, 7500-U B, 7500-Cs B, 7500-I B, 7500-I C, 7500-I D, 7500-Sr B, and 7500-³H B are in the 17th, 18th, 19th and 20th editions. Method 7110 C is in the 18th, 19th and 20th editions. Method 7500-U C Fluorometric Uranium is only in the 17th Edition, and 7500-U C Alpha spectrometry is only in the 18th, 19th and 20th editions. Method 7120 is only in the 19th and 20th editions. Method 3125 is only in the 20th edition. Methods 7110 B-00, 7110 C-00, 7500-Ra B-01, 7500-Ra C-01, 7500-Ra D-01, 7500-U B-00, 7500-U C-00, 7500-I B-00, 7500-I C-00, 7500-I D-00, 7120-97, 7500-Sr B-01, and 7500-³H B-00 are available online at <http://www.standardmethods.org>. 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 may be used.

⁶*Annual Book of ASTM Standards*, Vol. 11.01 and 11.02, 2002; ASTM International; any year containing the cited version of the method may be used. Copies of these two volumes and the 2003 version of D 5673-03 may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

⁷“Methods for Determination of Radioactive Substances in Water and Fluvial Sediments,” Chapter A5 in Book 5 of *Techniques of Water-Resources Investigations of the United States Geological Survey*, 1977. Available at U.S. Geological Survey (USGS) Information Services, Box 25286, Federal Center, Denver, CO 80225-0425.

⁸“EML Procedures Manual,” 28th (1997) or 27th (1990) Editions, Volumes 1 and 2; either edition may be used. In the 27th Edition Method Ra-04 is listed as Ra-05 and Method Ga-01-R is listed as Sect. 4.5.2.3. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.

⁹“Determination of Ra-226 and Ra-228 (Ra-02),” January 1980, Revised June 1982. Available at Radiological Sciences Institute for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

¹⁰“Determination of Radium 228 in Drinking Water,” August 1980. Available at State of New Jersey, Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analytical Services, 9 Ewing Street, Trenton, NJ 08625.

¹¹Natural uranium and thorium-230 are approved as gross alpha calibration standards for gross alpha with co-precipitation and evaporation methods; americium-241 is approved with co-precipitation methods.

¹²If uranium (U) is determined by mass, a 0.67 pCi/μg of uranium conversion factor must be used. This conversion factor is based on the 1:1 activity ratio of U-234 and U-238 that is characteristic of naturally occurring uranium.

¹³“Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry,” Revision 5.4, which is published in “Methods for the Determination of Metals in Environmental Samples—Supplement I,” EPA 600-R-94-111, May 1994. Available at NTIS, PB 95-125472.

¹⁴“The Determination of Radium-226 and Radium-228 in Drinking Water by Gamma-ray Spectrometry Using HPGE or Ge(Li) Detectors,” Revision 1.2, December 2004. Available from the Environmental Resources Center, Georgia Institute of Technology, 620 Cherry Street, Atlanta, GA 30332-0335, USA, Telephone: 404-894-3776. This method may be used to analyze for radium-226 and radium-228 in samples collected after January 1, 2005 to satisfy the radium-226 and radium-228 monitoring requirements specified at 40 CFR 141.26.

- (b) When the identification and measurement of radionuclides other than those listed in paragraph (a) of this section is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with §141.27.
 - (1) *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions*, H. L. Krieger and S. Gold, EPA-R4-73-014. USEPA, Cincinnati, Ohio, May 1973.
 - (2) *HASL Procedure Manual*, Edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, NY., 1973.
- (c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).
 - (1) To determine compliance with §141.66(b), (c), and (e) the detection limit shall not exceed the concentrations in Table B to this paragraph.

Table B—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	1 µg/L

- (2) To determine compliance with §141.66(d) the detection limits shall not exceed the concentrations listed in Table C to this paragraph.

Table C—Detection Limits for Man-made Beta Particle and Photon Emitters

RADIONUCLIDE	DETECTION LIMIT
Tritium	1,000 pCi/l.
Strontium-89	10 pCi/l.
Strontium-90	2 pCi/l.
Iodine-131	1 pCi/l.
Cesium-134	10 pCi/l.
Gross beta	4 pCi/l.

Other radionuclides	$\frac{1}{10}$ of the applicable limit.
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- (d) To judge compliance with the maximum contaminant levels listed in §141.66, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.
- (e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[41 FR 28404, July 9, 1976, as amended at 45 FR 57345, Aug. 27, 1980; 62 FR 10173, Mar. 5, 1997; 65 FR 76745, Dec. 7, 2000; 67 FR 65250, Oct. 23, 2002; 69 FR 38855, June 29, 2004; 69 FR 52180, Aug. 25, 2004; 72 FR 11245, Mar. 12, 2007; 74 FR 30958, June 29, 2009]

§141.26 Monitoring frequency and compliance requirements for radionuclides in community water systems.

- (a) **Monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium.**
 - (1) Community water systems (CWSs) must conduct initial monitoring to determine compliance with §141.66(b), (c), and (e) by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, “detection limit” is defined as in §141.25(c).
 - (i) *Applicability and sampling location for existing community water systems or sources.* All existing CWSs using ground water, surface water or systems using both ground and surface water (for the purpose of this section hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the State has designated a distribution system location, in accordance with paragraph (a)(2)(ii)(C) of this section.
 - (ii) *Applicability and sampling location for new community water systems or sources.* All new CWSs or CWSs that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after initiating use of the source. CWSs must conduct more frequent monitoring when ordered by the State in the event of possible contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.
 - (2) **Initial monitoring:** Systems must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:
 - (i) Systems without acceptable historical data, as defined below, must collect four consecutive quarterly samples at all sampling points before December 31, 2007.
 - (ii) *Grandfathering of data:* States may allow historical monitoring data collected at a sampling point to satisfy the initial monitoring requirements for that sampling point, for the following situations.
 - (A) To satisfy initial monitoring requirements, a community water system having only one entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.
 - (B) To satisfy initial monitoring requirements, a community water system with multiple entry points and having appropriate historical monitoring data for each entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.
 - (C) To satisfy initial monitoring requirements, a community water system with appropriate historical data for a representative point in the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003, provided that the State finds that the historical data satisfactorily demonstrate that each entry point to the distribution system is expected to

be in compliance based upon the historical data and reasonable assumptions about the variability of contaminant levels between entry points. The State must make a written finding indicating how the data conforms to these requirements.

- (iii) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the State may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.
 - (iv) If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the State.
- (3) **Reduced monitoring:** States may allow community water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria.
- (i) If the average of the initial monitoring results for each contaminant (*i.e.*, gross alpha particle activity, uranium, radium-226, or radium-228) is below the detection limit specified in Table B, in §141.25(c)(1), the system must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.
 - (ii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below $\frac{1}{2}$ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below $\frac{1}{2}$ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years.
 - (iii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above $\frac{1}{2}$ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above $\frac{1}{2}$ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years.
 - (iv) Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine-year monitoring period, and the sample result is above $\frac{1}{2}$ MCL, then the next monitoring period for that sampling point is three years).
 - (v) If a system has a monitoring result that exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the State.
- (4) **Compositing:** To fulfill quarterly monitoring requirements for gross alpha particle activity, radium-226, radium-228, or uranium, a system may composite up to four consecutive quarterly samples from a single entry point if analysis is done within a year of the first sample. States will treat analytical results from the composited as the average analytical result to determine compliance with the MCLs and the future monitoring frequency. If the analytical result from the composited sample is greater than $\frac{1}{2}$ MCL, the State may direct the system to take additional quarterly samples before allowing the system to sample under a reduced monitoring schedule.
- (5) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed 5 pCi/l. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/l. The gross alpha measurement shall have a confidence interval of 95% (1.65σ , where σ is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium-226 and/or uranium measurement, the gross alpha

particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, $\frac{1}{2}$ the detection limit will be used to determine compliance and the future monitoring frequency.

(b) *Monitoring and compliance requirements for beta particle and photon radioactivity.* To determine compliance with the maximum contaminant levels in §141.66(d) for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

- (1)** Community water systems (both surface and ground water) designated by the State as vulnerable must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the State. Systems already designated by the State must continue to sample until the State reviews and either reaffirms or removes the designation.
 - (i)** 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 50 pCi/L (screening level), the State may reduce the frequency of monitoring at that sampling point to once every 3 years. Systems must collect all samples required in paragraph (b)(1) of this section during the reduced monitoring period.
 - (ii)** For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with paragraph (b)(1) of this section.
- (2)** Community water systems (both surface and ground water) designated by the State as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the State. Systems already designated by the State as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the State reviews and either reaffirms or removes the designation.
 - (i)** Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended.
 - (ii)** For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.
 - (iii)** Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.
 - (iv)** 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 State may reduce the frequency of monitoring at that sampling point to every 3 years. Systems must collect the same type of samples required in paragraph (b)(2) of this section during the reduced monitoring period.
 - (v)** For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with paragraph (b)(2) of this section.
- (3)** Community water systems designated by the State to monitor for beta particle and photon radioactivity cannot apply to the State for a waiver from the monitoring frequencies specified in paragraph (b)(1) or (b)(2) of this section.
- (4)** Community water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for the gross beta particle activity analysis. Systems are

allowed to subtract the potassium-40 beta particle activity value from the total gross beta particle activity value to determine if the screening level is exceeded. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82.

- (5) 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 §141.66(d)(1), using the formula in §141.66(d)(2). Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.
 - (6) Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in §141.66(d) beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of 3 monthly samples, that the MCL is being met. Systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in paragraph (b)(1)(i) or (b)(2)(iv) of this section.
- (c) **General monitoring and compliance requirements for radionuclides.**
- (1) The State may require more frequent monitoring than specified in paragraphs (a) and (b) of this section, or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.
 - (2) Each public water systems shall monitor at the time designated by the State during each compliance period.
 - (3) **Compliance:** Compliance with §141.66 (b) through (e) will be determined based on the analytical result(s) obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.
 - (i) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point. If the average of any sampling point is greater than the MCL, then the system is out of compliance with the MCL.
 - (ii) For systems monitoring more than once per year, if any sample result will cause the running average to exceed the MCL at any sample point, the system is out of compliance with the MCL immediately.
 - (iii) Systems must include all samples taken and analyzed under the provisions of this section in determining compliance, even if that number is greater than the minimum required.
 - (iv) If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running average of the samples collected.
 - (v) If a sample result is less than the detection limit, zero will be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, $\frac{1}{2}$ the detection limit will be used to calculate the annual average.
 - (4) States have the discretion to delete results of obvious sampling or analytic errors.
 - (5) If the MCL for radioactivity set forth in §141.66 (b) through (e) is exceeded, the operator of a community water system must give notice to the State pursuant to §141.31 and to the public as required by subpart Q of this part.

[65 FR 76745, Dec. 7, 2000, as amended at 69 FR 38855, June 29, 2004]

§141.27 Alternate analytical techniques.

- (a) With the written permission of the State, concurred in by the Administrator of the U.S. EPA, an alternate analytical technique may be employed. An alternate technique shall be accepted only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any MCL. The use of the alternate analytical technique shall not decrease the frequency of monitoring required by this part.

[45 FR 57345, Aug. 27, 1980]

§141.28 Certified laboratories.

- (a) For the purpose of determining compliance with §141.21 through 141.27, 141.30, 141.40, 141.74, 141.89 and 141.402, samples may be considered only if they have been analyzed by a laboratory certified by the State except that measurements of alkalinity, calcium, conductivity, disinfectant residual, orthophosphate, pH, silica, temperature and turbidity may be performed by any person acceptable to the State.
- (b) Nothing in this part shall be construed to preclude the State or any duly designated representative of the State from taking samples or from using the results from such samples to determine compliance by a supplier of water with the applicable requirements of this part.

[45 FR 57345, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982, as amended at 59 FR 34323, July 1, 1994; 64 FR 67465, Dec. 1, 1999; 71 FR 65651, Nov. 8, 2006]

§141.29 Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the State may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the State and concurred in by the Administrator of the U.S. Environmental Protection Agency.

**Appendix A to Subpart C of Part 141—Alternative Testing Methods
Approved for Analyses Under the Safe Drinking Water Act**

Only the editions stated in the following table are approved.

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.21(f)(6)

ORGANISM	METHODOLOGY	SM 20TH EDITION ⁶	SM 21ST EDITION ¹	SM 22ND EDITION ²⁸	SM ONLINE ³	OTHER
<i>E.coli</i>	ONPG-MUG Test	9223 B	9223 B	9223 B	9223 B-97, B-04	
	Colitag TM					Modified Colitag ^{TM13}
	Tecta EC/TC ³³					

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.23(k)(1)

Contaminant	Methodology	EPA method	SM 21st edition ¹	SM 22nd edition ²⁸	SM 23rd edition ⁴⁹	SM Online ³	ASTM ⁴	Other
Alkalinity	Titrimetric		2320 B	2320 B	2320 B		D1067-06 B, 11 B, 16 B	
Antimony	Hydride—Atomic Absorption						D 3697-07, -12	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry	200.5, Revision 4.2 ²						

	(AVICP-AES)							
Arsenic	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 2972-08 C, -15 C	
	Hydride Atomic Absorption		3114 B	3114 B	3114 B	3114 B-09	D 2972-08 B, -15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Barium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Direct		3111 D	3111 D	3111 D			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Beryllium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 3645-08 B, -15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Cadmium	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Calcium	EDTA titrimetric		3500-Ca B	3500-Ca B	3500-Ca B		D 511-09, -14 A	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B		D 511-09, -14 B	

	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
	Ion Chromatography						D 6919-09	
Chromium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Copper	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 1688-07, -12 C	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B		D 1688-07, -12 A	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
	Colorimetry							Hach Method 8026; ³⁵ Hach Method 10272. ³⁶
Conductivity	Conductance		2510 B	2510 B	2510 B		D 1125-14 A	
Cyanide	Manual Distillation with MgCl ₂ followed by:		4500-CN ⁻ C	4500-CN ⁻ C	4500-CN ⁻ C	4500-CN ⁻ C-99	D 2036-06 A	
	Spectrophotometric, Amenable		4500-CN ⁻ G	4500-CN ⁻ G	4500-CN ⁻ G		D 2036-06 B	
	Spectrophotometric Manual		4500-CN ⁻ E	4500-CN ⁻ E	4500-CN ⁻ E		D2036-06 A	
	Selective Electrode		4500-CN ⁻ F	4500-CN ⁻ F	4500-CN ⁻ F			
	Gas							ME355.01. ⁷

	Chromatography/Mass Spectrometry Headspace							
Fluoride	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Manual Distillation; Colorimetric SPADNS		4500-F ⁻ B, D	4500-F ⁻ B, D	4500-F ⁻ B, D			
	Manual Electrode		4500-F ⁻ C	4500-F ⁻ C	4500-F ⁻ C		D 1179-04, 10 B, 16 B	
	Automated Alizarin		4500-F ⁻ E	4500-F ⁻ E	4500-F ⁻ E			
	Arsenite-Free Colorimetric SPADNS							Hach SPADNS 2 Method 10225. ²²
Lead	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 3559-08 D, 15 D	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Magnesium	Atomic Absorption		3111 B	3111 B	3111 B		D 511-09, -14 B	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Complexation Titrimetric Methods		3500-Mg B	3500-Mg B	3500-Mg B		D 511-09, -14 A	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
	Ion Chromatography						D 6919-09	
Mercury	Manual, Cold Vapor		3112 B	3112 B	3112 B	3112 B-09	D 3223-12	
Nickel	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Direct		3111 B	3111 B	3111 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		

	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Nitrate	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Automated Cadmium Reduction		4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F			
	Manual Cadmium Reduction		4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E			
	Ion Selective Electrode		4500-NO ₃ ⁻ D	4500-NO ₃ ⁻ D	4500-NO ₃ ⁻ D			
	Reduction-Colorimetric							Systea Easy (1-Reagent); ⁸ N ECi Nitrate-Reductase. ⁴⁰
	Colorimetric; Direct							Hach TNTplus™ 8 35/836 Method 10206. ²³
	Capillary Ion Electrophoresis						D 6508-15	
Nitrite	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Automated Cadmium Reduction		4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F	4500-NO ₃ ⁻ F			
	Manual Cadmium Reduction		4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E	4500-NO ₃ ⁻ E			
	Spectrophotometric		4500-NO ₂ ⁻ B	4500-NO ₂ ⁻ B	4500-NO ₂ ⁻ B			
	Reduction/Colorimetric							Systea Easy (1-Reagent); ⁸ N ECi Nitrate-Reductase. ⁴⁰
	Capillary Ion Electrophoresis						D 6508-15	
Ortho-phosphate	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Colorimetric, ascorbic acid, single reagent		4500-P E	4500-P E	4500-P E	4500-P E-99		
	Colorimetric, Automated,		4500-P F	4500-P F	4500-P F	4500-P F-99		Thermo Fisher

	Ascorbic Acid							Discrete Analyzer. ⁴¹
	Capillary Ion Electrophoresis						D 6508-15	
pH	Electrometric	150.3 ⁴⁸	4500-H ⁺ B	4500-H ⁺ B	4500-H ⁺ B		D 1293-12	
Selenium	Hydride-Atomic Absorption		3114 B	3114 B	3114 B	3114 B-09	D 3859-08 A, -15 A	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 3859-08 B, -15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
Silica	Colorimetric						D859-05, 10, 16	
	Molybdosilicate		4500-SiO ₂ C	4500-SiO ₂ C	4500-SiO ₂ C			
	Heteropoly blue		4500-SiO ₂ D	4500-SiO ₂ D	4500-SiO ₂ D			
	Automated for Molybdate-reactive Silica		4500-SiO ₂ E	4500-SiO ₂ E	4500-SiO ₂ E			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
Sodium	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²						
	Ion Chromatography						D 6919-09	
Temperature	Thermometric		2550	2550	2550	2550-10		

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.24(e)(1)

Contaminant	Methodology	EPA method	SM 21st edition¹	SM 22nd edition,²⁸ SM 23rd edition⁴⁹	SM online³
Benzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Carbon tetrachloride	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Chlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,2-Dichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,4-Dichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,2-Dichloroethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
cis-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
trans-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Dichloromethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,2-Dichloropropane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Ethylbenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Styrene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Tetrachloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,1,1-Trichloroethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			

Trichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Toluene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,2,4-Trichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,1-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
1,1,2-Trichlorethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Vinyl chloride	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
Xylenes (total)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4. ²⁹			
2,4-D	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06.
2,4,5-TP (Silvex)	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06.
Alachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Atrazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)	536. ²⁵			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3, ²⁴ 523. ²⁶			
Benzo(a)pyrene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Carbofuran	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B	6610 B-04.
Chlordane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Dalapon	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557. ¹⁴			

	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06.
Di(2-ethylhexyl)adipate	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Di(2-ethylhexyl)phthalate	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Dibromochloropropane (DBCP)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3. ⁹			
Dinoseb	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06.
Endrin	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Ethyl dibromide (EDB)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3. ⁹			
Glyphosate	High-Performance Liquid Chromatography (HPLC) with Post-Column Derivatization and Fluorescence Detection		6651 B	6651 B	6651 B-00, B-05.
Heptachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Heptachlor Epoxide	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Hexachlorobenzene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Hexachlorocyclopentadiene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Lindane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Methoxychlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Oxamyl	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B	6610 B-04.
PCBs (as Aroclors)	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			

Pentachlorophenol	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06.
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Picloram	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06.
Simazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)	536. ²⁵			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3, ²⁴ 523. ²⁶			
Toxaphene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3. ²⁴			
Total Trihalomethanes	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3, ⁹ 524.4 ²⁹			

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.25(a)

Contaminant	Methodology	EPA method	SM 21st edition¹	SM 22nd edition,²⁸ SM 23rd edition⁴⁹	ASTM⁴	SM Online³
Naturally Occurring:						
Gross alpha and beta	Evaporation	900.0, Rev. 1.0 ⁵⁰	7110 B	7110 B		
	Liquid Scintillation				D 7283-17	7110 D-17.
Gross alpha Radium 226	Coprecipitation		7110 C	7110 C		
	Radon emanation		7500-Ra C	7500-Ra C	D 3454-05	
	Radiochemical		7500-Ra B	7500-Ra B	D 2460-07	
	Gamma Spectrometry			7500-Ra E		7500-Ra E-07.
Radium 228	Radiochemical		7500-Ra D	7500-Ra D		
	Gamma Spectrometry			7500Ra-E		7500-Ra E-07.
Uranium	Radiochemical		7500-U B	7500-U B		
	ICP-MS		3125		D 5673-05,	

					10, 16	
	Alpha spectrometry		7500-U C	7500-U C	D 3972-09	
	Laser Phosphorimetry				D 5174-07	
	Alpha Liquid Scintillation Spectrometry				D 6239-09	
Man-Made:						
Radioactive Cesium	Radiochemical		7500-Cs B	7500-Cs B		
	Gamma Ray Spectrometry		7120	7120	D 3649-06	
Radioactive Iodine	Radiochemical		7500-I B	7500-I B	D 3649-06	
			7500-I C	7500-I C		
			7500-I D	7500-I D		
	Gamma Ray Spectrometry		7120	7120	D 4785-08	
Radioactive Strontium 89, 90	Radiochemical		7500-Sr B	7500-Sr B		
Tritium	Liquid Scintillation		7500- ³ H B	7500- ³ H B	D 4107-08	
Gamma Emitters	Gamma Ray		7120	7120	D 3649-06	
	Spectrometry		7500-Cs B	7500-Cs B	D 4785-08	
			7500-I B	7500-I B		

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.74(a)(1)

Organism	Methodology	SM 21st edition¹	SM 22nd edition²⁸	SM 23rd edition⁴⁹	SM Online³	Other
Total Coliform	Total Coliform Fermentation Technique	9221 A, B, C	9221 A, B, C	9221 A, B, C	9221 A,B,C-06	
	Total Coliform Membrane Filter Technique	9222 A, B, C		9222 A, B, C.		
	ONPG-MUG Test	9223	9223 B	9223 B	9223 B-04.	
Fecal Coliforms	Fecal Coliform Procedure	9221 E	9221 E	9221 E	9221 E-06.	
	Fecal Coliform Filter Procedure	9222 D	9222 D	9222 D	9222 D-06.	
Heterotrophic bacteria	Pour Plate Method	9215 B	9215 B	9215 B	9215 B-04.	
	Nephelometric Method	2130 B	2130 B	2130 B		Hach Method 8195, Rev. 3.0. ⁵²

Turbidity	Laser Nephelometry (on-line)				Mitchell M5271, ¹⁰ Mitchell M5331, Rev. 1.2, ⁴² Lovibond PTV 6000. ⁴⁶
	LED Nephelometry (on-line)				Mitchell M5331, ¹¹ Mitchell M5331, Rev. 1.2, ⁴² Lovibond PTV 2000. ⁴⁵
	LED Nephelometry (on-line)				AMI Turbiwell, ¹⁵ Lovibond PTV 1000. ⁴⁴
	LED Nephelometry (portable)				Orion AQ4500. ¹²
	360° Nephelometry				Hach Method 10258 Rev. 1.0, ³⁹ Hach Method 10258, Rev. 2.0. ⁵¹

Alternative Testing Methods for Disinfectant Residuals Listed at 40 CFR 141.74(a)(2)

Residual	Methodology	SM 21st edition¹	SM 22nd edition,²⁸ SM 23rd edition⁴⁹	ASTM⁴	Other
Free Chlorine	Amperometric Titration	4500-C1 D	4500-C1 D	D 1253-08, -14	
	DPD Ferrous Titrimetric	4500-C1 F	4500-C1 F		
	DPD Colorimetric	4500-C1 G	4500-C1 G		Hach Method 10260. ³¹
	Indophenol Colorimetric				Hach Method 10241. ³⁴
	Syringaldazine (FACTS)	4500-C1 H	4500-C1 H		
	On-line Chlorine Analyzer				EPA 334.0. ¹⁶
	Amperometric Sensor				ChloroSense. ¹⁷
Total Chlorine	Amperometric Titration	4500-C1 D	4500-C1 D	D 1253-08, -14	
	Amperometric Titration (Low level measurement)	4500-C1 E	4500-C1 E.		
	DPD Ferrous Titrimetric	4500-C1 F	4500-C1 F.		
	DPD Colorimetric	4500-C1 G	4500-C1 G		Hach Method 10260. ³¹
	Iodometric Electrode	4500-C1 I	4500-C1 I.		
	On-line Chlorine Analyzer				EPA 334.0. ¹⁶
	Amperometric Sensor				ChloroSense. ¹⁷

Chlorine Dioxide	Amperometric Titration	4500-ClO ₂ C	4500-ClO ₂ C.		
	Amperometric Titration	4500-ClO ₂ E.	4500-ClO ₂ E.		
	Amperometric Sensor				ChlordioX Plus. ³²
Ozone	Indigo Method	4500-O ₃ B	4500-O ₃ B.		

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.131(b)(1)

Contaminant	Methodology	EPA method	ASTM⁴	SM online³	SM 21st edition¹	SM 22nd edition,²⁸ SM 23rd edition⁴⁹	Other
TTHM	P&T/GC/MS	524.3, ⁹ 524.4. ²⁹					
HAA5	LLE (diazomethane)/GC/ECD			6251 B-07	6251 B	6251 B.	
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557. ¹⁴					
	Two-Dimensional Ion Chromatography (IC) with Suppressed Conductivity Detection						Thermo Fisher 557.1. ⁴⁷
Bromate	Two-Dimensional Ion Chromatography (IC)	302.0. ¹⁸					
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557. ¹⁴					
	Chemically Suppressed Ion Chromatography		D 6581-08 A.				
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B.				
Chlorite	Chemically Suppressed Ion Chromatography		D 6581-08 A.				
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B.				
Chlorite—daily monitoring as prescribed in 40 CFR 141.132(b)(2)(i)(A)	Amperometric Titration				4500-ClO ₂ E	4500-ClO ₂ E.	
	Amperometric Sensor						ChlordioX Plus. ³²

Alternative Testing Methods for Disinfectant Residuals Listed at 40 CFR 141.131(c)(1)

Residual	Methodology	SM 21st edition¹	SM 22nd edition,²⁸ SM 23rd edition⁴⁹	ASTM⁴	Other
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08,	

				-14.	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260. ³¹
	Indophenol Colorimetric				Hach Method 10241. ³⁴
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H.		
	Amperometric Sensor				ChloroSense. ¹⁷
	On-line Chlorine Analyzer				EPA 334.0. ¹⁶
Combined Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08, -14.	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260. ³¹
Total Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08, -14.	
	Low level Amperometric Titration	4500-Cl E	4500-Cl E.		
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F.		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260. ³¹
	Iodometric Electrode	4500-Cl I	4500-Cl I.		
	Amperometric Sensor				ChloroSense. ¹⁷
	On-line Chlorine Analyzer				EPA 334.0. ¹⁶
Chlorine Dioxide	Amperometric Method II	4500-ClO ₂ E	4500-ClO ₂ E.		
	Amperometric Sensor				ChlorioX Plus. ³²

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.21(f)(3)

Organism	Methodology	SM 21st Edition¹	SM 22nd Edition²⁸	SM Online³	Other
Total Coliforms	Total Coliform Fermentation Technique	9221 A, B	9221 A, B	9221 A,B-06	
	Total Coliform Membrane Filter Technique	9222 A, B, C			
	Presence-Absence (P-A) Coliform Test	9221 D			
	ONPG-MUG Test	9223	9223 B	9223 B-04	
	Colitag TM				Modified Colitag ^{TM13}
	Tecta EC/TC ³³				

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.21(f)(5)

Organism	Methodology	SM 22nd Edition ²⁸	SM Online ³
Fecal Coliforms	Fecal Coliform Procedure	9221 E	9221 E-06

**Alternative Testing Methods for Disinfectant Residuals Listed at 40 CFR 141.131(c)(2),
If Approved by the State**

Residual	Methodology	Method
Free Chlorine	Test Strips	Method D99-003 ⁵

Alternative Testing Methods for Parameters Listed at 40 CFR 141.131(d)

Parameter	Methodology	SM 21st edition ¹	SM 22nd edition ²⁸	SM 23rd edition ⁴⁹	SM online ³	EPA	Other
Total Organic Carbon (TOC)	High Temperature Combustion	5310 B	5310 B	5310 B		415.3, Rev 1.2. ¹⁹	
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	5310 C	5310 C		415.3, Rev 1.2. ¹⁹	Hach Method 10267. ³⁸
	Wet Oxidation	5310 D	5310 D			415.3, Rev 1.2. ¹⁹	
	Ozone Oxidation						Hach Method 10261. ³⁷
Specific Ultraviolet Absorbance (SUVA)	Calculation using DOC and UV ₂₅₄ data					415.3, Rev 1.2. ¹⁹	
Dissolved Organic Carbon (DOC)	High Temperature Combustion	5310 B	5310 B	5310 B		415.3, Rev 1.2. ¹⁹	
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	5310 C	5310 C		415.3, Rev 1.2. ¹⁹	
	Wet Oxidation	5310 D	5310 D			415.3, Rev 1.2. ¹⁹	
Ultraviolet absorption at 254 nm (UV₂₅₄)	Spectrophotometry	5910 B	5910 B	5910 B	5910 B-11	415.3, Rev 1.2. ¹⁹	

**Alternative Testing Methods with MRL ≤0.0010 mg/L for Monitoring
Listed at 40 CFR 141.132(b)(3)(ii)(B)**

CONTAMINANT	METHODOLOGY	EPA METHOD
Bromate	Two-Dimensional Ion Chromatography (IC)	302.0 ¹⁸
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹⁴

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.402(c)(2)

Organism	Methodology	SM 20th edition ⁶	SM 21st edition ¹	SM 22nd edition ²⁸	SM 23rd edition ⁴⁹	SM online ³	Other
<i>E. coli</i>	Colilert		9223 B	9223 B	9223 B	9223 B-97, B-04.	
	Colisure		9223 B	9223 B	9223 B	9223 B-97, B-04.	
	Colilert-18	9223 B	9223 B	9223 B	9223 B	9223 B-97, B-04.	
	Readycult [®]						Readycult [®] . ²⁰
	Colitag						Modified Colitag. ^{TM13}
	Chromocult [®]						Chromocult [®] . ²¹
	EC-MUG			9221 F	9221 F	9221 F-06.	
	NA-MUG				9222 I.		
	m-ColiBlue24 Test				9222 J.		
	Tecta EC/TC ³³⁴³						
Enterococci	Multiple-Tube Technique					9230 B-04.	
	Membrane Filter Techniques				9230 C.		
	Fluorogenic Substrate Enterococcus Test (using Enterolert)				9230 D.		
Coliphage	Two-Step Enrichment Presence-Absence Procedure						Fast Phage. ³⁰

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.704(a)

Organism	Methodology	EPA Method
<i>Cryptosporidium</i>	Filtration/Immunomagnetic Separation/Immunofluorescence Assay Microscopy	1623.1 ²⁷

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.704(b)

Organism	Methodology	SM 20th edition⁶
<i>E. coli</i>	Membrane Filtration, Two Step	9222 D/9222 G

Alternative Testing Methods for Contaminants Listed at 40 CFR 141.852(a)(5)

Organism	Methodology category	Method	SM 20th 21st editions¹⁶	SM 22nd edition²⁸	SM 23rd edition⁴⁹	SM online³	
Total Coliforms	Lactose Fermentation Methods	Standard Total Coliform Fermentation Technique		9221 B.1, B.2	9221 B.1, B.2, B.3, B.4	9221 B.1, B.2-06.	
		Presence-Absence (P-A) Coliform Test			9221 D.1, D.2, D.3		
	Membrane Filtration Methods	Standard Total Coliform Membrane Filter Procedure using Endo Media				9222 B, C.	
		Simultaneous Detection of Total Coliforms and <i>E. coli</i> by Dual Chromogen Membrane Filter Procedure (using mColiBlue24 medium)				9222 J.	
	Enzyme Substrate Methods	Colilert [®]			9223 B	9223 B	9223 B-04.
		Colisure [®]			9223 B	9223 B	9223 B-04.
		Colilert-18	9223 B		9223 B	9223 B	9223 B-04.
		Tecta EC/TC ^{33 43}					
	<i>Escherichia coli</i>	<i>Escherichia coli</i> Procedure (following Lactose Fermentation Methods)	EC-MUG medium		9221 F.1	9221 F.1	9221 F.1-06.
		<i>Escherichia coli</i> Partitioning Methods (following Membrane Filtration Methods)	EC broth with MUG (EC-MUG)			9222 H.	
NA-MUG medium					9222 I.		
Simultaneous Detection of Total Coliforms and <i>E. coli</i> by Dual Chromogen Membrane Filter Procedure		mColiBlue24 medium			9222 J.		
Enzyme Substrate Methods		Colilert [®]			9223 B	9223 B	9223 B-04.

		Colisure®		9223 B	9223 B	9223 B-04.
		Colilert-18	9223 B	9223 B	9223 B	9223 B-04.
		Tecta EC/TC ^{33 43}				

Alternative Testing Methods for Contaminants Listed at 40 CFR 143.4(b)

Contaminant	Methodology	EPA method	ASTM ⁴	SM 21st edition ¹	SM 22nd edition, ²⁸ SM 23rd edition ⁴⁹	SM online ³
Aluminum	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2. ²				
	Atomic Absorption; Direct			3111 D	3111 D.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Chloride	Silver Nitrate Titration		D 512-04 B, 12 B	4500-Cl ⁻ B	4500-Cl ⁻ B	
	Ion Chromatography		D 4327-11	4110 B	4110 B.	
	Potentiometric Titration			4500-Cl ⁻ D	4500-Cl ⁻ D.	
Color	Visual Comparison			2120 B	2120 B.	
Foaming Agents	Methylene Blue Active Substances (MBAS)			5540 C	5540 C.	
Iron	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2. ²				
	Atomic Absorption; Direct			3111 B	3111 B.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Manganese	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2. ²				
	Atomic Absorption; Direct			3111 B	3111 B.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Odor	Threshold Odor Test			2150 B	2150 B.	

Silver	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2. ²				
	Atomic Absorption; Direct			3111 B	3111 B.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Sulfate	Ion Chromatography		D 4327-11	4110 B	4110 B.	
	Gravimetric with ignition of residue			4500-SO ₄ ²⁻ C	4500-SO ₄ ²⁻ C	4500-SO ₄ ²⁻ C-97.
	Gravimetric with drying of residue			4500-SO ₄ ²⁻ D	4500-SO ₄ ²⁻ D	4500-SO ₄ ²⁻ D-97.
	Turbidimetric method		D 516-07, 11, 16	4500-SO ₄ ²⁻ E	4500-SO ₄ ²⁻ E	4500-SO ₄ ²⁻ E-97.
	Automated methylthymol blue method			4500-SO ₄ ²⁻ F	4500-SO ₄ ²⁻ F	4500-SO ₄ ²⁻ F-97.
Total Dissolved Solids	Total Dissolved Solids Dried at 180 deg C			2540 C	2540 C.	
Zinc	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2. ²				
	Atomic Absorption; Direct Aspiration			3111 B	3111 B.	
	Inductively Coupled Plasma			3120 B	3120 B.	

¹Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street, NW., Washington, DC 20001-3710.

²EPA Method 200.5, Revision 4.2. "Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry." 2003. EPA/600/R-06/115. (Available at <http://www.epa.gov/water-research/epa-drinking-water-research-methods>.)

³Standard Methods Online are available at <http://www.standardmethods.org>. 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 may be used.

⁴Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or <http://astm.org>. The methods listed are the only alternative versions that may be used.

⁵Method D99-003, Revision 3.0. "Free Chlorine Species (HOCl⁻ and OCl⁻) by Test Strip," November 21, 2003. Available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730.

⁶Standard Methods for the Examination of Water and Wastewater, 20th edition (1998). Available from American Public Health Association, 800 I Street, NW., Washington, DC 20001-3710.

⁷Method ME355.01, Revision 1.0. “Determination of Cyanide in Drinking Water by GC/MS Headspace,” May 26, 2009. Available at <http://www.nemi.gov> or from James Eaton, H & E Testing Laboratory, 221 State Street, Augusta, ME 04333. (207) 287-2727.

⁸Systea Easy (1-Reagent). “Systea Easy (1-Reagent) Nitrate Method,” February 4, 2009. Available at <http://www.nemi.gov> or from Systea Scientific, LLC., 900 Jorie Blvd., Suite 35, Oak Brook, IL 60523.

⁹EPA Method 524.3, Version 1.0. “Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry,” June 2009. EPA 815-B-09-009. Available at <https://www.nemi.gov>.

¹⁰Mitchell Method M5271, Revision 1.1. “Determination of Turbidity by Laser Nephelometry,” March 5, 2009. Available at <http://www.nemi.gov> or from Leck Mitchell, PhD, PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

¹¹Mitchell Method M5331, Revision 1.1. “Determination of Turbidity by LED Nephelometry,” March 5, 2009. Available at <http://www.nemi.gov> or from Leck Mitchell, PhD, PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

¹²Orion Method AQ4500, Revision 1.0. “Determination of Turbidity by LED Nephelometry,” May 8, 2009. Available at <http://www.nemi.gov> or from Thermo Scientific, 166 Cummings Center, Beverly, MA 01915, <http://www.thermo.com>.

¹³Modified ColitagTM Method, “Modified ColitagTM Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water (ATP D05-0035),” August 28, 2009. Available at <http://www.nemi.gov> or from CPI, International, 580 Skylane Boulevard, Santa Rosa, CA 95403.

¹⁴EPA Method 557. “Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS),” September 2009. EPA 815-B-09-012. Available at <https://www.nemi.gov>.

¹⁵AMI Turbiwell, “Continuous Measurement of Turbidity Using a SWAN AMI Turbiwell Turbidimeter,” August 2009. Available at <http://www.nemi.gov> or from Markus Bernasconi, SWAN Analytische Instrumente AG, Studbachstrasse 13, CH-8340 Hinwil, Switzerland.

¹⁶EPA Method 334.0. “Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer,” September 2009. EPA 815-B-09-013. Available at <https://www.nemi.gov>.

¹⁷ChloroSense. “Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense,” August 2009. Available at <https://www.nemi.gov> or from Palintest Ltd, 1455 Jamike Avenue (Suite 100), Erlanger, KY 41018.

¹⁸EPA Method 302.0. “Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection,” September 2009. EPA 815-B-09-014. Available at <https://www.nemi.gov>.

¹⁹EPA 415.3, Revision 1.2. “Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,” September 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/water-research/epa-drinking-water-research-methods>.

²⁰Readycult[®] Method, “Readycult[®] Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters,” January, 2007. Version 1.1. Available from EMD Millipore (division of Merck KGaA, Darmstadt, Germany), 290 Concord Road, Billerica, MA 01821.

- ²¹Chromocult® Method, “Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters,” November, 2000. Version 1.0. EMD Millipore (division of Merck KGaA, Darmstadt, Germany), 290 Concord Road, Billerica, MA 01821.
- ²²Hach Company. “Hach Company SPADNS 2 (Arsenite-Free) Fluoride Method 10225—Spectrophotometric Measurement of Fluoride in Water and Wastewater,” January 2011. 5600 Lindbergh Drive, P.O. Box 389, Loveland, Colorado 80539.
- ²³Hach Company. “Hach Company TNTplus™ 835/836 Nitrate Method 10206—Spectrophotometric Measurement of Nitrate in Water and Wastewater,” January 2011. 5600 Lindbergh Drive, P.O. Box 389, Loveland, Colorado 80539.
- ²⁴EPA Method 525.3. “Determination of Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS),” February 2012. EPA/600/R-12/010. Available at <http://www.epa.gov/water-research/epa-drinking-water-research-methods>.
- ²⁵EPA Method 536. “Determination of Triazine Pesticides and their Degradates in Drinking Water by Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS),” October 2007. EPA 815-B-07-002. Available at the National Service Center for Environmental Publications (EPA Method 536).
- ²⁶EPA Method 523. “Determination of Triazine Pesticides and their Degradates in Drinking Water by Gas Chromatography/Mass Spectrometry (GC/MS),” February 2011. EPA 815-R-11-002. Available at the National Service Center for Environmental Publications (EPA Method 523).
- ²⁷EPA Method 1623.1. “*Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA,” 2012. EPA-816-R-12-001. Available at the National Service Center for Environmental Publications (www.epa.gov/nscep). Search “816R12001”.
- ²⁸*Standard Methods for the Examination of Water and Wastewater*, 22nd edition (2012). Available from American Public Health Association, 800 I Street NW., Washington, DC 20001-3710.
- ²⁹EPA Method 524.4, Version 1.0. “Measurement of Purgeable Organic Compounds in Water by Gas Chromatography/Mass Spectrometry using Nitrogen Purge Gas,” May 2013. EPA 815-R-13-002. Available at the National Service Center for Environmental Publications (EPA Method 524.4).
- ³⁰Charm Sciences Inc. “Fast Phage Test Procedure. Presence/Absence for Coliphage in Ground Water with Same Day Positive Prediction”. Version 009. November 2012. 659 Andover Street, Lawrence, MA 01843. Available at www.charmsciences.com.
- ³¹Hach Company. “Hach Method 10260—Determination of Chlorinated Oxidants (Free and Total) in Water Using Disposable Planar Reagent-filled Cuvettes and Mesofluidic Channel Colorimetry,” April 2013. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.
- ³²ChlordioX Plus. “Chlorine Dioxide and Chlorite in Drinking Water by Amperometry using Disposable Sensors,” November 2013. Available from Palintest Ltd, Jamike Avenue (Suite 100), Erlanger, KY 41018.
- ³³Tecta EC/TC. “Tecta™EC/TC Medium and Tecta™Instrument: A Presence/Absence Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* (*E. coli*) in Drinking Water,” version 1.0, May 2014. Available from Pathogen Detection Systems, Inc., 382 King Street East, Kingston, Ontario, Canada, K7K 2Y2.
- ³⁴Hach Company. “Hach Method 10241—Spectrophotometric Measurement of Free Chlorine (Cl₂) in Drinking Water,” November 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.
- ³⁵Hach Company. “Hach Method 8026—Spectrophotometric Measurement of Copper in Finished Drinking Water,” December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

- ³⁶Hach Company. “Hach Method 10272—Spectrophotometric Measurement of Copper in Finished Drinking Water,” December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.
- ³⁷Hach Company. “Hach Method 10261—Total Organic Carbon in Finished Drinking Water by Catalyzed Ozone Hydroxyl Radical Oxidation Infrared Analysis,” December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.
- ³⁸Hach Company. “Hach Method 10267—Spectrophotometric Measurement of Total Organic Carbon (TOC) in Finished Drinking Water,” December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.
- ³⁹Hach Company. “Hach Method 10258—Determination of Turbidity by 360° Nephelometry,” January 2016. Revision 1.0. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.
- ⁴⁰Nitrate Elimination Company, Inc. (NECi). “Method for Nitrate Reductase Nitrate-Nitrogen Analysis of Drinking Water,” February 2016. Superior Enzymes, Inc., 334 Hecla Street, Lake Linden, Michigan 49945.
- ⁴¹Thermo Fisher. “Thermo Fisher Scientific Drinking Water Orthophosphate Method for Thermo Scientific Gallery Discrete Analyzer,” February 2016. Revision 5. Thermo Fisher Scientific, Ratastie 2, 01620 Vantaa, Finland.
- ⁴²Mitchell Method M5331, Revision 1.2. “Determination of Turbidity by LED or Laser Nephelometry,” February 2016. Available from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.
- ⁴³Tecta EC/TC. “Tecta™ EC/TC Medium and the Tecta™ Instrument: A Presence/Absence Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* (*E. coli*) in Drinking Water,” version 2.0, February 2017. Available from Pathogen Detection Systems, Inc., 382 King Street East, Kingston, Ontario, Canada, K7K 2Y2.
- ⁴⁴Lovibond PTV 1000. “Continuous Measurement of Drinking Water Turbidity Using a Lovibond PTV 1000 White Light LED Turbidimeter,” December 2016. Revision 1.0. Available from Tintometer, Inc., 6456 Parkland Drive, Sarasota, FL 34243.
- ⁴⁵Lovibond PTV 2000. “Continuous Measurement of Drinking Water Turbidity Using a Lovibond PTV 2000 660-nm LED Turbidimeter,” December 2016. Revision 1.0. Available from Tintometer, Inc., 6456 Parkland Drive, Sarasota, FL 34243.
- ⁴⁶Lovibond PTV 6000. “Continuous Measurement of Drinking Water Turbidity Using a Lovibond PTV 6000 Laser Turbidimeter,” December 2016. Revision 1.0. Available from Tintometer, Inc., 6456 Parkland Drive, Sarasota, FL 34243.
- ⁴⁷Thermo Fisher. “Thermo Fisher Method 557.1: Determination of Haloacetic Acids in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection,” January 2017. Version 1.0. Available from Thermo Fisher Scientific, 490 Lakeside Dr., Sunnyvale, CA 94085 (Richard.jack@thermofisher.com).
- ⁴⁸EPA Method 150.3. “Determination of pH in Drinking Water,” February 2017. EPA 815-B-17-001. Available at the National Service Center for Environmental Publications (EPA Method 150.3).
- ⁴⁹*Standard Methods for the Examination of Water and Wastewater*, 23rd edition (2017). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.
- ⁵⁰EPA Method 900.0, Rev. 1.0. “Determination of Gross Alpha and Gross Beta in Drinking Water,” February 2018. EPA 815-B-18-002. Available at the National Service Center for Environmental Publications (EPA Method 900.0 Rev 1.0).

⁵¹Hach Company. “Hach Method 10258—Determination of Turbidity by 360° Nephelometry,” March 2018. Revision 2.0. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

⁵²Hach Company. “Hach Method 8195—Determination of Turbidity by Nephelometry,” March 2018. Revision 3.0. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539. [74 FR 38353, Aug. 3, 2009, as amended at 74 FR 57914, Nov. 10, 2009; 74 FR 63069, Dec. 2, 2009; 75 FR 32299, June 8, 2010; 76 FR 37018, June 24, 2011; 77 FR 38527, June 28, 2012; 78 FR 32565, May 31, 2013; 78 FR 37463, June 21, 2013; 79 FR 35086, June 19, 2014; 79 FR 36428, June 27, 2014; 81 FR 46844, July 19, 2016; 82 FR 34867, July 27, 2017; 83 FR 51644, Oct. 12, 2018; 83 FR 54676, Oct. 31, 2018]

Subpart D—Reporting and Recordkeeping

§141.31 Reporting requirements.

- (a) Except where a shorter period is specified in this part, the supplier of water shall report to the State the results of any test measurement or analysis required by this part within (1) The first ten days following the month in which the result is received, or (2) the first ten days following the end of the required monitoring period as stipulated by the State, whichever of these is shortest.
- (b) Except where a different reporting period is specified in this part, the supplier of water must report to the State within 48 hours the failure to comply with any national primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.
- (c) The supplier of water is not required to report analytical results to the State in cases where a State laboratory performs the analysis and reports the results to the State office which would normally receive such notification from the supplier.
- (d) The public water system, within 10 days of completing the public notification requirements under subpart Q of this part for the initial public notice and any repeat notices, must submit to the primacy agency a certification that it has fully complied with the public notification regulations. The public water system must include with this certification a representative copy of each type of notice distributed, published, posted, and made available to the persons served by the system and to the media.
- (e) The water supply system shall submit to the State within the time stated in the request copies of any records required to be maintained under §141.33 hereof or copies of any documents then in existence which the State or the Administrator is entitled to inspect pursuant to the authority of section 1445 of the Safe Drinking Water Act or the equivalent provisions of State law.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57345, Aug. 27, 1980; 65 FR 26022, May 4, 2000]

§141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

- (a) Records of microbiological analyses and turbidity analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:
 - (1) The date, place, and time of sampling, and the name of the person who collected the sample;
 - (2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;
 - (3) Date of analysis;
 - (4) Laboratory and person responsible for performing analysis;
 - (5) The analytical technique/method used; and
 - (6) The results of the analysis.
- (b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

- (c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.
- (d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.
- (e) Copies of public notices issued pursuant to subpart Q of this part and certifications made to the primacy agency pursuant to §141.31 must be kept for three years after issuance.
- (f) Copies of monitoring plans developed pursuant to this part shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under paragraph (a) of this section, except as specified elsewhere in this part.

[40 FR 59570, Dec. 24, 1975, as amended at 65 FR 26022, May 4, 2000; 71 FR 478, Jan. 4, 2006]

§141.35 Reporting for unregulated contaminant monitoring results.

- (a) **General applicability.** This section applies to any owner or operator of a public water system (PWS) required to monitor for unregulated contaminants under §141.40(a); such owner or operator is referred to as “you.” This section specifies the information that must be reported to EPA prior to the commencement of monitoring and describes the process for reporting monitoring results to EPA. For the purposes of this section, PWS “population served” is the retail population served directly by the PWS as reported to the Federal Safe Drinking Water Information System (SDWIS/Fed); wholesale or consecutive populations are not included. For purposes of this section, the term “finished” means water that is introduced into the distribution system of a PWS and is intended for distribution and consumption without further treatment, except the treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals). For purposes of this section, the term “State” refers to the State or Tribal government entity that has jurisdiction over your PWS even if that government does not have primary enforcement responsibility for PWSs under the Safe Drinking Water Act. For purposes of this section, the term “PWS Official” refers to the person at your PWS who is able to function as the official spokesperson for the system's Unregulated Contaminant Monitoring Regulation (UCMR) activities; and the term “PWS Technical Contact” refers to the person at your PWS who is responsible for the technical aspects of your UCMR activities, such as details concerning sampling and reporting.
- (b) **Reporting by all systems.** You must meet the reporting requirements of this paragraph if you meet the applicability criteria in §141.40(a)(1) and (2).
 - (1) **Where to submit UCMR reporting requirement information.** Some of your reporting requirements are to be fulfilled electronically and others by mail. Information that must be submitted using EPA's electronic data reporting system must be submitted through: <https://www.epa.gov/dwucmr>. Documentation that is required to be mailed can be submitted either: To UCMR Sampling Coordinator, USEPA, Technical Support Center, 26 West Martin Luther King Drive (MS 140), Cincinnati, OH 45268; or by email at UCMR_Sampling_Coordinator@epa.gov. In addition, you must notify the public of the availability of unregulated contaminant monitoring data as provided in subpart Q (Public Notification) of this part (40 CFR 141.207). Community Water Systems that detect unregulated contaminants under this monitoring must also address such detections as part of their Consumer Confidence Reports, as provided in subpart O of this part (40 CFR 141.151).
 - (2) **Contacting EPA if your system does not meet applicability criteria or has a status change.** *Contacting EPA if your system does not meet applicability criteria or has a status change.* If you have received a letter from EPA or your State concerning your required monitoring and your system does not meet the applicability criteria for UCMR established in §141.40(a)(1) or (2), or if a change occurs at your system that may affect your requirements under UCMR as defined in §141.40(a)(3) through (5), you must mail or email a letter to EPA, as specified in paragraph (b)(1) of this section. The letter must be from your PWS Official and must include your PWS Identification (PWSID) Code along with an explanation as to why the UCMR requirements are not applicable to your PWS, or have changed for your PWS, along with the appropriate contact information. EPA will make an applicability determination based on your letter and in consultation with the State when

necessary. You are subject to UCMR requirements unless and until you receive a letter from EPA agreeing that you do not meet the applicability criteria.

(c) **Reporting by large systems.** If you serve a population of more than 10,000 people, and meet the applicability criteria in §141.40(a)(2)(i), you must meet the reporting requirements in paragraphs (c)(1) through (8) of this section.

(1) **Contact and zip code information.** You must provide contact information by December 31, 2017, and provide updates within 30 days if this information changes. The contact information must be submitted using EPA's electronic data reporting system, as specified in paragraph (b)(1) of this section, and include the name, affiliation, mailing address, phone number, and email address for your PWS Technical Contact and your PWS Official. In addition, as a one-time reporting requirement, you must report the U.S. Postal Service Zip Code(s) for all areas being served water by your PWS.

(2) **Sampling location and inventory information.** You must provide your sampling location(s) and inventory information by December 31, 2017, using EPA's electronic data reporting system. You must submit, verify or update the following information for each sampling location, or for each approved representative sampling location (as specified in paragraph (c)(3) of this section regarding representative sampling locations): PWSID Code; PWS Name; PWS Facility Identification Code; PWS Facility Name; PWS Facility Type; Water Source Type; Sampling Point Identification Code; Sampling Point Name; and Sampling Point Type Code; (as defined in Table 1 of paragraph (e) of this section). If this information changes, you must report updates, including new sources and sampling locations that are put in use before or during the PWS' UCMR sampling period, to EPA's electronic data reporting system within 30 days of the change.

(3) **Proposed ground water representative sampling locations.** Some systems that use ground water as a source and have multiple entry points to the distribution system (EPTDSs) may propose monitoring at representative entry point(s), rather than monitor at every EPTDS, as follows:

(i) **Qualifications.** Large PWSs that have EPA- or State-approved alternate EPTDS sampling locations from a previous UCMR cycle, or as provided for under §141.23(a)(1), §141.24(f)(1), or §141.24(h)(1), may submit a copy of documentation from their State or EPA that approves their alternative sampling plan for EPTDSs. PWSs that do not have an approved alternative EPTDS sampling plan may submit a proposal to sample at representative EPTDS(s) rather than at each individual EPTDS if: They use ground water as a source; all of their well sources have either the same treatment or no treatment; and they have multiple EPTDSs from the same source, such as an aquifer. You must submit a copy of the existing alternate EPTDS sampling plan or your representative well proposal, as appropriate, April 19, 2017, as specified in paragraph (b)(1) of this section.

(ii) **Demonstration.** If you are submitting a proposal to sample at representative EPTDS(s) rather than at each individual EPTDS, you must demonstrate that any EPTDS that you select as representative of the ground water you supply from multiple wells is associated with a well that draws from the same aquifer as the wells it will represent. The proposed well must be representative of the highest annual volume producing and most consistently active wells in the representative array. If that representative well is not in use at the scheduled sampling time, you must select and sample an alternative representative well. You must submit the following information for each proposed representative sampling location: PWSID Code; PWS Name; PWS Facility Identification Code; PWS Facility Name; PWS Facility Type; Sampling Point Identification Code; and Sampling Point Name (as defined in Table 1, paragraph (e) of this section). You must also include documentation to support your proposal that the specified wells are representative of other wells. This documentation can include system-maintained well logs or construction drawings indicating that the representative well(s) is/are at a representative depth, and details of well casings and grouting; data demonstrating relative homogeneity of water quality constituents (e.g., pH, dissolved oxygen, conductivity, iron, manganese) in samples drawn from each well; and data showing that your wells are located in a limited geographic area (e.g., all wells within a 0.5 mile radius) and/or, if available, the hydrogeologic data indicating the time of travel separating the representative well from each of the individual wells it represents (e.g., all wells within a five-year time of travel delineation). Your proposal must be sent in writing to EPA, as specified in paragraph (b)(1) of this section.

You must also provide a copy of this information to the State, unless otherwise directed by the State. Information about the actual or potential occurrence or non-occurrence of contaminants in an individual well, or a well's vulnerability to contamination, must not be used as a basis for selecting a representative well.

- (iii) **Approval.** EPA or the State (as specified in the Partnership Agreement reached between the State and EPA) will review your proposal, coordinate any necessary changes with you, and approve the final list of EPTDSs where you will be required to monitor. Your plan will not be final until you receive written approval from EPA or the State.

- (4) **Contacting EPA if your PWS has not been notified of requirements.** If you believe you are subject to UCMR requirements, as defined in §141.40(a)(1) and (2)(i), and you have not been notified by either EPA or your State by April 19, 2017, you must send a letter to EPA, as specified in paragraph (b)(1) of this section. The letter must be from your PWS Official and must include an explanation as to why the UCMR requirements are applicable to your system along with the appropriate contact information. A copy of the letter must also be submitted to the State, as directed by the State. EPA will make an applicability determination based on your letter, and in consultation with the State when necessary, and will notify you regarding your applicability status and required sampling schedule. However, if your PWS meets the applicability criteria specified in §141.40(a)(2)(i), you are subject to the UCMR monitoring and reporting requirements, regardless of whether you have been notified by the State or EPA.

- (5) **Notifying EPA if your PWS cannot sample according to schedule —**
 - (i) **General rescheduling notification requirements.** Large systems may change their monitoring schedules up to December 31, 2017, using EPA's electronic data reporting system, as specified in paragraph (b)(1) of this section. After this date has passed, if your PWS cannot sample according to your assigned sampling schedule (e.g., because of budget constraints, or if a sampling location will be closed during the scheduled month of monitoring), you must mail or email a letter to EPA, as specified in paragraph (b)(1) of this section, prior to the scheduled sampling date. You must include an explanation of why the samples cannot be taken according to the assigned schedule, and you must provide the alternative schedule you are requesting. You must not reschedule monitoring specifically to avoid sample collection during a suspected vulnerable period. You are subject to your assigned UCMR sampling schedule or the schedule that you revised on or before December 31, 2017, unless and until you receive a letter from EPA specifying a new schedule.
 - (ii) **Exceptions to the rescheduling notification requirements.** For ground water sampling, if the second round of sampling will be completed five to seven months after the first sampling event, as specified in Table 2 of §141.40(a)(4)(i)(B), no notification to EPA is required. If any ground water sampling location will be non-operational for more than one month before and one month after the month in which the second sampling event is scheduled (*i.e.*, it is not possible for you to sample within the five to seven-month window), you must notify EPA, as specified in paragraph (b)(1) of this section, explaining why the schedule cannot be met. You must comply with any modified schedule provided by EPA.

- (6) **Reporting monitoring results.** For UCMR samples, you must report all data elements specified in Table 1 of paragraph (e) of this section, using EPA's electronic data reporting system. You also must report any changes, relative to what is currently posted, made to data elements 1 through 9 to EPA in writing, explaining the nature and purpose of the proposed change, as specified in paragraph (b)(1) of this section.
 - (i) **Electronic reporting system.** You are responsible for ensuring that the laboratory conducting the analysis of your unregulated contaminant monitoring samples (your laboratory) posts the analytical results to EPA's electronic reporting system. You are also responsible for reviewing, approving, and submitting those results to EPA.
 - (ii) **Reporting schedule.** You must ensure that your laboratory posts the data to EPA's electronic data reporting system within 120 days from the sample collection date (sample collection must occur as specified in §141.40(a)(4)). You have 60 days from when the laboratory posts the data in EPA's electronic data reporting system to review, approve, and submit the data to the State

and EPA, at the Web address specified in paragraph (b)(1) of this section. If you do not electronically approve and submit the laboratory data to EPA within 60 days of the laboratory's posting data to EPA's electronic reporting system, the data will be considered approved by you and available for State and EPA review.

- (7) **Only one set of results accepted.** If you report more than one set of valid results for the same sampling location and the same sampling event (for example, because you have had more than one laboratory analyze replicate samples collected under §141.40(a)(5), or because you have collected multiple samples during a single monitoring event at the same sampling location), EPA will use the highest of the reported values as the official result.
- (8) **No reporting of previously collected data.** You cannot report previously collected data to meet the testing and reporting requirements for the contaminants listed in §141.40(a)(3). All analyses must be performed by laboratories approved by EPA to perform UCMR analyses using the analytical methods specified in Table 1 of §141.40(a)(3) and using samples collected according to §141.40(a)(4). Such requirements preclude the possibility of “grandfathering” previously collected data.
- (d) **Reporting by small systems.** If you serve a population of 10,000 or fewer people, and you are notified that you have been selected for UCMR monitoring, your reporting requirements will be specified within the materials that EPA sends you, including a request for contact information, and a request for information associated with the sampling kit.
 - (1) **Contact and zip code information.** EPA will send you a notice requesting contact information for key individuals at your system, including name, affiliation, mailing address, phone number and email address. These individuals include your PWS Technical Contact and your PWS Official. You are required to provide this contact information within 90 days of receiving the notice from EPA as specified in paragraph (b)(1) of this section. If this contact information changes, you also must provide updates within 30 days of the change, as specified in paragraph (b)(1) of this section. In addition, as a one-time reporting requirement, you must report the U.S. Postal Service Zip Code(s) for all areas being served water by your PWS.
 - (2) **Reporting sampling information.** You must provide your sampling location(s) by December 31, 2017, using EPA's electronic data reporting system, as specified in paragraph (b)(1) of this section. If this information changes, you must report updates, including new sources and sampling locations that are put in use before or during the PWS' UCMR sampling period, to EPA's electronic data reporting system within 30 days of the change, as specified in paragraph (b)(1) of this section. You must record all data elements listed in Table 1 of paragraph (e) of this section on each sample form and sample bottle, as appropriate, provided to you by the UCMR Sampling Coordinator. You must send this information as specified in the instructions of your sampling kit, which will include the due date and return address. You must report any changes made in data elements 1 through 9 by emailing an explanation of the nature and purpose of the proposed change to EPA, as specified in paragraph (b)(1) of this section.
- (e) **Data elements.** Table 1 defines the data elements that must be provided for UCMR monitoring.

Table 1—Unregulated Contaminant Monitoring Reporting Requirements

DATA ELEMENT	DEFINITION
1. Public Water System Identification (PWSID) Code	The code used to identify each PWS. The code begins with the standard 2-character postal State abbreviation or Region code; the remaining 7 numbers are unique to each PWS in the State. The same identification code must be used to represent the PWS identification for all current and future UCMR monitoring.
2. Public Water System Name	Unique name, assigned once by the PWS.
3.	An identification code established by the State or, at the State's discretion, by the PWS,

Public Water System Facility Identification Code	following the format of a 5-digit number unique within each PWS for each applicable facility (<i>i.e.</i> , for each source of water, treatment plant, distribution system, or any other facility associated with water treatment or delivery). The same identification code must be used to represent the facility for all current and future UCMR monitoring.
4. Public Water System Facility Name	Unique name, assigned once by the PWS, for every facility ID (e.g., Treatment Plant).
5. Public Water System Facility Type	That code that identifies that type of facility as either: CC = consecutive connection. DS = distribution system. IN = source water influent. SS = sampling station. TP = treatment plant. OT = other.
6. Water Source Type	The type of source water that supplies a water system facility. Systems must report one of the following codes for each sampling location: SW = surface water (to be reported for water facilities that are served entirely by a surface water source during the twelve-month period). GW = ground water (to be reported for water facilities that are served entirely by a ground water source during the twelve-month period). GU = ground water under the direct influence of surface water (to be reported for water facilities that are served all or in part by ground water under the direct influence of surface water at any time during the twelve-month sampling period), and are not served at all by surface water during this period. MX = mixed water (to be reported for water facilities that are served by a mix of surface water, ground water and/or ground water under the direct influence of surface water during the twelve-month period).
7. Sampling Point Identification Code	An identification code established by the State, or at the State's discretion, by the PWS, that uniquely identifies each sampling point. Each sampling code must be unique within each applicable facility, for each applicable sampling location (<i>i.e.</i> , entry point to the distribution system, source water influent or distribution system sample at maximum residence time). The same identification code must be used to represent the sampling location for all current and future UCMR monitoring.
8. Sampling Point Name	Unique sample point name, assigned once by the PWS, for every sample point ID (e.g., Entry Point).
9. Sampling Point Type Code	A code that identifies the location of the sampling point as either: SR = source water taken from plant influent; untreated water entering the water treatment plant (<i>i.e.</i> , a location prior to any treatment). EP = entry point to the distribution system. DS = distribution system sample.
10. Disinfectant Type	All of the disinfectants/oxidants that have been added prior to the entry point to the distribution system. Please select all that apply: PEMB = Permanganate. HPXB = Hydrogen peroxide. CLGA = Gaseous chlorine. CLOF = Offsite Generated Hypochlorite (stored as a liquid form). CLON = Onsite Generated Hypochlorite. CAGC = Chloramine (formed with gaseous chlorine). CAOF = Chloramine (formed with offsite hypochlorite). CAON = Chloramine (formed with onsite hypochlorite).

	<p>CLDB = Chlorine dioxide. OZON = Ozone. ULVL = Ultraviolet light. OTHD = All other types of disinfectant/oxidant. NODU = No disinfectant/oxidant used.</p>
11. Treatment Information	<p>Treatment information associated with the sample point. Please select all that apply: CON = Conventional (non-softening, consisting of at least coagulation/sedimentation basins and filtration). SFN = Softening. RBF = River bank filtration. PSD = Pre-sedimentation.</p>
	INF = In-line filtration.
	DFL = Direct filtration.
	SSF = Slow sand filtration.
	BIO = Biological filtration (operated with an intention of maintaining biological activity within filter).
	UTR = Unfiltered treatment for surface water source.
	GWD = Groundwater system with disinfection only.
	PAC = Application of powder activated carbon.
	GAC = Granular activated carbon adsorption (not part of filters in CON, SCO, INF, DFL, or SSF).
	AIR = Air stripping (packed towers, diffused gas contactors).
	POB = Pre-oxidation with chlorine (applied before coagulation for CON or SFN plants or before filtration for other filtration plants).
	MFL = Membrane filtration.
	IEX = Ionic exchange.
	DAF = Dissolved air floatation.
	CWL = Clear well/finished water storage without aeration.
	CWA = Clear well/finished water storage with aeration.
	ADS = Aeration in distribution system (localized treatment).
OTH = All other types of treatment.	
NTU = No treatment used.	
DKN = Do not know.	
12. Disinfectant Residual Type	<p>Disinfectant residual type in the distribution system for each HAA sample. CL2 = Chlorine (<i>i.e.</i>, originating from addition of free chlorine only). CLO2 = chlorine dioxide. CLM = Chloramines (originating from with addition of chlorine and ammonia or pre-formed chloramines). CAC = Chlorine and chloramines (if being mixed from chlorinated and chloroaminated water). NOD = No disinfectant residual.</p>
13. Sample Collection Date	<p>The date the sample is collected, reported as 4-digit year, 2-digit month, and 2-digit day (YYYY/MM/DD).</p>

14. Sample Identification Code	An alphanumeric value up to 30 characters assigned by the laboratory to uniquely identify containers, or groups of containers, containing water samples collected at the same sampling location for the same sampling date.
15. Contaminant	The unregulated contaminant for which the sample is being analyzed.
16. Analytical Method Code	The identification code of the analytical method used.
17. Extraction Batch Identification Code	Laboratory assigned extraction batch ID. Must be unique for each extraction batch within the laboratory for each method. For CCC samples report the Analysis Batch Identification Code as the value for this field. For methods without an extraction batch, leave this field null.
18. Extraction Date	Date for the start of the extraction batch (YYYY/MM/DD). For methods without an extraction batch, leave this field null.
19. Analysis Batch Identification Code	Laboratory assigned analysis batch ID. Must be unique for each analysis batch within the laboratory for each method.
20. Analysis Date	Date for the start of the analysis batch (YYYY/MM/DD).
21. Sample Analysis Type	The type of sample collected and/or prepared, as well as the fortification level. Permitted values include:
	CF = concentration fortified; the concentration of a known contaminant added to a field sample reported with sample analysis types LFSM, LFSMD, LFB, CCC and QCS.
	CCC = continuing calibration check; a calibration standard containing the contaminant, the internal standard, and surrogate analyzed to verify the existing calibration for those contaminants.
	FS = field sample; sample collected and submitted for analysis under this rule. IS = internal standard; a standard that measures the relative response of contaminants.
	LFB = laboratory fortified blank; an aliquot of reagent water fortified with known quantities of the contaminants and all preservation compounds.
	LRB = laboratory reagent blank; an aliquot of reagent water treated exactly as a field sample, including the addition of preservatives, internal standards, and surrogates to determine if interferences are present in the laboratory, reagents, or other equipment.
	LFSM = laboratory fortified sample matrix; a UCMR field sample with a known amount of the contaminant of interest and all preservation compounds added.
	LFSMD = laboratory fortified sample matrix duplicate; duplicate of the laboratory fortified sample matrix.
	QCS = quality control sample; a sample prepared with a source external to the one used for initial calibration and CCC. The QCS is used to check calibration standard integrity.
	QHS = quality HAA sample; HAA sample collected and submitted for quality control purposes.
SUR = surrogate standard; a standard that assesses method performance for each extraction.	

<p align="center">22. Analytical Results—Sign</p>	<p>A value indicating whether the sample analysis result was: (<) “less than” means the contaminant was not detected, or was detected at a level below the Minimum Reporting Level. (=) “equal to” means the contaminant was detected at the level reported in “Analytical Result— Measured Value.”</p>
<p align="center">23. Analytical Result —Measured Value</p>	<p>The actual numeric value of the analytical results for: Field samples; laboratory fortified matrix samples; laboratory fortified sample matrix duplicates; and concentration fortified.</p>
<p align="center">24. Additional Value</p>	<p>Represents the true value or the fortified concentration for spiked samples for QC Sample Analysis Types (CCC, EQC, LFB, LFSM and LFSMD). For Sample Analysis Type FS and LRB and for IS and surrogate QC Contaminants, leave this field null.</p>
<p align="center">25. Laboratory Identification Code</p>	<p>The code, assigned by EPA, used to identify each laboratory. The code begins with the standard two-character State postal abbreviation; the remaining five numbers are unique to each laboratory in the State.</p>
<p align="center">26. Sample Event Code</p>	<p>A code assigned by the PWS for each sample event. This will associate samples with the PWS monitoring plan to allow EPA to track compliance and completeness. Systems must assign the following codes:</p>
	<p>SEC1, SEC2, SEC3, SEC4, SEC5, SEC6, SEC7 and SEC8—represent samples collected to meet UCMR Assessment Monitoring requirements for cyanotoxins; where “SEC1” represents the first sampling period, “SEC2” the second period and so forth, for all eight sampling events.</p>
	<p>SEA1, SEA2, SEA3 and SEA4—represent samples collected to meet UCMR Assessment Monitoring requirements for the additional contaminants; where “SEA1” and “SEA2” represent the first and second sampling period for all water types; and “SEA3” and “SEA4” represent the third and fourth sampling period for SW and GU sources only.</p>
<p align="center">27. Bloom Occurrence</p>	<p>A yes or no answer provided by the PWS for each cyanotoxin sample event.</p>
	<p><i>Question:</i> Preceding the finished water sample collection, did you observe an algal bloom in your source waters near the intake?</p>
	<p>YES = if yes, select all the YESs that apply:</p>
	<p>YD = yes, on the day the UCMR cyanotoxin sample was collected.</p>
	<p>YW = yes, between the day the sample was taken and the past week.</p>
	<p>YM = yes, between the past week and past month.</p>
	<p>YY = yes, between the past month and past year.</p>
	<p>YP = yes, prior to the past year. NO = have never seen a bloom.</p>
<p align="center">28. Cyanotoxin Occurrence</p>	<p>A yes or no answer provided by the PWS for each cyanotoxin sample event. <i>Question:</i> Preceding the finished water sample collection, were cyanotoxins ever detected in your source waters near the intake and prior to any treatment (based on sampling by you or another party)?</p>
	<p>YES = if yes, select all the YESs that apply:</p>
	<p>YD = yes, on the day the UCMR cyanotoxin sample was collected.</p>
	<p>YW = yes, between the day the sample was taken and the past week.</p>
	<p>YM = yes, between the past week and past month. YY = yes, between the past month and past year.</p>

	YP = yes, prior to the past year.
	NO = have never detected cyanotoxins in source water.
	NS = unaware of any source water cyanotoxin sampling. Select all that apply (<i>i.e.</i> , all that were detected) if you answered YES to detecting cyanotoxins in source water:
	MIC = Microcystins.
	CYL = Cylindrospermopsin.
	ANA = Anatoxin-A.
	SAX = Saxitoxins.
	OTH = Other.
	DK = do not know.
29. Indicator of Possible Bloom—Treatment	A yes or no answer provided by the PWS for each cyanotoxin sample event. <i>Question:</i> Preceding the finished water sample collection, did you notice any changes in your treatment system operation and/or treated water quality that may indicate a bloom in the source water?
	YES = if yes, select all that apply:
	DFR = Decrease in filter runtimes.
	ITF = Increase in turbidity in filtered water.
	ICD = Need for increased coagulant dose.
	TOI = Increase in taste and odor issues in finished water.
	IOD = Need for increase in oxidant/disinfectant dose.
	IDB = Increase in TTHM/HAA5 in finished water.
	OTH = Describe other changes.
	NO = no changes.
30. Indicator of Possible Bloom—Source Water Quality Parameters	A yes or no answer provided by the PWS for each cyanotoxin sample event. <i>Question:</i> Preceding the finished water sample collection, did you observe any notable changes in source water quality parameters (if measured)?
	YES = if yes, select all that apply to the source water:
	ITP = Increase in water temperature.
	ITU = Increase in turbidity.
	IAL = Increase in alkalinity.
	ITO = Increase in total organic carbon.
	ICD = Increase in chlorine demand.
	IPH = Increase in pH.
	ICA = Increase in chlorophyll a.
	IPY = Increase in phycocyanin.
	INU = Increase in nutrients (example: nitrogen or phosphorus).
	OTH = Describe other changes.
	NO = no changes observed.

Subpart E — Special Regulations, Including Monitoring Regulations and Prohibition on Lead Use

§141.40 Monitoring requirements for unregulated contaminants.

- (a) **General applicability.** This section specifies the monitoring and quality control requirements that must be followed if you own or operate a public water system (PWS) that is subject to the Unregulated Contaminant Monitoring Regulation (UCMR), as specified in paragraphs (a)(1) and (2) of this section. In addition, this section specifies the UCMR requirements for State and Tribal participation. For the purposes of this section, PWS “population served,” “State,” “PWS Official,” “PWS Technical Contact,” and “finished water” apply as defined in §141.35(a). The determination of whether a PWS is required to monitor under this rule is based on the type of system (e.g., community water system, non-transient non-community water system, etc.), and its retail population, as indicated by SDWIS/Fed on December 31, 2015.
- (1) **Applicability to transient non-community systems.** If you own or operate a transient non-community water system, you are not subject to monitoring requirements in this section.
- (2) **Applicability to community water systems and non-transient non-community water systems—**
- (i) **Large systems.** If you own or operate a retail PWS (other than a transient non-community system) that serves more than 10,000 people, you must monitor according to the specifications in this paragraph (a)(2)(i). If you believe that your applicability status is different than EPA has specified in the notification letter that you received, or if you are subject to UCMR requirements and you have not been notified by either EPA or your State, you must report to EPA, as specified in §141.35(b)(2) or (c)(4).
- (A) **Assessment monitoring.** You must monitor for the contaminants on List 1, per Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. If you serve a retail population of more than 10,000 people, you are required to perform this monitoring regardless of whether you have been notified by the State or EPA.
- (B) **Screening Survey.** You must monitor for the unregulated contaminants on List 2 (Screening Survey) of Table 1, as specified in paragraph (a)(3) of this section, if your system serves 10,001 to 100,000 people and you are notified by EPA or your State that you are part of the State Monitoring Plan for Screening Survey testing. If your system serves more than 100,000 people, you are required to conduct this Screening Survey testing regardless of whether you have been notified by the State or EPA.
- (C) **Pre-Screen Testing.** You must monitor for the unregulated contaminants on List 3 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the Pre-Screen Testing.
- (ii) **Small systems.** Small PWSs, as defined in this paragraph, will not be selected to monitor for any more than one of the three monitoring lists provided in Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. EPA will provide sample containers, provide pre-paid air bills for shipping the sampling materials, conduct the laboratory analysis, and report and review monitoring results for all small systems selected to conduct monitoring under paragraphs (a)(2)(ii)(A) through (C) of this section. If you own or operate a PWS that serves 10,000 or fewer people you must monitor as follows:
- (A) **Assessment monitoring.** You must monitor for the contaminants on List 1 per Table 1, in paragraph (a)(3) of this section, if you are notified by your State or EPA that you are part of the State Monitoring Plan for Assessment Monitoring.
- (B) **Screening Survey.** You must monitor for the unregulated contaminants on List 2 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the State Monitoring Plan for the Screening Survey.
- (C) **Pre-screen testing.** You must monitor for the contaminants on List 3 of Table 1, in paragraph (a)(3) of this section if you are notified by your State or EPA that you are part of the State Monitoring Plan for Pre-Screen Testing.

(3) *Analytes to be monitored.* Lists 1, 2, and 3 contaminants are provided in the following table:

Table 1—UCMR Contaminant List

1 — Contaminant	2 — CAS Registry No.	3 — Analytical methods ^a	4 — Minimum reporting level ^b	5 — Sampling location ^c	6 — Period during which monitoring to be completed
List 1: Assessment Monitoring Cyanotoxin Chemical Contaminants					
“total microsystem”	N/A	EPA 546	0.3 µg/L	EPTDS	3/1/2018-11/30/2020.
anatoxin-a	64285-06-9	EPA 545	0.03 µg/L	EPTDS	3/1/2018-11/30/2020.
cylindrospermopsin	143545-90-8	EPA 545	0.09 µg/L	EPTDS	3/1/2018-11/30/2020.
microcystin-LA	96180-79-9	EPA 544	0.008 µg/L	EPTDS	3/1/2018-11/30/2020.
microcystin-LF	154037-70-4	EPA 544	0.006 µg/L	EPTDS	3/1/2018-11/30/2020.
microcystin-LR	101043-37-2	EPA 544	0.02 µg/L	EPTDS	3/1/2018-11/30/2020.
microcystin-LY	123304-10-9	EPA 544	0.009 µg/L	EPTDS	3/1/2018-11/30/2020.
microcystin-RR	111755-37-4	EPA 544	0.006 µg/L	EPTDS	3/1/2018-11/30/2020.
microcystin-YR	101064-48-6	EPA 544	0.02 µg/L	EPTDS	3/1/2018-11/30/2020.
nodularin	118399-22-7	EPA 544	0.005 µg/L	EPTDS	3/1/2018-11/30/2020.
List 1: Assessment Monitoring Additional Chemical Contaminants					
<u>Metals</u>					
germanium	7440-56-4	EPA 200.8, ASTM D5673-10, SM 3125	0.3 µg/L	EPTDS	1/1/2018-12/31/2020.
manganese	7439-96-5	EPA 200.8, ASTM D5673-10, SM 3125	0.4 µg/L	EPTDS	1/1/2018-12/31/2020.
<u>Pesticides and a Pesticide Manufacturing Byproduct</u>					
alpha-hexachlorocyclohexane	319-84-6	EPA 525.3	0.01 µg/L	EPTDS	1/1/2018-12/31/2020.
chlorpyrifos	2921-88-2	EPA 525.3	0.03 µg/L	EPTDS	1/1/2018-

					12/31/2020.
dimethipin	55290-64-7	EPA 525.3	0.2 µg/L	EPTDS	1/1/2018-12/31/2020.
ethoprop	13194-48-4	EPA 525.3	0.03 µg/L	EPTDS	1/1/2018-12/31/2020.
oxyfluorfen	42874-03-3	EPA 525.3	0.05 µg/L	EPTDS	1/1/2018-12/31/2020.
profenofos	41198-08-7	EPA 525.3	0.3 µg/L	EPTDS	1/1/2018-12/31/2020.
tebuconazole	107534-96-3	EPA 525.3	0.2 µg/L	EPTDS	1/1/2018-12/31/2020.
total permethrin (cis- & trans-)	52645-53-1	EPA 525.3	0.04 µg/L	EPTDS	1/1/2018-12/31/2020.
tribufos	78-48-8	EPA 525.3	0.07 µg/L	EPTDS	1/1/2018-12/31/2020.
<u>Brominated Haloacetic Acid (HAA) Groups^{d e}</u>					
HAA5	N/A	EPA 552.3 or EPA 557	N/A	D/DBPR HAA location	1/1/2018-12/31/2020.
HAA6Br	N/A	EPA 552.3 or EPA 557	N/A	D/DBPR HAA location	1/1/2018-12/31/2020.
HAA9	N/A	EPA 552.3 or EPA 557	N/A	D/DBPR HAA location	1/1/2018-12/31/2020.
<u>Alcohols</u>					
1-butanol	71-36-3	EPA 541	2.0 µg/L	EPTDS	1/1/2018-12/31/2020.
2-methoxyethanol	109-86-4	EPA 541	0.4 µg/L	EPTDS	1/1/2018-12/31/2020.
2-propen-1-ol	107-18-6	EPA 541	0.5 µg/L	EPTDS	1/1/2018-12/31/2020.
<u>Other Semivolatile Chemicals</u>					
butylated hydroxanisole	25013-16-5	EPA 530	0.03 µg/L	EPTDS	1/1/2018-12/31/2020.
o-toluidine	95-53-4	EPA 530	0.007 µg/L	EPTDS	1/1/2018-12/31/2020.
quinoline	91-22-5	EPA 530	0.02 µg/L	EPTDS	1/1/2018-12/31/2020.
List 2: Screening Survey					
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved.

List 3: Pre-Screen Testing					
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved.

Column headings are:

1—*Contaminant*: The name of the contaminant to be analyzed.

2—*CAS (Chemical Abstract Service) Registry Number or Identification Number*: A unique number identifying the chemical contaminants.

3—*Analytical Methods*: Method numbers identifying the methods that must be used to test the contaminants.

4—*Minimum Reporting Level (MRL)*: The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods. If EPA determines, after the first six months of monitoring that the specified MRLs result in excessive resampling, EPA will establish alternate MRLs and will notify affected PWSs and laboratories of the new MRLs. N/A is defined as non-applicable.

5—*Sampling Location*: The locations within a PWS at which samples must be collected.

6—*Period During Which Monitoring to be Completed*: The time period during which the sampling and testing will occur for the indicated contaminant.

^aThe analytical procedures shall be performed in accordance with the documents associated with each method, see paragraph (c) of this section.

^bThe MRL is the minimum concentration of each analyte that must be reported to EPA.

^cWith the exception of HAA monitoring, sampling must occur at entry points to the distribution system (EPTDSs), after treatment is applied, that represent each non-emergency water source in routine use over the 12-month period of monitoring. Systems that purchase water with multiple connections from the same wholesaler may select one representative connection from that wholesaler. This EPTDS sampling location must be representative of the highest annual volume connections. If the connection selected as the representative EPTDS is not available for sampling, an alternate highest volume representative connection must be sampled. See 40 CFR 141.35(c)(3) for an explanation of the requirements related to the use of representative GW EPTDSs. Sampling for UCMR 4 HAA groups must be conducted at the Disinfectants and Disinfection Byproduct Rule (D/DBPR) sampling locations (40 CFR 141.622).

^dUCMR 4 HAA monitoring applies only to those PWSs that are subject to D/DBPR HAA5 monitoring requirements.

^ePWSs that purchase 100 percent of their water (“consecutive systems”) are not required to collect UCMR 4 source water samples for TOC or bromide analyses. Sampling for TOC and bromide must otherwise occur at source water influent locations representing untreated water entering the water treatment plant (*i.e.*, a location prior to any treatment). SW and GWUDI systems subject to the D/DBPR TOC monitoring must use their D/DBPR TOC source water sampling site(s) from 40 CFR 141.132 for UCMR 4 TOC and bromide samples. SW and GWUDI systems that are not subject to D/DBPR TOC monitoring will use their Long Term 2 Enhance Surface Water Treatment Rule (LT2) source water sampling site(s) (40 CFR 141.703) for UCMR 4 TOC and bromide samples. Ground water systems that are subject to the D/DBPRs, and therefore subject to UCMR 4 HAA monitoring, will take TOC and bromide samples at their influents entering their treatment train. TOC and bromide must be collected at the same time as HAA samples. These indicator samples must be collected at a single source water influent using methods already approved for compliance monitoring. TOC methods include: SM 5310 B, SM 5310 C, SM 5310 D (21st edition), or SM 5310 B-00, SM 5310 C-00, SM 5310 D-00 (SM Online), EPA Method 415.3 (Rev. 1.1 or 1.2). Bromide methods include: EPA Methods 300.0 (Rev. 2.1), 300.1 (Rev. 1.0), 317.0 (Rev. 2.0), 326.0 (Rev. 1.0) or ASTM D 6581-12. The MRLs for the individual HAAs are discussed in paragraph (a)(5)(v) of this section.

(4) *Sampling requirements*—

- (i) **Large systems.** If you serve more than 10,000 people and meet the UCMR applicability criteria specified in paragraph (a)(2)(i) of this section, you must comply with the requirements specified in paragraphs (a)(4)(i)(A) through (I) of this section. Your samples must be collected according to the schedule that you are assigned by EPA or your State, or the schedule that you revised using EPA's electronic data reporting system on or before December 31, 2017. Your schedule must follow both the timing and frequency of monitoring specified in Tables 1 and 2 of this section.
- (A) **Monitoring period.** You must collect the samples in one continuous 12-month period for List 1 Assessment Monitoring, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, during the time frame indicated in column 6 of Table 1, in paragraph (a)(3) of this section. EPA or your State will specify the month(s) and year(s) in which your monitoring must occur. As specified in §141.35(c)(5), you must contact EPA if you believe you cannot conduct monitoring according to your schedule.
- (B) **Frequency.** You must collect the samples within the timeframe and according to the frequency specified by contaminant type and water source type for each sampling location, as specified in Table 2, in this paragraph. For the second or subsequent round of sampling, if a sample location is non-operational for more than one month before and one month after the scheduled sampling month (*i.e.*, it is not possible for you to sample within the window specified in Table 2, in this paragraph), you must notify EPA as specified in §141.35(c)(5) to reschedule your sampling.

Table 2—Monitoring Frequency by Contaminant and Water Source Types

CONTAMINANT TYPE	WATER SOURCE TYPE	TIMEFRAME	FREQUENCY ¹
List 1 Cyanotoxins Chemicals	Surface water or Ground water under the direct influence of surface water (GWUDI)	March-November	You must monitor twice a month for four consecutive months (total of eight sampling events). Sample events must occur two weeks apart.
List 1 Contaminants— Additional Chemicals	Surface water or GWUDI	12 months	You must monitor for four consecutive quarters. Sample events must occur three months apart. (Example: If first monitoring is in January, the second monitoring must occur any time in April, the third any time in July and the fourth any time in October).
	Ground water	12 months	You must monitor twice in a consecutive 12-month period. Sample events must occur 5-7 months apart. (Example: If the first monitoring event is in April, the second monitoring event must occur any time in September, October or November).

¹Systems must assign a sample event code for each contaminant listed in Table 1. Sample event codes must be assigned by the PWS for each sample event. For more information on sample event codes see §141.35(e) Table 1.

- (C) **Location.** You must collect samples for each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, as specified in Table 1, in paragraph (a)(3) of this section. Samples must be collected at each sample point that is specified in column 5 and footnote c of Table 1, in paragraph (a)(3) of this section. PWSs conducting List 1 monitoring for the brominated HAA groups must collect TOC and bromide samples as specified in footnote d of Table 1, in paragraph (a)(3) of this section. If you are a GW

system with multiple EPTDSs, and you request and receive approval from EPA or the State for sampling at representative EPTDS(s), as specified in §141.35(c)(3), you must collect your samples from the approved representative sampling location(s).

- (D) **Sampling instructions.** For each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, you must follow the sampling procedure for the method specified in column 3 of Table 1, in paragraph (a)(3) of this section. In addition, you must not composite (that is, combine, mix, or blend) the samples; you must collect and preserve each sample separately.
 - (E) **Sample collection and shipping time.** If you must ship the samples for analysis, you must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature, unless you have made special arrangements with your laboratory to receive the samples.
 - (F) **Analytical methods.** For each contaminant, you must use the respective analytical methods for List 1, and, if applicable, for List 2, or List 3 that are specified in column 3 of Table 1, in paragraph (a)(3) of this section; report values at or above the minimum reporting levels for List 1, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, that are specified in column 4 of Table 1, in paragraph (a)(3) of this section; and conduct the quality control procedures specified in paragraph (a)(5) of this section.
 - (G) **Laboratory errors or sampling deviations.** If the laboratory data do not meet the required QC criteria, as specified in paragraph (a)(5) of this section, or you do not follow the required sampling procedures, as specified in paragraphs (a)(4) of this section, you must resample within 30 days of being informed or becoming aware of these facts. This resampling is not for the purpose of confirming previous results, but to correct the sampling or laboratory error. All systems must report the results obtained from the first sampling for each sampling period, except for cases of sampling or laboratory errors. For the purposes of this rule, no samples are to be recollected for the purposes of confirming the results observed in a previous sampling.
 - (H) **Analysis.** For the List 1 contaminants, and, if applicable, List 2 Screening Survey, or List 3 Pre-Screen Testing contaminants, identified in Table 1, paragraph (a)(3) of this section, you must arrange for testing by a laboratory that has been approved by EPA according to requirements in paragraph (a)(5)(ii) of this section.
 - (I) **Review and reporting of results.** After you have received the laboratory results, you must review, approve, and submit the system information, and sample collection data and test results. You must report the results as provided in §141.35(c)(6).
- (ii) **Small systems.** If you serve 10,000 or fewer people and are notified that you are part of the State Monitoring Plan for Assessment Monitoring, Screening Survey or Pre-Screen monitoring, you must comply with the requirements specified in paragraphs (a)(4)(ii)(A) through (H) of this section. If EPA or the State informs you that they will be collecting your UCMR samples, you must assist them in identifying the appropriate sampling locations and in collecting the samples.
- (A) **Monitoring period and frequency.** You must collect samples at the times specified for you by the State or EPA. Your schedule must follow both the timing of monitoring specified in Table 1, List 1, and, if applicable, List 2, or List 3, and the frequency of monitoring in Table 2 of this section.
 - (B) **Location.** You must collect samples at the locations specified for you by the State or EPA.
 - (C) **Sample kits.** You must store and maintain the sample collection kits sent to you by the UCMR Sampling Coordinator in accordance with the kit's instructions. The sample kit will include all necessary containers, packing materials and cold packs, instructions for collecting the sample and sample treatment (such as dechlorination or preservation),

report forms for each sample, contact name and telephone number for the laboratory, and a prepaid return shipping docket and return address label. If any of the materials listed in the kit's instructions are not included in the kit or arrive damaged, you must notify the UCMR Sampling Coordinator who sent you the sample collection kits.

- (D) **Sampling instructions.** You must comply with the instructions sent to you by the State or EPA concerning the use of containers, collection (how to fill the sample bottle), dechlorination and/or preservation, and sealing and preparation of sample and shipping containers for shipment. You must not composite (that is, combine, mix, or blend) the samples. You also must collect, preserve, and test each sample separately. You must also comply with the instructions sent to you by the UCMR Sampling Coordinator concerning the handling of sample containers for specific contaminants.
 - (E) **Sampling deviations.** If you do not collect a sample according to the instructions provided to you for a listed contaminant, you must report the deviation within 7 days of the scheduled monitoring on the sample reporting form, as specified in §141.35(d)(2). You must resample following instructions that you will be sent from the UCMR Sampling Coordinator or State. A copy of the form must be sent to the laboratory with the recollected samples, and to the UCMR Sampling Coordinator.
 - (F) **[Reserved]**
 - (G) **Sampling forms.** You must completely fill out each of the sampling forms and bottles sent to you by the UCMR Sampling Coordinator, including data elements listed in §141.35(e) for each sample, as specified in §141.35(d)(2). You must sign and date the sampling forms.
 - (H) **Sample collection and shipping.** You must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature unless you have made special arrangements with EPA for the laboratory to receive the samples. Once you have collected the samples and completely filled in the sampling forms, you must send the samples and the sampling forms to the laboratory designated on the air bill.
- (iii) **Phased sample analysis for microcystins.** You must collect the three required samples (one each for EPA Methods 544, 545 and 546 (ELISA) at the EPTDS) for each sampling event, but not all samples may need to be analyzed. If the Method 546 ELISA result is less than 0.3 µg/L, report that result and do not analyze the EPA Method 544 sample for that sample event. If the Method 546 ELISA result is greater than or equal to 0.3 µg/L, report the value and analyze the other microcystin sample using EPA Method 544. You must analyze the EPA Method 545 sample for each sample event for Cylindrospermopsin and anatoxin-a only.
- (5) **Quality control requirements.** If your system serves more than 10,000 people, you must ensure that the quality control requirements listed below are met during your sampling procedures and by the laboratory conducting your analyses. You must also ensure that all method quality control procedures and all UCMR quality control procedures are followed.
 - (i) **Sample collection/preservation.** You must follow the sample collection and preservation requirements for the specified method for each of the contaminants in Table 1, in paragraph (a)(3) of this section. These requirements specify sample containers, collection, dechlorination, preservation, storage, sample holding time, and extract storage and/or holding time that you must assure that the laboratory follow.
 - (ii) **Laboratory approval for Lists 1, List 2 and List 3.** To be approved to conduct UCMR testing, the laboratory must be certified under §141.28 for one or more compliance analyses; demonstrate for each analytical method it plans to use for UCMR testing that it can meet the Initial Demonstration of Capability (IDC) requirements detailed in the analytical methods specified in column 3 of Table 1, in paragraph (a)(3) of this section; and successfully participate in the UCMR Proficiency Testing (PT) Program administered by EPA for each analytical method it plans to use for UCMR testing. UCMR laboratory approval decisions will be granted on an individual method basis for the methods listed in column 3 of Table 1 in

paragraph (a)(3) of this section for List 1, List 2, and List 3 contaminants. Laboratory approval is contingent upon the capability of the laboratory to post monitoring data to the EPA electronic data reporting system. To participate in the UCMR Laboratory Approval Program, the laboratory must complete and submit the necessary registration forms by February 21, 2017, and necessary application material April 19, 2017. Correspondence must be addressed to: UCMR Laboratory Approval Coordinator, USEPA, Technical Support Center, 26 West Martin Luther King Drive, (MS 140), Cincinnati, OH 45268; or emailed to EPA at: UCMR_Sampling_Coordinator@epa.gov.

(iii) **Minimum Reporting Level.** The MRL is an estimate of the quantitation limit. Assuming good instrumentation and experienced analysts, an MRL is achievable, with 95% confidence, by 75% of laboratories nationwide.

(6) Validation of laboratory performance. Your laboratory must be capable of quantifying each contaminant listed in Table 1, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section. You must ensure that the laboratory completes and has on file and available for your inspection, records of two distinct procedures. First, your laboratory must have conducted an IDC involving replicate analyses at or below the MRL as described in this paragraph. Second, for each day that UCMR analyses are conducted by your laboratory, a validation of its ability to quantify each contaminant, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section, following the procedure listed in paragraph (a)(5)(iii)(B) of this section, must be performed. The procedure for initial validation of laboratory performance at or below the MRL is as follows:

- (1) All laboratories performing analysis under UCMR must demonstrate that they are capable of meeting data quality objectives at or below the MRL listed in Table 1, column 4, in paragraph (a)(3) of this section.
- (2) The MRL, or any concentration below the MRL, at which performance is being evaluated, must be contained within the range of calibration. The calibration curve regression model and the range of calibration levels that are used in these performance validation steps must be used in all routine sample analyses used to comply with this regulation. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.
- (3) Replicate analyses of at least seven (7) fortified samples in reagent water must be performed at or below the MRL for each analyte, and must be processed through the entire method procedure (*i.e.*, including extraction, where applicable, and with all preservatives).
- (4) A prediction interval of results (PIR), which is based on the estimated arithmetic mean of analytical results and the estimated sample standard deviation of measurement results, must be determined by Equation 1:

$$\text{Equation 1} \quad \text{PIR} = \text{Mean} \pm s \times t_{(\alpha, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

Where:

t is the Student's t value with df degrees of freedom and confidence level $(1-\alpha)$,

s is the sample standard deviation of n replicate samples fortified at the MRL,

n is the number of replicates.

- (5) The values needed to calculate the PIR using Equation 1 are: Number of replicates (n); Student's t value with a two-sided 99% confidence level for n number of replicates; the average (mean) of at least seven replicates; and the sample standard deviation. Factor 1 is referred to as the Half Range PIR (HR_{PIR}).

$$HR_{PIR} = s \times t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

For a certain number of replicates and for a certain confidence level in Student's *t*, this factor

$$C = t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

is constant, and can be tabulated according to replicate number and confidence level for the Student's *t*. Table 3 in this paragraph lists the constant factor (*C*) for replicate sample numbers 7 through 10 with a confidence level of 99% for Student's *t*.

- (6) The HRPIR is calculated by Equation 2:

$$\text{Equation 2} \quad HR_{PIR} = s \times C$$

- (7) The PIR is calculated by Equation 3:

$$\text{Equation 3} \quad PIR = \text{Mean} \pm HR_{PIR}$$

Table 3—The Constant Factor (C) to be Multiplied by the Standard Deviation to Determine the Half Range Interval of the PIR (Student's *t* 99% Confidence Level)

Replicates	Degrees of freedom	Constant factor (C) to be multiplied by the standard deviation
7	6	3.963
8	7	3.711
9	8	3.536
10	9	3.409

^aThe critical *t*-value for a two-sided 99% confidence interval is equivalent to the critical *t*-value for a one-sided 99.5% confidence interval, due to the symmetry of the *t*-distribution. PIR = Prediction Interval of Results.

- (8) The lower and upper result limits of the PIR must be converted to percent recovery of the concentration being tested. To pass criteria at a certain level, the PIR lower recovery limits cannot be lower than the lower recovery limits of the QC interval (50%), and the PIR upper recovery limits cannot be greater than the upper recovery limits of the QC interval (150%). When either of the PIR recovery limits falls outside of either bound of the QC interval of recovery (higher than 150% or less than 50%), laboratory performance is not validated at the concentration evaluated. If the PIR limits are contained within both bounds of the QC interval, laboratory performance is validated for that analyte.
- (7) Quality control requirements for validation of laboratory performance at or below the MRL.
- (1) You must ensure that the calibration curve regression model and that the range of calibration levels that are used in these performance validation steps are used in future routine sample analysis. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

- (2) You must ensure, once your laboratory has performed an IDC as specified in each analytical method (demonstrating that DQOs are met at or below an MRL), that a daily performance check is performed for each analyte and method. A single laboratory blank, fortified at or below the MRL for each analyte, must be processed through the entire method procedure. The measured concentration for each analyte must be converted to a percent recovery, and if the recovery is within 50%-150% (inclusive), the daily performance of the laboratory has been validated. The results for any analyte for which 50%-150% recovery cannot be demonstrated during the daily check are not valid. Laboratories may elect to re-run the daily performance check sample if the performance for any analyte or analytes cannot be validated. If performance is validated for these analytes, the laboratory performance is considered validated. Alternatively, the laboratory may re-calibrate and repeat the performance validation process for all analytes.
- (iv) **Laboratory fortified sample matrix and laboratory fortified sample matrix duplicate.** You must ensure that your laboratory prepares and analyzes the Laboratory Fortified Sample Matrix (LFSM) sample for accuracy and Laboratory Fortified Sample Matrix Duplicate (LFSMD) samples for precision to determine method accuracy and precision for all contaminants in Table 1, in paragraph (a)(3) of this section. LFSM/LFSMD samples must be prepared using a sample collected and analyzed in accordance with UCMR requirements and analyzed at a frequency of 5% (or 1 LFSM/LFSMD set per every 20 samples) or with each sample batch, whichever is more frequent. In addition, the LFSM/LFSMD fortification concentrations must be alternated between a low-level fortification and mid-level fortification approximately 50% of the time. (For example: A set of 40 samples will require preparation and analysis of 2 LFSM/LFSMD paired samples. The first LFSM/LFSMD paired sample set must be fortified at either the low-level or mid-level, and the second LFSM/LFSMD paired sample set must be fortified with the other standard, either the low-level or mid-level, whichever was not used for the initial LFSM/LFSMD paired sample set.) The low-level LFSM/LFSMD fortification concentration must be within $\pm 50\%$ of the MRL for each contaminant (e.g., for an MRL of 1 $\mu\text{g/L}$ the acceptable fortification levels must be between 0.5 $\mu\text{g/L}$ and 1.5 $\mu\text{g/L}$). The mid-level LFSM/LFSMD fortification concentration must be within $\pm 20\%$ of the mid-level calibration standard for each contaminant, and is to represent, where possible and where the laboratory has data from previously analyzed samples, an approximate average concentration observed in previous analyses of that analyte. There are no UCMR contaminant recovery acceptance criteria specified for LFSM/LFSMD analyses. All LFSM/LFSMD data are to be reported.
- (v) **Method defined quality control.** You must ensure that your laboratory analyzes Laboratory Fortified Blanks and conducts Laboratory Performance Checks, as appropriate to the method's requirements, for those methods listed in Table 1, column 3, in paragraph (a)(3) of this section. Each method specifies acceptance criteria for these QC checks. The following HAA results must be reported using EPA's electronic data reporting system for quality control purposes.

Table 4—HAA QC Results

1— Contaminant	2— CAS Registry No.	3— Analytical methods ^a	4— Minimum reporting level ^b	5— HAA6Br Group	6— HAA9 Group	7— HAA5 Group
Brominated Haloacetic Acid (HAA) Groups						
Bromochloroacetic acid (BCAA)	5589-96-8	EPA 552.3 or EPA 557	0.3 $\mu\text{g/L}$			
Bromodichloroacetic	71133-14-7	EPA 552.3 or EPA	0.5 $\mu\text{g/L}$			

acid (BDCAA)		557				
Chlorodibromoacetic acid (CDBAA)	5278-95-5	EPA 552.3 or EPA 557	0.3 µg/L	HAA6Br		
Tribromoacetic acid (TBAA)	75-96-7	EPA 552.3 or EPA 557	2.0 µg/L			
Monobromoacetic acid (MBAA)	79-08-3	EPA 552.3 or EPA 557	0.3 µg/L			
Dibromoacetic acid (DBAA)	631-64-1	EPA 552.3 or EPA 557	0.3 µg/L		HAA9	
Dichloroacetic acid (DCAA)	79-43-6	EPA 552.3 or EPA 557	0.2 µg/L			
Monochloroacetic acid (MCAA)	79-11-8	EPA 552.3 or EPA 557	2.0 µg/L			HAA5
Trichloroacetic acid (TCAA)	76-03-9	EPA 552.3 or EPA 557	0.5 µg/L			

Column headings are:

1—**Contaminant:** The name of the contaminant to be analyzed.

2—**CAS (Chemical Abstract Service) Registry Number or Identification Number:** A unique number identifying the chemical contaminants.

3—**Analytical Methods:** Method numbers identifying the methods that must be used to test the contaminants.

4—**Minimum Reporting Level (MRL):** The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods. If EPA determines, after the first six months of monitoring that the specified MRLs result in excessive resampling, EPA will establish alternate MRLs and will notify affected PWSs and laboratories of the new MRLs.

5-7—HAA groups identified in paragraph (a)(3) of this section to be monitored as UCMR contaminants.

^aThe analytical procedures shall be performed in accordance with the documents associated with each method, see paragraph (c) of this section, and must meet all quality control requirements outlined paragraph (a)(5) of this section.

^bThe MRL is the minimum concentration of each analyte that must be reported to EPA.

(vi) **Reporting.** You must require your laboratory to submit these data electronically to the State and EPA using EPA's electronic data reporting system, accessible at <https://www.epa.gov/dwucmr>, within 120 days from the sample collection date. You then have 60 days from when the laboratory posts the data to review, approve and submit the data to the State and EPA, via EPA's electronic data reporting system. If you do not electronically approve and submit the laboratory data to EPA within 60 days of the laboratory posting data to EPA's electronic reporting system, the data will be considered approved and available for State and EPA review.

(6) **Violation of this rule—**

- (i) **Monitoring violations.** Any failure to monitor in accordance with §141.40(a)(3) - (5) is a monitoring violation.
 - (ii) **Reporting violations.** Any failure to report in accordance with §141.35 is a reporting violation.
- (b) **Petitions and waivers by States—**
- (1) **Governors' petition for additional contaminants.** The Safe Drinking Water Act allows Governors of seven (7) or more States to petition the EPA Administrator to add one or more contaminants to the UCMR Contaminant List in paragraph (a)(3) of this section. The petition must clearly identify the reason(s) for adding the contaminant(s) to the monitoring list, including the potential risk to public health, particularly any information that might be available regarding disproportional risks to the health and safety of children, the expected occurrence documented by any available data, any analytical methods known or proposed to be used to test for the contaminant(s), and any other information that could assist the Administrator in determining which contaminants present the greatest public health concern and should, therefore, be included on the UCMR Contaminant List in paragraph (a)(3) of this section.
 - (2) **State-wide waivers.** A State can waive monitoring requirements only with EPA approval and under very limited conditions. Conditions and procedures for obtaining a waiver are as follows:
 - (i) **Application.** A State may apply to EPA for a State-wide waiver from the unregulated contaminant monitoring requirements for PWSs serving more than 10,000 people. To apply for such a waiver, the State must submit an application to EPA that includes the following information: The list of contaminants on the UCMR Contaminant List for which a waiver is requested, along with documentation for each contaminant in the request demonstrating that the contaminants or their parent compounds do not occur naturally in the State, and certifying that during the past 15 years they have not been used, applied, stored, disposed of, released, or detected in the source waters or distribution systems in the State.
 - (ii) **Approval.** EPA will review State applications and notify the State whether it accepts or rejects the request. The State must receive written approval from EPA before issuing a State-wide waiver.
- (c) **Incorporation by reference.** These standards are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available for inspection either electronically at <http://www.regulations.gov>, in hard copy at the Water Docket, EPA/DC, and from the sources as follows. The Public Reading Room (EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC) is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for this Public Reading Room is (202) 566-1744, and the telephone number for the Water Docket is (202) 566-2426. The material is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to <http://www.archives.gov/federal-register/cfr/about.html>.
- (1) U.S. Environmental Protection Agency, Water Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC 20004.
 - (i) Method 200.8 “Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma—Mass Spectrometry,” Revision 5.4, EMMC Version, 1994. Available on the Internet at <https://www.nemi.gov>.
 - (ii) Method 300.0 “Determination of Inorganic Anions by Ion Chromatography Samples,” Revision 2.1, August 1993. Available on the Internet at <https://www.nemi.gov>.
 - (iii) Method 300.1 “Determination of Inorganic Anions in Drinking Water by Ion Chromatography,” Revision 1.0, 1997. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
 - (iv) 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, July 2001, EPA 815-B-01-001. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
 - (v) 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, June 2002, EPA 815-R-03-007. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
- (vi) Method 415.3 “Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,” Revision 1.1, February 2005, EPA/600/R-05/055. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.
 - (vii) Method 415.3 “Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,” Revision 1.2, September 2009, EPA/600/R-09/122. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.
 - (viii) Method 525.3 “Determination of Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS),” Version 1.0, February 2012, EPA/600/R-12/010. Available on the Internet <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.
 - (ix) Method 530 “Determination of Select Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Gas Chromatography/Mass Spectrometry (GC/MS),” Version 1.0, January 2015, EPA/600/R-14/442. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.
 - (x) EPA Method 541: “Determination of 1-Butanol, 1,4-Dioxane, 2-Methoxyethanol and 2-Propen-1-ol in Drinking Water by Solid Phase Extraction and Gas Chromatography/Mass Spectrometry,” November 2015, EPA 815-R-15-011. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.
 - (xi) Method 544 “Determination of Microcystins and Nodularin in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS),” Version 1.0, February 2015, EPA 600-R-14/474. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.
 - (xii) EPA Method 545: “Determination of Cylindrospermopsin and Anatoxin-a in Drinking Water by Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS),” April 2015, EPA 815-R-15-009. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
 - (xiii) EPA Method 546: “Determination of Total Microcystins and Nodularins in Drinking Water and Ambient Water by Adda Enzyme-Linked Immunosorbent Assay,” August 2016, EPA-815-B-16-011. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
 - (xiv) 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, July 2003, EPA 815-B-03-002. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
 - (xv) EPA Method 557: “Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS),” Version 1.0, September 2009, EPA 815-B-09-012. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.
- (2) American Public Health Association—Standard Test Method for Elements in Water by Inductively Coupled Plasma-Mass Spectrometry,” approved August 1, 2010. Available for purchase on the Internet at <http://www.astm.org/Standards/D5673.htm>.
- (i) “Standard Methods for the Examination of Water & Wastewater,” 21st edition (2005).
 - (A) SM 3125 “Metals by Inductively Coupled Plasma/Mass Spectrometry.”
 - (B) SM 5310B “Total Organic Carbon (TOC): High-Temperature Combustion Method.”
 - (C) SM 5310C “Total Organic Carbon (TOC): Persulfate-UV or Heated-Persulfate Oxidation Method.”
 - (D) SM 5310D “Total Organic Carbon (TOC): Wet-Oxidation Method.”
 - (ii) The following methods are from “Standard Methods Online.,” approved 2000 (unless noted). Available for purchase on the Internet at <http://www.standardmethods.org>.
 - (A) SM 3125 “Metals by Inductively Coupled Plasma/Mass Spectrometry” Editorial revisions, 2011 (SM 3125-09).

- (B) SM 5310B “Total Organic Carbon: High-Temperature Combustion Method,” (5310B-00).
 - (C) SM 5310C “Total Organic Carbon: Persulfate-UV or Heated-Persulfate Oxidation Method,” (5310C-00).
 - (D) SM 5310D “Total Organic Carbon: Wet-Oxidation Method,” (5310D-00).
- (3) ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
- (i) ASTM D5673-10 “Standard Test Method for Elements in Water by Inductively Coupled Plasma-Mass Spectrometry,” approved August 1, 2010. Available for purchase on the Internet at <http://www.astm.org/Standards/D5673.htm>.
 - (ii) ASTM D6581-12 “Standard Test Methods for Bromate, Bromide, Chlorate, and Chlorite in Drinking Water by Suppressed Ion Chromatography,” approved March 1, 2012. Available for purchase on the Internet at <http://www.astm.org/Standards/D6581.htm>.

[72 FR 393, Jan. 4, 2007; 72 FR 3916, Jan. 26, 2007, as amended at 77 FR 26098, May 2, 2012; 81 FR 92688, Dec. 20, 2016]

§141.41 Special monitoring for sodium.

- (a) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the State to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.
- (b) The supplier of water shall report to EPA and/or the State the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required, the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State. The supplier shall report the results to EPA where the State has not adopted this regulation.
- (c) The supplier of water shall notify appropriate local and State public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to EPA and/or the State within 10 days of its issuance. The supplier of water is not required to notify appropriate local and State public health officials of the sodium levels where the State provides such notices in lieu of the supplier.
- (d) Analyses for sodium shall be conducted as directed in §141.23(k)(1).

[45 FR 57345, Aug. 27, 1980, as amended at 59 FR 62470, Dec. 5, 1994]

§141.42 Special monitoring for corrosivity characteristics.

- (a) - (c) [Reserved]
- (d) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the State:
 - *Lead from piping, solder, caulking, and interior lining of distribution mains, alloys and home plumbing.*
 - *Copper from piping and alloys, service lines, and home plumbing.*
 - *Galvanized piping, service lines, and home plumbing.*
 - *Ferrous piping materials such as cast iron and steel.*
 - *Asbestos cement pipe.*

In addition, States may require identification and reporting of other materials of construction present in distribution systems that may contribute contaminants to the drinking water, such as:

- Vinyl lined asbestos cement pipe.
- Coal tar lined pipes and tanks.

[45 FR 57346, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982, as amended at 59 FR 62470, Dec. 5, 1994]

Subpart F — Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals

§141.52 Maximum contaminant level goals for microbiological contaminants.

(a) MCLGs for the following contaminants are as indicated:

CONTAMINANT	MCLG
(1) <i>Giardia lamblia</i>	zero
(2) Viruses	zero
(3) <i>Legionella</i>	zero
(4) Total coliforms (including fecal) coliforms and <i>Escherichia coli</i>	zero
(5) <i>Cryptosporidium</i>	zero
(6) <i>Escherichia coli (E. coli)</i>	zero

(b) The MCLG identified in paragraph (a)(4) of this section is applicable until March 31, 2016. The MCLG identified in paragraph (a)(6) of this section is applicable beginning April 1, 2016.

[78 FR 10347, Feb. 13, 2013]

§141.53 Maximum contaminant level goals for disinfection byproducts.

MCLGs for the following disinfection byproducts are as indicated:

DISINFECTION BYPRODUCT	MCLG (MG/L)
Bromodichloromethane	zero
Bromoform	zero
Bromate	zero
Chlorite	0.8
Chloroform	0.07
Dibromochloromethane	0.06
Dichloroacetic acid	zero

Monochloroacetic acid	0.07
Trichloroacetic acid	0.02

[63 FR 69465, Dec. 16, 1998, as amended at 65 FR 34405, May 30, 2000; 71 FR 478, Jan. 4, 2006]

§141.54 Maximum residual disinfectant level goals for disinfectants.

MRDLGs for disinfectants are as follows:

DISINFECTANT RESIDUAL	MRDLG (MG/L)
Chlorine	4 (as Cl ₂).
Chloramines	4 (as Cl ₂).
Chlorine dioxide	0.8 (as ClO ₂)

[63 FR 69465, Dec. 16, 1998]

§141.55 Maximum contaminant level goals for radionuclides.

MCLGs for radionuclides are as indicated in the following table:

CONTAMINANT	MCLG
1. Combined radium-226 and radium-228	Zero.
2. Gross alpha particle activity (excluding radon and uranium)	Zero.
3. Beta particle and photon radioactivity	Zero.
4. Uranium	Zero.

[65 FR 76748, Dec. 7, 2000]

Subpart G—National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels

§141.61 Maximum contaminant levels for organic contaminants.

(a) The following maximum contaminant levels for organic contaminants apply to community and non-transient, non-community water systems.

CAS No.	CONTAMINANT	MCL (mg/l)
(1) 75-01-4	Vinyl chloride	0.002
(2) 71-43-2	Benzene	0.005
(3) 56-23-5	Carbon tetrachloride	0.005
(4) 107-06-2	1,2-Dichloroethane	0.005
(5) 79-01-6	Trichloroethylene	0.005
(6) 106-46-7	para-Dichlorobenzene	0.075
(7) 75-35-4	1,1-Dichloroethylene	0.007

(8) 71-55-6	1,1,1-Trichloroethane	0.2
(9) 156-59-2	cis-1,2-Dichloroethylene	0.07
(10) 78-87-5	1,2-Dichloropropane	0.005
(11) 100-41-4	Ethylbenzene	0.7
(12) 108-90-7	Monochlorobenzene	0.1
(13) 95-50-1	o-Dichlorobenzene	0.6
(14) 100-42-5	Styrene	0.1
(15) 127-18-4	Tetrachloroethylene	0.005
(16) 108-88-3	Toluene	1
(17) 156-60-5	trans-1,2-Dichloroethylene	0.1
(18) 1330-20-7	Xylenes (total)	10
(19) 75-09-2	Dichloromethane	0.005
(20) 120-82-1	1,2,4-Trichloro- benzene	.07
(21) 79-00-5	1,1,2-Trichloro- ethane	.005

- (b) The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the Table below granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in paragraphs (a) and (c) of this section:

BAT for Organic Contaminants Listed in §141.61 (a) and (c)

CAS No.	CONTAMINANT	GAC	PTA	OX
15972-60-8	Alachlor	X		
116-06-3	Aldicarb	X		
1646-88-4	Aldicarb sulfone	X		
1646-87-3	Aldicarb sulfoxide	X		
1912-24-9	Atrazine	X		
71-43-2	Benzene	X	X	
50-32-8	Benzo[a]pyrene	X		
1563-66-2	Carbofuran	X		
56-23-5	Carbon tetrachloride	X	X	
57-74-9	Chlordane	X		
75-99-0	Dalapon	X		
94-75-7	2,4-D	X		
103-23-1	Di (2-ethylhexyl) adipate	X	X	
117-81-7	Di (2-ethylhexyl) phthalate	X		

96-12-8	Dibromochloropropane (DBCP)	X	X	
95-50-1	o-Dichlorobenzene	X	X	
106-46-7	para-Dichlorobenzene	X	X	
107-06-2	1,2-Dichloroethane	X	X	
75-35-4	1,1-Dichloroethylene	X	X	
156-59-2	cis-1,2-Dichloroethylene	X	X	
156-60-5	trans-1,2-Dichloroethylene	X	X	
75-09-2	Dichloromethane		X	
78-87-5	1,2-Dichloropropane	X	X	
88-85-7	Dinoseb	X		
85-00-7	Diquat	X		
145-73-3	Endothall	X		
72-20-8	Endrin	X		
100-41-4	Ethylbenzene	X	X	
106-93-4	Ethylene Dibromide (EDB)	X	X	
1071-83-6	Glyphosate			X
76-44-8	Heptachlor	X		
1024-57-3	Heptachlor epoxide	X		
118-74-1	Hexachlorobenzene	X		
77-47-3	Hexachlorocyclopentadiene	X	X	
58-89-9	Lindane	X		
72-43-5	Methoxychlor	X		
108-90-7	Monochlorobenzene	X	X	
23135-22-0	Oxamyl (Vydate)	X		
87-86-5	Pentachlorophenol	X		
1918-02-1	Picloram	X		
1336-36-3	Polychlorinated biphenyls (PCB)	X		
122-34-9	Simazine	X		
100-42-5	Styrene	X	X	
1746-01-6	2,3,7,8-TCDD (Dioxin)	X		
127-18-4	Tetrachloroethylene	X	X	
108-88-3	Toluene	X	X	
8001-35-2	Toxaphene	X		
93-72-1	2,4,5-TP (Silvex)	X		

120-82-1	1,2,4-Trichlorobenzene	X	X	
71-55-6	1,1,1-Trichloroethane	X	X	
79-00-5	1,1,2-Trichloroethane	X	X	
79-01-6	Trichloroethylene	X	X	
75-01-4	Vinyl chloride		X	
1330-20-7	Xylene	X	X	

- (c) The following maximum contaminant levels for synthetic organic contaminants apply to community water systems and non-transient, non-community water systems:

CAS No.	CONTAMINANT	MCL (mg/l)
(1) 15972-60-8	Alachlor	0.002
(2) 116-06-3	Aldicarb	0.003
(3) 1646-87-3	Aldicarb sulfoxide	0.004
(4) 1646-87-4	Aldicarb sulfone	0.002
(5) 1912-24-9	Atrazine	0.003
(6) 1563-66-2	Carbofuran	0.04
(7) 57-74-9	Chlordane	0.002
(8) 96-12-8	Dibromochloropropane	0.0002
(9) 94-75-7	2,4-D	0.07
(10) 106-93-4	Ethylene dibromide	0.00005
(11) 76-44-8	Heptachlor	0.0004
(12) 1024-57-3	Heptachlor epoxide	0.0002
(13) 58-89-9	Lindane	0.0002
(14) 72-43-5	Methoxychlor	0.04
(15) 1336-36-3	Polychlorinated biphenyls	0.0005
(16) 87-86-5	Pentachlorophenol	0.001
(17) 8001-35-2	Toxaphene	0.003
(18) 93-72-1	2,4,5-TP	0.05
(19) 50-32-8	Benzo[a]pyrene	0.0002
(20) 75-99-0	Dalapon	0.2
(21) 103-23-1	Di(2-ethylhexyl) adipate	0.4
(22) 117-81-7	Di(2-ethylhexyl) phthalate	0.006
(23) 88-85-7	Dinoseb	0.007
(24) 85-00-7	Diquat	0.02
(25) 145-73-3	Endothall	0.1

(26) 72-20-8	Endrin	0.002
(27) 1071-53-6	Glyphosate	0.7
(28) 118-74-1	Hexachlorobenzene	0.001
(29) 77-47-4	Hexachlorocyclopentadiene	0.05
(30) 23135-22-0	Oxamyl (Vydate)	0.2
(31) 1918-02-1	Picloram	0.5
(32) 122-34-9	Simazine	0.004
(33) 1746-01-6	2,3,7,8-TCDD (Dioxin)	3×10^{-8}

[56 FR 3593, Jan. 30, 1991, as amended at 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992; 59 FR 34324, July 1, 1994]

§141.62 Maximum contaminant levels for inorganic contaminants.

(a) [Reserved]

(b) The maximum contaminant levels for inorganic contaminants specified in paragraphs (b) (2)-(6), (b)(10), and (b) (11)-(16) of this section apply to community water systems and non-transient, non-community water systems. The maximum contaminant level specified in paragraph (b)(1) of this section only applies to community water systems. The maximum contaminant levels specified in (b)(7), (b)(8), and (b)(9) of this section apply to community water systems; non-transient, non-community water systems; and transient non-community water systems.

CONTAMINANT	MCL (mg/l)
(1) Fluoride	4.0
(2) Asbestos	7 Million Fibers/liter (longer than 10 µm).
(3) Barium	2
(4) Cadmium	0.005
(5) Chromium	0.1
(6) Mercury	0.002
(7) Nitrate	10 (as Nitrogen)
(8) Nitrite	1 (as Nitrogen)
(9) Total Nitrate and Nitrite	10 (as Nitrogen)
(10) Selenium	0.05
(11) Antimony	0.006
(12) Beryllium	0.004
(13) Cyanide (as free Cyanide)	0.2
(14) [Reserved]	
(15) Thallium	0.002
(16) Arsenic	0.010

- (c) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant levels for inorganic contaminants identified in paragraph (b) of this section, except fluoride:

BAT for Inorganic Compounds Listed in Section 141.62(b)

CHEMICAL NAME	BAT(s)
Antimony	2,7
Arsenic ⁴	1, 2, 5, 6, 7, 9, 12 ⁵
Asbestos	2,3,8
Barium	5,6,7,9
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,6 ² ,7
Cyanide	5,7,13
Mercury	2 ¹ ,4,6 ¹ ,7 ¹
Nickel	5,6,7
Nitrate	5,7,9
Nitrite	5,7
Selenium	1,2 ³ ,6,7,9
Thallium	1,5

¹BAT only if influent Hg concentrations $\leq 10\mu\text{g}/\text{l}$.

²BAT for Chromium III only.

³BAT for Selenium IV only.

⁴BATs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

⁵To obtain high removals, iron to arsenic ratio must be at least 20:1.

Key to BATS in Table

- 1 = Activated Alumina
- 2 = Coagulation/Filtration (not BAT for systems <500 service connections)
- 3 = Direct and Diatomite Filtration
- 4 = Granular Activated Carbon
- 5 = Ion Exchange
- 6 = Lime Softening (not BAT for systems <500 service connections)
- 7 = Reverse Osmosis
- 8 = Corrosion Control
- 9 = Electrodialysis
- 10 = Chlorine
- 11 = Ultraviolet
- 12 = Oxidation/Filtration
- 13 = Alkaline Chlorination (pH ≥ 8.5)

- (d) The Administrator, pursuant to section 1412 of the Act, hereby identifies in the following table the affordable technology, treatment technique, or other means available to systems serving 10,000 persons or fewer for achieving compliance with the maximum contaminant level for arsenic:

Small System Compliance Technologies (SSCTs)¹ for Arsenic²

SMALL SYSTEM COMPLIANCE TECHNOLOGY	AFFORDABLE FOR LISTED SMALL SYSTEM CATEGORIES³
Activated Alumina (centralized)	All size categories.
Activated Alumina (Point-of-Use) ⁴	All size categories.
Coagulation/Filtration ⁵	501-3,300, 3,301-10,000.
Coagulation-assisted Microfiltration	501-3,300, 3,301-10,000.
Electrodialysis reversal ⁶	501-3,300, 3,301-10,000.
Enhanced coagulation/filtration	All size categories
Enhanced lime softening (pH>10.5)	All size categories.
Ion Exchange	All size categories.
Lime Softening ⁵	501-3,300, 3,301-10,000.
Oxidation/Filtration ⁷	All size categories.
Reverse Osmosis (centralized) ⁶	501-3,300, 3,301-10,000.
Reverse Osmosis (Point-of-Use) ⁴	All size categories.

¹Section 1412(b)(4)(E)(ii) of SDWA specifies that SSCTs must be affordable and technically feasible for small systems.

²SSCTs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

³The Act (ibid.) specifies three categories of small systems: (i) those serving 25 or more, but fewer than 501, (ii) those serving more than 500, but fewer than 3,301, and (iii) those serving more than 3,300, but fewer than 10,001.

⁴When POU or POE devices are used for compliance, programs to ensure proper long-term operation, maintenance, and monitoring must be provided by the water system to ensure adequate performance.

⁵Unlikely to be installed solely for arsenic removal. May require pH adjustment to optimal range if high removals are needed.

⁶Technologies reject a large volume of water—may not be appropriate for areas where water quantity may be an issue.

⁷To obtain high removals, iron to arsenic ratio must be at least 20:1.

[56 FR 3594, Jan. 30, 1991, as amended at 56 FR 30280, July 1, 1991; 57 FR 31847, July 17, 1992; 59 FR 34325, July 1, 1994; 60 FR 33932, June 29, 1995; 66 FR 7063, Jan. 22, 2001; 68 FR 14506, Mar. 25, 2003; 69 FR 38855, June 29, 2004]

§141.63 Maximum contaminant levels (MCLs) for microbiological contaminants.

- (a) Until March 31, 2016, the total coliform MCL is based on the presence or absence of total coliforms in a sample, rather than coliform density.

- (1) For a system that collects at least 40 samples per month, if no more than 5.0 percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms.
- (2) For a system that collects fewer than 40 samples per month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.
- (b) Until March 31, 2016, any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or *E. coli*-positive routine sample, constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in subpart Q of this part, this is a violation that may pose an acute risk to health.
- (c) Beginning April 1, 2016, a system is in compliance with the MCL for *E. coli* for samples taken under the provisions of subpart Y of this part unless any of the conditions identified in paragraphs (c)(1) through (c)(4) of this section occur. For purposes of the public notification requirements in subpart Q of this part, violation of the MCL may pose an acute risk to health.
 - (1) The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample
 - (2) The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample.
 - (3) The system fails to take all required repeat samples following an *E. coli*-positive routine sample.
 - (4) The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.
- (d) Until March 31, 2016, a public water system must determine compliance with the MCL for total coliforms in paragraphs (a) and (b) of this section for each month in which it is required to monitor for total coliforms. Beginning April 1, 2016, a public water system must determine compliance with the MCL for *E. coli* in paragraph (c) of this section for each month in which it is required to monitor for total coliforms.
- (e) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in paragraphs (a) and (b) of this section and for achieving compliance with the maximum contaminant level for *E. coli* in paragraph (c) of this section:
 - (1) Protection of wells from fecal contamination by appropriate placement and construction;
 - (2) Maintenance of a disinfectant residual throughout the distribution system;
 - (3) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, cross connection control, and continual maintenance of positive water pressure in all parts of the distribution system
 - (4) Filtration and/or disinfection of surface water, as described in subparts H, P, T, and W of this part, or disinfection of ground water, as described in subpart S of this part, using strong oxidants such as chlorine, chlorine dioxide, or ozone; and
 - (5) For systems using ground water, compliance with the requirements of an EPA-approved State Wellhead Protection Program developed and implemented under section 1428 of the SDWA.
- (f) The Administrator, pursuant to section 1412 of the Act, hereby identifies the technology, treatment techniques, or other means available identified in paragraph (e) of this section as affordable technology, treatment techniques, or other means available to systems serving 10,000 or fewer people for achieving compliance with the maximum contaminant level for total coliforms in paragraphs (a) and (b) of this section and for achieving compliance with the maximum contaminant level for *E. coli* in paragraph (c) of this section.

[78 FR 10347, Feb. 13, 2013]

§141.64 Maximum contaminant levels for disinfection byproducts.

- (a) ***Bromate and chlorite.*** The maximum contaminant levels (MCLs) for bromate and chlorite are as follows:

DISINFECTION BYPRODUCT	MCL (mg/L)
Bromate	0.010
Chlorite	1.0

- (1) *Compliance dates for CWSs and NTNCWSs.* Subpart H systems serving 10,000 or more persons must comply with this paragraph (a) beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this paragraph (a) beginning January 1, 2004.
- (2) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for bromate and chlorite identified in this paragraph (a):

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
Bromate	Control of ozone treatment process to reduce production of bromate
Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels

(b) TTHM and HAA5.

(1) Subpart L—RAA compliance.

- (i) **Compliance dates.** Subpart H systems serving 10,000 or more persons must comply with this paragraph (b)(1) beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this paragraph (b)(1) beginning January 1, 2004. All systems must comply with these MCLs until the date specified for subpart V compliance in §141.620(c).

DISINFECTION BYPRODUCT	MCL (mg/L)
Total trihalomethanes (TTHM)	0.080
Haloacetic acids (five) (HAA5)	0.060

- (ii) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this paragraph (b)(1):

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5)	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant

(2) Subpart V—LRAA compliance.

- (i) **Compliance dates.** The subpart V MCLs for TTHM and HAA5 must be complied with as a locational running annual average at each monitoring location beginning the date specified for subpart V compliance in §141.620(c).

DISINFECTION BYPRODUCT	MCL (mg/L)
Total trihalomethanes (TTHM)	0.080
Haloacetic acids (five) (HAA5)	0.060

- (ii) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this paragraph (b)(2) for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5)	Enhanced coagulation or enhanced softening, plus GAC10; or nanofiltration with a molecular weight cutoff ≤ 1000 Daltons; or GAC20

- (iii) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this paragraph (b)(2) for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5)	Systems serving $\geq 10,000$: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance
	Systems serving $< 10,000$: Improved distribution system and storage tank management to reduce residence time

[71 FR 478, Jan. 4, 2006]

§141.65 Maximum residual disinfectant levels.

- (a) Maximum residual disinfectant levels (MRDLs) are as follows:

DISINFECTANT RESIDUAL	MRDL (mg/L)
Chlorine	4.0 (as Cl ₂).
Chloramines	4.0 (as Cl ₂).
Chlorine dioxide	0.8 (as ClO ₂).

- (b) **Compliance dates—**

- (1) **CWSs and NTNCWSs.** Subpart H systems serving 10,000 or more persons must comply with this section beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subpart beginning January 1, 2004.
- (2) **Transient NCWSs.** Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

- (c) The Administrator, pursuant to Section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels identified in paragraph (a) of this section: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

[63 FR 69465, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001]

§141.66 Maximum contaminant levels for radionuclides.

- (a) [Reserved]
- (b) *MCL for combined radium-226 and -228.* The maximum contaminant level for combined radium-226 and radium-228 is 5 pCi/L. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.
- (c) *MCL for gross alpha particle activity (excluding radon and uranium).* The maximum contaminant level for gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/L.
- (d) *MCL for beta particle and photon radioactivity.*
- (1) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year (mrem/year).
 - (2) Except for the radionuclides listed in table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of 2 liters per day drinking water intake using the 168-hour data list in “Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure,” NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. This incorporation by reference 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 this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

Table A—Average Annual Concentrations Assumed to Produce: a Total Body or Organ Dose of 4 mrem/yr

1. Radionuclide	Critical organ	pCi per liter
2. Tritium	Total body	20,000
3. Strontium-90	Bone Marrow	8

- (e) *MCL for uranium.* The maximum contaminant level for uranium is 30 µg/L.
- (f) **Compliance dates.**
- (1) Compliance dates for combined radium-226 and -228, gross alpha particle activity, gross beta particle and photon radioactivity, and uranium: Community water systems must comply with the MCLs listed in paragraphs (b), (c), (d), and (e) of this section beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of §§141.25 and 141.26. Compliance with reporting requirements for the radionuclides under appendix A to subpart O and appendices A and B to subpart Q is required on December 8, 2003.
 - (2) [Reserved]
- (g) **Best available technologies (BATs) for radionuclides.** The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the following table the best technology available for achieving

compliance with the maximum contaminant levels for combined radium-226 and -228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.

Table B—BAT for Combined Radium-226 and Radium-228, Uranium, Gross Alpha Particle Activity, and Beta Particle and Photon Radioactivity

CONTAMINANT	BAT
1. Combined radium-226 and radium-228	Ion exchange, reverse osmosis, lime softening.
2. Uranium	Ion exchange, reverse osmosis, lime softening, coagulation/filtration.
3. Gross alpha particle activity (excluding Radon and Uranium)	Reverse osmosis.
4. Beta particle and photon radioactivity	Ion exchange, reverse osmosis.

(h) *Small systems compliance technologies list for radionuclides.*

Table C—List of Small Systems Compliance Technologies for Radionuclides and Limitations to Use

Unit technologies	Limitations (see footnotes)	Operator skill level required ¹	Raw water quality range and considerations. ¹
1. Ion exchange (IE)	(^a)	Intermediate	All ground waters.
2. Point of use (POU ²) IE	(^b)	Basic	All ground waters.
3. Reverse osmosis (RO)	(^c)	Advanced	Surface waters usually require pre-filtration.
4. POU ² RO	(^b)	Basic	Surface waters usually require pre-filtration.
5. Lime softening	(^d)	Advanced	All waters.
6. Green sand filtration	(^e)	Basic.	
7. Co-precipitation with Barium sulfate	(^f)	Intermediate to Advanced	Ground waters with suitable water quality.
8. Electrodialysis/electrodialysis reversal		Basic to Intermediate	All ground waters.
9. Pre-formed hydrous Manganese oxide filtration	(^g)	Intermediate	All ground waters.
10. Activated alumina	(^a), (^h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency.
11. Enhanced coagulation/filtration	(ⁱ)	Advanced	Can treat a wide range of water qualities.

¹National Research Council (NRC). Safe Water from Every Tap: Improving Water Service to Small Communities. National Academy Press. Washington, D.C. 1997.

²A POU, or “point-of-use” technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes: Technologies for Radionuclides:

^aThe regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

^bWhen POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

^cReject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.

^dThe combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

^eRemoval efficiencies can vary depending on water quality.

^fThis technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

^gThis technology is most applicable to small systems that already have filtration in place.

^hHandling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

ⁱAssumes modification to a coagulation/filtration process already in place.

Table D—Compliance Technologies by System Size Category for Radionuclide NPDWR's

Contaminant	Compliance technologies ¹ for system size categories (population served)		3,300-10,000
	25-500	501-3,300	
1. Combined radium-226 and radium-228	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9.
2. Gross alpha particle activity	3, 4	3, 4	3, 4.
3. Beta particle activity and photon activity	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4.
4. Uranium	1, 2, 4, 10, 11	1, 2, 3, 4, 5, 10, 11	1, 2, 3, 4, 5, 10, 11.

NOTE: ¹Numbers correspond to those technologies found listed in the table C of 141.66(h). [65 FR 76748, Dec. 7, 2000]

Subpart H—Filtration and Disinfection

SOURCE: 54 FR 27527, June 29, 1989, unless otherwise noted.

§141.70 General requirements.

- (a) The requirements of this subpart H constitute national primary drinking water regulations. These regulations establish criteria under which filtration is required as a treatment technique for public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water. In addition, these regulations establish treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate

count bacteria, *Legionella*, and turbidity. Each public water system with a surface water source or a ground water source under the direct influence of surface water must provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

- (1) At least 99.9 percent (3-log) removal and/or inactivation of *Giardia lamblia* cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and
 - (2) At least 99.99 percent (4-log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.
- (b) A public water system using a surface water source or a ground water source under the direct influence of surface water is considered to be in compliance with the requirements of paragraph (a) of this section if:
- (1) It meets the requirements for avoiding filtration in §141.71 and the disinfection requirements in §141.72(a); or
 - (2) It meets the filtration requirements in §141.73 and the disinfection requirements in §141.72(b).
- (c) Each public water system using a surface water source or a ground water source under the direct influence of surface water must be operated by qualified personnel who meet the requirements specified by the State.
- (d) **Additional requirements for systems serving at least 10,000 people.** In addition to complying with requirements in this subpart, systems serving at least 10,000 people must also comply with the requirements in subpart P of this part.
- (e) **Additional requirements for systems serving fewer than 10,000 people.** In addition to complying with requirements in this subpart, systems serving fewer than 10,000 people must also comply with the requirements in subpart T of this part.

[54 FR 27527, June 29, 1989, as amended at 63 FR 69516, Dec. 16, 1998; 67 FR 1836, Jan. 14, 2002]

§141.71 Criteria for avoiding filtration.

A public water system that uses a surface water source must meet all of the conditions of paragraphs (a) and (b) of this section, and is subject to paragraph (c) of this section, beginning December 30, 1991, unless the State has determined, in writing pursuant to §1412(b)(7)(C)(iii), that filtration is required. A public water system that uses a ground water source under the direct influence of surface water must meet all of the conditions of paragraphs (a) and (b) of this section and is subject to paragraph (c) of this section, beginning 18 months after the State determines that it is under the direct influence of surface water, or December 30, 1991, whichever is later, unless the State has determined, in writing pursuant to §1412(b)(7)(C)(iii), that filtration is required. If the State determines in writing pursuant to §1412(b)(7)(C)(iii) before December 30, 1991, that filtration is required, the system must have installed filtration and meet the criteria for filtered systems specified in §§141.72(b) and 141.73 by June 29, 1993. Within 18 months of the failure of a system using surface water or a ground water source under the direct influence of surface water to meet any one of the requirements of paragraphs (a) and (b) of this section or after June 29, 1993, whichever is later, the system must have installed filtration and meet the criteria for filtered systems specified in §§141.72(b) and 141.73.

(a) Source water quality conditions.

- (1) The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than 100/100 ml (measured as specified in §141.74 (a) (1) and (2) and (b)(1)), in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph must be met.
- (2) The turbidity level cannot exceed 5 NTU (measured as specified in §141.74 (a)(1) and (b)(2)) in representative samples of the source water immediately prior to the first or only point of disinfectant application unless: (i) the State determines that any such event was caused by circumstances that were unusual and unpredictable; and (ii) as a result of any such event, there have not been more than two events in the past 12 months the system served water to the public, or more than five events in the past

120 months the system served water to the public, in which the turbidity level exceeded 5 NTU. An “event” is a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

(b) Site-specific conditions.

(1)

- (i)** The public water system must meet the requirements of §141.72(a)(1) at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and the State determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.
- (ii)** The public water system must meet the requirements of §141.72(a)(2) at all times the system serves water to the public.
- (iii)** The public water system must meet the requirements of §141.72(a)(3) at all times the system serves water to the public unless the State determines that any such failure was caused by circumstances that were unusual and unpredictable.
- (iv)** The public water system must meet the requirements of §141.72(a)(4) on an ongoing basis unless the State determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

(2)

The public water system must maintain a watershed control program which minimizes the potential for contamination by *Giardia lamblia* cysts and viruses in the source water. The State must determine whether the watershed control program is adequate to meet this goal. The adequacy of a program to limit potential contamination by *Giardia lamblia* cysts and viruses must be based on: the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within the watershed. At a minimum, the watershed control program must:

- (i)** Characterize the watershed hydrology and land ownership;
- (ii)** Identify watershed characteristics and activities which may have an adverse effect on source water quality; and
- (iii)** Monitor the occurrence of activities which may have an adverse effect on source water quality.

The public water system must demonstrate through ownership and/or written agreements with landowners within the watershed that it can control all human activities which may have an adverse impact on the microbiological quality of the source water. The public water system must submit an annual report to the State that identifies any special concerns about the watershed and how they are being handled; describes activities in the watershed that affect water quality; and projects what adverse activities are expected to occur in the future and describes how the public water system expects to address them. For systems using a ground water source under the direct influence of surface water, an approved wellhead protection program developed under section 1428 of the Safe Drinking Water Act may be used, if the State deems it appropriate, to meet these requirements.

(3)

The public water system must be subject to an annual on-site inspection to assess the watershed control program and disinfection treatment process. Either the State or a party approved by the State must conduct the on-site inspection. The inspection must be conducted by competent individuals such as sanitary and civil engineers, sanitarians, or technicians who have experience and knowledge about the operation and maintenance of a public water system, and who have a sound understanding of public health principles and waterborne diseases. A report of the on-site inspection summarizing all findings must be prepared every year. The on-site inspection must indicate to the State's satisfaction that the watershed control program and disinfection treatment process are adequately designed and maintained. The on-site inspection must include:

- (i)** A review of the effectiveness of the watershed control program;
- (ii)** A review of the physical condition of the source intake and how well it is protected;
- (iii)** A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;
- (iv)** An inspection of the disinfection equipment for physical deterioration;
- (v)** A review of operating procedures;

- (vi) A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and
 - (vii) Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.
- (4) The public water system must not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system must have been modified sufficiently to prevent another such occurrence, as determined by the State.
 - (5) The public water system must comply with the maximum contaminant level (MCL) for total coliforms in §141.63(a) and (b) and the MCL for *E. coli* in §141.63(c) at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the State determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.
 - (6) The public water system must comply with the requirements for trihalomethanes in §§141.12 and 141.30 until December 31, 2001. After December 31, 2001, the system must comply with the requirements for total trihalomethanes, haloacetic acids (five), bromate, chlorite, chlorine, chloramines, and chlorine dioxide in subpart L of this part.
- (c) ***Treatment technique violations.***
- (1) A system that (i) fails to meet any one of the criteria in paragraphs (a) and (b) of this section and/or which the State has determined that filtration is required, in writing pursuant to §1412(b)(7)(C)(iii), and (ii) fails to install filtration by the date specified in the introductory paragraph of this section is in violation of a treatment technique requirement.
 - (2) A system that has not installed filtration is in violation of a treatment technique requirement if:
 - (i) The turbidity level (measured as specified in §141.74(a)(1) and (b)(2)) in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or
 - (ii) The system is identified as a source of a waterborne disease outbreak.

[54 FR 27527, June 29, 1989, as amended at 63 FR 69516, Dec. 16, 1998; 66 FR 3776, Jan. 16, 2001; 69 FR 38855, June 29, 2004; 78 FR 10347, Feb. 13, 2013]

§141.72 Disinfection.

A public water system that uses a surface water source and does not provide filtration treatment must provide the disinfection treatment specified in paragraph (a) of this section beginning December 30, 1991, unless the State determines that filtration is required in writing pursuant to §1412 (b)(7)(C)(iii). A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment specified in paragraph (a) of this section beginning December 30, 1991, or 18 months after the State determines that the ground water source is under the influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii). If the State has determined that filtration is required, the system must comply with any interim disinfection requirements the State deems necessary before filtration is installed. A system that uses a surface water source that provides filtration treatment must provide the disinfection treatment specified in paragraph (b) of this section beginning June 29, 1993, or beginning when filtration is installed, whichever is later. A system that uses a ground water source under the direct influence of surface water and provides filtration treatment must provide disinfection treatment as specified in paragraph (b) of this section by June 29, 1993, or beginning when filtration is installed, whichever is later. Failure to meet any requirement of this section after the applicable date specified in this introductory paragraph is a treatment technique violation.

- (a) ***Disinfection requirements for public water systems that do not provide filtration.*** Each public water system that does not provide filtration treatment must provide disinfection treatment as follows:
- (1) The disinfection treatment must be sufficient to ensure at least 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts and 99.99 percent (4-log) inactivation of viruses, every day the system serves water to the public, except any one day each month. Each day a system serves water to the public, the public water system must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in §141.74(b)(3), and determine whether this value(s) is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. If a system uses a disinfectant other than chlorine, the system may demonstrate to the State, through the use of a State-approved protocol for on-site disinfection challenge studies or other information satisfactory to the State, that

CT_{99.9} values other than those specified in tables 2.1 and 3.1 in §141.74(b)(3) or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by paragraph (a)(1) of this section.

- (2) The disinfection system must have either (i) redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system, or (ii) automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/l of residual disinfectant concentration in the water. If the State determines that automatic shut-off would cause unreasonable risk to health or interfere with fire protection, the system must comply with paragraph (a)(2)(i) of this section.
- (3) The residual disinfectant concentration in the water entering the distribution system, measured as specified in §141.74 (a)(2) and (b)(5), cannot be less than 0.2 mg/l for more than 4 hours.
- (4) (i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in §141.74 (a)(2) and (b)(6), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in §141.74(a)(1), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value “V” in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

where:

a = number of instances where the residual disinfectant concentration is measured;

b = number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances where the residual disinfectant concentration is measured but not detected and where the HPC is >500/ml; and

e = number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

- (ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by §141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (a)(4)(i) of this section do not apply to that system.

(b) ***Disinfection requirements for public water systems which provide filtration.*** Each public water system that provides filtration treatment must provide disinfection treatment as follows.

- (1) 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 and/or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation and/or removal of viruses, as determined by the State.
- (2) The residual disinfectant concentration in the water entering the distribution system, measured as specified in §141.74 (a)(2) and (c)(2), cannot be less than 0.2 mg/l for more than 4 hours.
- (3) (i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in §141.74 (a)(2) and (c)(3), cannot be

undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in §141.74(a)(1), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value “V” in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

where:

a = number of instances where the residual disinfectant concentration is measured;

b = number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances where no residual disinfectant concentration is detected and where the HPC is >500/ml; and

e = number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

- (ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in §141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(3)(i) of this section do not apply.

[54 FR 27527, June 29, 1989, as amended at 69 FR 38855, June 29, 2004]

§141.73 Filtration.

A public water system that uses a surface water source or a ground water source under the direct influence of surface water, and does not meet all of the criteria in §141.71 (a) and (b) for avoiding filtration, must provide treatment consisting of both disinfection, as specified in §141.72(b), and filtration treatment which complies with the requirements of paragraph (a), (b), (c), (d), or (e) of this section by June 29, 1993, or within 18 months of the failure to meet any one of the criteria for avoiding filtration in §141.71 (a) and (b), whichever is later. Failure to meet any requirement of this section after the date specified in this introductory paragraph is a treatment technique violation.

(a) **Conventional filtration treatment or direct filtration.**

- (1) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 NTU in at least 95 percent of the measurements taken each month, measured as specified in §141.74 (a)(1) and (c)(1), except that if the State determines that the system is capable of achieving at least 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts at some turbidity level higher than 0.5 NTU in at least 95 percent of the measurements taken each month, the State may substitute this higher turbidity limit for that system. However, in no case may the State approve a turbidity limit that allows more than 1 NTU in more than 5 percent of the samples taken each month, measured as specified in §141.74 (a)(1) and (c)(1).
- (2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in §141.74 (a)(1) and (c)(1).
- (3) Beginning January 1, 2002, systems serving at least 10,000 people must meet the turbidity requirements in §141.173(a).
- (4) Beginning January 1, 2005, systems serving fewer than 10,000 people must meet the turbidity requirements in §§141.550 through 141.553.

(b) **Slow sand filtration.**

- (1) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in §141.74 (a)(1) and (c)(1), except that if the State determines there is no significant interference with disinfection at a higher turbidity level, the State may substitute this higher turbidity limit for that system.
- (2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in §141.74 (a)(1) and (c)(1).
- (c) ***Diatomaceous earth filtration.***
 - (1) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in §141.74 (a)(1) and (c)(1).
 - (2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in §141.74 (a)(1) and (c)(1).
- (d) ***Other filtration technologies.*** A public water system may use a filtration technology not listed in paragraphs (a) through (c) of this section if it demonstrates to the State, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of §141.72(b), consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses. For a system that makes this demonstration, the requirements of paragraph (b) of this section apply. Beginning January 1, 2002, systems serving at least 10,000 people must meet the requirements for other filtration technologies in §141.173(b). Beginning January 14, 2005, systems serving fewer than 10,000 people must meet the requirements for other filtration technologies in §141.550 through 141.553.

[54 FR 27527, June 29, 1989, as amended at 63 FR 69516, Dec. 16, 1998; 66 FR 3776, Jan. 16, 2001; 67 FR 1836, Jan. 14, 2002; 69 FR 38855, June 29, 2004]

§141.74 Analytical and monitoring requirements.

- (a) ***Analytical requirements.*** Only the analytical method(s) specified in this paragraph, or otherwise approved by EPA, may be used to demonstrate compliance with §§141.71, 141.72 and 141.73. Measurements for pH, turbidity, temperature and residual disinfectant concentrations must be conducted by a person approved by the State. Measurement for total coliforms, fecal coliforms and HPC must be conducted by a laboratory certified by the State or EPA to do such analysis. Until laboratory certification criteria are developed for the analysis of fecal coliforms and HPC, any laboratory certified for total coliforms analysis by the State or EPA is deemed certified for fecal coliforms and HPC analysis. The following procedures shall be conducted in accordance with the publications listed in the following section. This incorporation by reference 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 methods published in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association et al., 1015 Fifteenth Street, NW., Washington, DC 20005; copies of the Minimal Medium ONPG-MUG Method as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method" (Edberg et al.), *Applied and Environmental Microbiology*, Volume 54, pp. 1595-1601, June 1988 (as amended under Erratum, *Applied and Environmental Microbiology*, Volume 54, p. 3197, December, 1988), may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, Colorado, 80235; and copies of the Indigo Method as set forth in the article "Determination of Ozone in Water by the Indigo Method" (Bader and Hoigne), may be obtained from Ozone Science & Engineering, Pergamon Press Ltd., Fairview Park, Elmsford, New York 10523. Copies may be inspected at the U.S. Environmental Protection Agency, Room EB15, 401 M St., SW., Washington, DC 20460 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.
 - (1) Public water systems must conduct analysis of pH and temperature in accordance with one of the methods listed at §141.23(k)(1). Public water systems must conduct analysis of total coliforms, fecal coliforms, heterotrophic bacteria, and turbidity in accordance with one of the following analytical methods or one of the alternative methods listed in appendix A to subpart C of this part and by using

analytical test procedures contained in *Technical Notes on Drinking Water Methods*, EPA-600/R-94-173, October 1994. This document is available from the National Service Center for Environmental Publications (NSCEP), P.O. Box 42419, Cincinnati, OH 45242-0419 or <http://www.epa.gov/nscep/>.

Organism	Methodology	Citation ¹
Total Coliform ²	Total Coliform Fermentation Technique ^{3 4 5}	9221 A, B, C
	Total Coliform Membrane Filter Technique ⁶	9222 A, B, C
	ONPG-MUG Test ⁷	9223
Fecal Coliforms ²	Fecal Coliform Procedure ⁸	9221 E
	Fecal Coliform Filter Procedure	9222 D
Heterotrophic bacteria ²	Pour Plate Method	9215 B
	SimPlate ¹¹	
Turbidity ¹³	Nephelometric Method	2130 B
	Nephelometric Method	180.1 ⁹
	Great Lakes Instruments	Method 2 ¹⁰
	Hach FilterTrak	10133 ¹²

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, 7 and 9-12 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, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

¹Except where noted, all methods refer to *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used. In addition, the following online versions may also be used: 2130 B-01, 9215 B-00, 9221 A, B, C, E-99, 9222 A, B, C, D-97, and 9223 B-97. Standard Methods Online are available at <http://www.standardmethods.org>. 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 may be used.

²The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10 deg. C during transit.

³Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform, using lactose broth, is less than 10 percent.

⁴Media should cover inverted tubes at least one-half to two-thirds after the sample is added.

⁵No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.

⁶MI agar also may be used. Preparation and use of MI agar is set forth in the article, “New medium for the simultaneous detection of total coliform and *Escherichia coli* in water” by Brenner, K.P., et. al., 1993, Appl. Environ. Microbiol. 59:3534-3544. Also available from the Office of Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460, EPA/600/J-99/225. Verification of colonies is not required.

⁷The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

⁸A-1 broth may be held up to 7 days in a tightly closed screw cap tube at 4 °C.

⁹“Methods for the Determination of Inorganic Substances in Environmental Samples”, EPA/600/R-93/100, August 1993. Available at NTIS, PB94-121811.

¹⁰GLI Method 2, “Turbidity,” November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, WI 53223.

¹¹A description of the SimPlate method, “IDEXX SimPlate TM HPC Test Method for Heterotrophs in Water,” November 2000, can be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092, telephone (800) 321-0207.

¹²A description of the Hach FilterTrak Method 10133, “Determination of Turbidity by Laser Nephelometry,” January 2000, Revision 2.0, can be obtained from; Hach Co., P.O. Box 389, Loveland, CO 80539-0389, telephone: 800-227-4224.

¹³Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin.

- (2) Public water systems must measure residual disinfectant concentrations with one of the analytical methods in the following table or one of the alternative methods listed in appendix A to subpart C of this part. If approved by the State, residual disinfectant concentrations for free chlorine and combined chlorine also may be measured by using DPD colorimetric test kits. In addition, States may approve the use of the ITS free chlorine test strip for the determination of free chlorine. Use of the test strips is described in Method D99-003, “Free Chlorine Species (HOCl⁻ and OCl⁻) by Test Strip,” Revision 3.0, November 21, 2003, available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730. Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five days, or with a protocol approved by the State.

Residual	Methodology	SM ¹	SM Online ²	Other
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D-00	D1253-03 ³
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F-00	
	DPD Colorimetric	4500-Cl G	4500-Cl G-00	
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H-00	
Total Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D-00	D1253-03 ³
	Amperometric Titration (low level measurement)	4500-Cl E	4500-Cl E-00	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F-00	
	DPD Colorimetric	4500-Cl G	4500-Cl G-00	

	Iodometric Electrode	4500-Cl I	4500-Cl I-00	
Chlorine Dioxide	Amperometric Titration	4500-ClO ₂ C	4500-ClO ₂ C-00	
	DPD Method	4500-ClO ₂ D		
	Amperometric Titration	4500-ClO ₂ E	4500-ClO ₂ E-00	
	Spectrophotometric			327.0, Revision 1.1 ⁴
Ozone	Indigo Method	4500-O ₃ B	4500-O ₃ B-97	

¹All the listed methods are contained in the 18th, 19th, and 20th editions of *Standard Methods for the Examination of Water and Wastewater*, 1992, 1995, and 1998; the cited methods published in any of these three editions may be used.

²Standard Methods Online are available at <http://www.standardmethods.org>. 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 may be used.

³*Annual Book of ASTM Standards*, Vol. 11.01, 2004; ASTM International; any year containing the cited version of the method may be used. Copies of this method may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428-2959.

⁴EPA Method 327.0, Revision 1.1, "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry," USEPA, May 2005, EPA 815-R-05-008. Available online at <http://www.epa.gov/safewater/methods/sourcalt.html>.

(b) *Monitoring requirements for systems that do not provide filtration.* A public water system that uses a surface water source and does not provide filtration treatment must begin monitoring, as specified in this paragraph (b), beginning December 31, 1990, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii), in which case the State may specify alternative monitoring requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must begin monitoring as specified in this paragraph (b) beginning December 31, 1990, or 6 months after the State determines that the ground water source is under the direct influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii), in which case the State may specify alternative monitoring requirements, as appropriate, until filtration is in place.

(1) Fecal coliform or total coliform density measurements as required by §141.71(a)(1) must be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system must sample for fecal or total coliforms at the following minimum frequency each week the system serves water to the public:

System size (persons served)	Samples/week ¹
≤500	1
501 to 3,300	2
3,301 to 10,000	3
10,001 to 25,000	4
>25,000	5

¹Must be taken on separate days.

Also, one fecal or total coliform density measurement must be made every day the system serves water to the public and the turbidity of the source water exceeds 1 NTU (these samples count towards the weekly coliform sampling requirement) unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection.

- (2) Turbidity measurements as required by §141.71(a)(2) must be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the State.
- (3) The total inactivation ratio for each day that the system is in operation must be determined based on the CT_{99.9} values in tables 1.1-1.6, 2.1, and 3.1 of this section, as appropriate. The parameters necessary to determine the total inactivation ratio must be monitored as follows:
 - (i) The temperature of the disinfected water must be measured at least once per day at each residual disinfectant concentration sampling point.
 - (ii) If the system uses chlorine, the pH of the disinfected water must be measured at least once per day at each chlorine residual disinfectant concentration sampling point.
 - (iii) The disinfectant contact time(s) (“T”) must be determined for each day during peak hourly flow.
 - (iv) The residual disinfectant concentration(s) (“C”) of the water before or at the first customer must be measured each day during peak hourly flow.
 - (v) If a system uses a disinfectant other than chlorine, the system may demonstrate to the State, through the use of a State-approved protocol for on-site disinfection challenge studies or other information satisfactory to the State, that CT_{99.9} values other than those specified in tables 2.1 and 3.1 in this section other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by §141.72(a)(1).

Table 1.1—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 0.5 °C or Lower¹

Residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	137	163	195	237	277	329	390
0.6	141	168	200	239	286	342	407
0.8	145	172	205	246	295	354	422
1.0	148	176	210	253	304	365	437
1.2	152	180	215	259	313	376	451
1.4	155	184	221	266	321	387	464
1.6	157	189	226	273	329	397	477
1.8	162	193	231	279	338	407	489
2.0	165	197	236	286	346	417	500
2.2	169	201	242	297	353	426	511
2.4	172	205	247	298	361	435	522
2.6	175	209	252	304	368	444	533
2.8	178	213	257	310	375	452	543

3.0	181	217	261	316	382	460	552
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¹These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature and at the higher pH.

Table 1.2—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 5.0 °C¹

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	97	117	139	166	198	236	279
0.6	100	120	143	171	204	244	291
0.8	103	122	146	175	210	252	301
1.0	105	125	149	179	216	260	312
1.2	107	127	152	183	221	267	320
1.4	109	130	155	187	227	274	329
1.6	111	132	158	192	232	281	337
1.8	114	135	162	196	238	287	345
2.0	116	138	165	200	243	294	353
2.2	118	140	169	204	248	300	361
2.4	120	143	172	209	253	306	368
2.6	122	146	175	213	258	312	375
2.8	124	148	178	217	263	318	382
3.0	126	151	182	221	268	324	389

¹These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature, and at the higher pH.

Table 1.3—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 10.0 °C¹

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	73	88	104	125	149	177	209
0.6	75	90	107	128	153	183	218
0.8	78	92	110	131	158	189	226
1.0	79	94	112	134	162	195	234

1.2	80	95	114	137	166	200	240
1.4	82	98	116	140	170	206	247
1.6	83	99	119	144	174	211	253
1.8	86	101	122	147	179	215	259
2.0	87	104	124	150	182	221	265
2.2	89	105	127	153	186	225	271
2.4	90	107	129	157	190	230	276
2.6	92	110	131	160	194	234	281
2.8	93	111	134	163	197	239	287
3.0	95	113	137	166	201	243	292

¹These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature, and at the higher pH.

Table 1.4—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 15.0 °C¹

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	49	59	70	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	64	76	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	60	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

¹These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables

may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature, and at the higher pH.

Table 1.5—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 20 °C¹

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	36	44	52	62	74	89	105
0.6	38	45	54	64	77	92	109
0.8	39	46	55	66	79	95	113
1.0	39	47	56	67	81	98	117
1.2	40	48	57	69	83	100	120
1.4	41	49	58	70	85	103	123
1.6	42	50	59	72	87	105	126
1.8	43	51	61	74	89	108	129
2.0	44	52	62	75	91	110	132
2.2	44	53	63	77	93	113	135
2.4	45	54	65	78	95	115	138
2.6	46	55	66	80	97	117	141
2.8	47	56	67	81	99	119	143
3.0	47	57	68	83	101	122	146

¹These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature, and at the higher pH.

Table 1.6—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 25 °C¹ and Higher

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	24	29	35	42	50	59	70
0.6	25	30	36	43	51	61	73
0.8	26	31	37	44	53	63	75
1.0	26	31	37	45	54	65	78
1.2	27	32	38	46	55	67	80
1.4	27	33	39	47	57	69	82
1.6	28	33	40	48	58	70	84

1.8	29	34	41	49	60	72	86
2.0	29	35	41	50	61	74	88
2.2	30	35	42	51	62	75	90
2.4	30	36	43	52	63	77	92
2.6	31	37	44	53	65	78	94
2.8	31	37	45	54	66	80	96
3.0	32	38	46	55	67	81	97

¹These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature, and at the higher pH.

Table 2.1—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Chlorine Dioxide and Ozone¹

	Temperature					
	<1 °C	5 °C	10 °C	15 °C	20 °C	≥25 °C
Chlorine dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.48

¹These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature for determining CT_{99.9} values between indicated temperatures.

Table 3.1—CT Values (CT_{99.9}) for 99.9 Percent Inactivation of Giardia Lamblia Cysts By Chloramines¹

Temperature					
<1 °C	5 °C	10 °C	15 °C	20 °C	25 °C
3,800	2,200	1,850	1,500	1,100	750

¹These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system must demonstrate, based on on-site studies or other information, as approved by the State, that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the CT_{99.9} value at the lower temperature for determining CT_{99.9} values between indicated temperatures.

- (4) The total inactivation ratio must be calculated as follows:
 - (i) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio based on either of the following two methods:
 - (A) One inactivation ratio (CT_{calc}/CT_{99.9}) is determined before or at the first customer during peak hourly flow and if the CT_{calc}/CT_{99.9} ≥ 1.0, the 99.9 percent *Giardia lamblia* inactivation requirement has been achieved; or

- (B) Successive $CT_{calc}/CT_{99.9}$ values, representing sequential inactivation ratios, are determined between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the following method must be used to calculate the total inactivation ratio:

- (1) Determine $\frac{CT_{calc}}{CT_{99.9}}$ for each sequence.
- (2) Add the $\frac{CT_{calc}}{CT_{99.9}}$ values together $\left(\sum \frac{CT_{calc}}{CT_{99.9}} \right)$
- (3) If $\sum \left(\frac{CT_{calc}}{CT_{99.9}} \right) \geq 1.0$, the 99.9 percent Giardia

lamblia inactivation requirement has been achieved.

- (ii) If the system uses more than one point of disinfectant application before or at the first customer, the system must determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The $CT_{calc}/CT_{99.9}$ value of each sequence and

$$\sum \frac{CT_{calc}}{CT_{99.9}}$$

must be calculated using the method in paragraph (b)(4)(i)(B) of this section to determine if the system is in compliance with §141.72(a).

- (iii) Although not required, the total percent inactivation for a system with one or more points of residual disinfectant concentration monitoring may be calculated by solving the following equation:

$$\text{Percent inactivation} = 100 - \frac{100}{10^z}$$

$$\text{where } z = 3 \times \sum \left(\frac{CT_{calc}}{CT_{99.9}} \right)$$

- (5) The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

System size by population	Samples/day ¹
<500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

¹The day's samples cannot be taken at the same time. The sampling intervals are subject to State review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every 4 hours until the residual concentration is equal to or greater than 0.2 mg/l.

- (6)
 - (i) Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §141.21. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §§141.854 through 141.858. The State may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the State determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (a)(1) of this section, may be measured in lieu of residual disinfectant concentration.
 - (ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (a)(1) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(6)(i) of this section do not apply to that system.

(c) **Monitoring requirements for systems using filtration treatment.** A public water system that uses a surface water source or a ground water source under the influence of surface water and provides filtration treatment must monitor in accordance with this paragraph (c) beginning June 29, 1993, or when filtration is installed, whichever is later.

- (1) Turbidity measurements as required by §141.73 must be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the State. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the State may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the State may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the State determines that less frequent monitoring is sufficient to indicate effective filtration performance.
- (2) The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies each day prescribed below:

System size by population	Samples/day ¹
±500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

¹The day's samples cannot be taken at the same time. The sampling intervals are subject to State review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every 4 hours until the residual disinfectant concentration is equal to or greater than 0.2 mg/l.

(3)

- (i)** Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §141.21. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §§141.854 through 141.858. The State may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the State determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (a)(1) of this section, may be measured in lieu of residual disinfectant concentration.
- (ii)** If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (a)(1) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (c)(3)(i) of this section do not apply to that system.

[54 FR 27527, June 29, 1989, as amended at 59 FR 62470, Dec. 5, 1994; 60 FR 34086, June 29, 1995; 64 FR 67465, Dec. 1, 1999; 67 FR 65252, Oct. 23, 2002; 67 FR 65901, Oct. 29, 2002; 69 FR 38856, June 29, 2004; 72 FR 11247, Mar. 12, 2007; 74 FR 30958, June 29, 2009; 78 FR 10347, Feb. 13, 2013]

§141.75 Reporting and recordkeeping requirements.

- (a)** A public water system that uses a surface water source and does not provide filtration treatment must report monthly to the State the information specified in this paragraph (a) beginning December 31, 1990, unless the State has determined that filtration is required in writing pursuant to section 1412(b)(7)(C)(iii), in which case the State may specify alternative reporting requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must report monthly to the State the information specified in this paragraph (a) beginning December 31, 1990, or 6 months after the State determines that the ground water source is under the direct influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii), in which case the State may specify alternative reporting requirements, as appropriate, until filtration is in place.
 - (1)** Source water quality information must be reported to the State within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:
 - (i)** The cumulative number of months for which results are reported.
 - (ii)** The number of fecal and/or total coliform samples, whichever are analyzed during the month (if a system monitors for both, only fecal coliforms must be reported), the dates of sample collection, and the dates when the turbidity level exceeded 1 NTU.
 - (iii)** The number of samples during the month that had equal to or less than 20/100 ml fecal coliforms and/or equal to or less than 100/100 ml total coliforms, whichever are analyzed.
 - (iv)** The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous six months the system served water to the public.

- (v) The cumulative number of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.
 - (vi) The percentage of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.
 - (vii) The maximum turbidity level measured during the month, the date(s) of occurrence for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the State.
 - (viii) For the first 12 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after one year of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 12 months the system served water to the public.
 - (ix) For the first 120 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 120 months the system served water to the public.
- (2) Disinfection information specified in §141.74(b) must be reported to the State within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:
- (i) For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.
 - (ii) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the State was notified of the occurrence.
 - (iii) The daily residual disinfectant concentration(s) (in mg/l) and disinfectant contact time(s) (in minutes) used for calculating the CT value(s).
 - (iv) If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection.
 - (v) The daily measurement(s) of water temperature in °C following each point of disinfection.
 - (vi) The daily CT_{calc} and CT_{calc}/CT_{99.9} values for each disinfectant measurement or sequence and the sum of all CT_{calc}/CT_{99.9} values ((CT_{calc}/CT_{99.9})) before or at the first customer.
 - (vii) The daily determination of whether disinfection achieves adequate *Giardia* cyst and virus inactivation, *i.e.*, whether (CT_{calc}/CT_{99.9}) is at least 1.0 or, where disinfectants other than chlorine are used, other indicator conditions that the State determines are appropriate, are met.
 - (viii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to §141.72:
 - (A) Number of instances where the residual disinfectant concentration is measured;
 - (B) Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;
 - (C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;
 - (D) Number of instances where the residual disinfectant concentration is detected and where HPC is >500/ml;
 - (E) Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml
 - (F) For the current and previous month, the system served water to the public, the value of “V” in the following formula:

$$V = \frac{c + d + e}{a + b} \times 100$$

where:

- a = the value in paragraph (a)(2)(viii)(A) of this section,
- b = the value in paragraph (a)(2)(viii)(B) of this section,
- c = the value in paragraph (a)(2)(viii)(C) of this section,
- d = the value in paragraph (a)(2)(viii)(D) of this section, and
- e = the value in paragraph (a)(2)(viii)(E) of this section.

- (G) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by §141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (a)(2)(viii) (A)-(F) of this section do not apply to that system.
- (ix) A system need not report the data listed in paragraphs (a)(2) (i), and (iii)-(vi) of this section if all data listed in paragraphs (a)(2) (i)-(viii) of this section remain on file at the system, and the State determines that:
 - (A) The system has submitted to the State all the information required by paragraphs (a)(2) (i)-(viii) of this section for at least 12 months; and
 - (B) The State has determined that the system is not required to provide filtration treatment.
- (3) No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the State a report which summarizes its compliance with all watershed control program requirements specified in §141.71(b)(2).
- (4) No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the State a report on the on-site inspection conducted during that year pursuant to §141.71(b)(3), unless the on-site inspection was conducted by the State. If the inspection was conducted by the State, the State must provide a copy of its report to the public water system.
- (5)
 - (i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the State as soon as possible, but no later than by the end of the next business day.
 - (ii) If at any time the turbidity exceeds 5 NTU, the system must consult with the primacy agency as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under §141.203(b)(3).
 - (iii) If at any time the residual falls below 0.2 mg/l in the water entering the distribution system, the system must notify the State as soon as possible, but no later than by the end of the next business day. The system also must notify the State by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.
- (b) A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment must report monthly to the State the information specified in this paragraph (b) beginning June 29, 1993, or when filtration is installed, whichever is later.
 - (1) Turbidity measurements as required by §141.74(c)(1) must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:
 - (i) The total number of filtered water turbidity measurements taken during the month.
 - (ii) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in §141.73 for the filtration technology being used.
 - (iii) The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

- (2) Disinfection information specified in §141.74(c) must be reported to the State within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:
- (i) For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.
 - (ii) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the State was notified of the occurrence.
 - (iii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to §141.72:
 - (A) Number of instances where the residual disinfectant concentration is measured;
 - (B) Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;
 - (C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;
 - (D) Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;
 - (E) Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml;
 - (F) For the current and previous month the system serves water to the public, the value of “V” in the following formula:

$$V = \frac{c + d + e}{a + b} \times 100$$

where:

- a = the value in paragraph (b)(2)(iii)(A) of this section,
- b = the value in paragraph (b)(2)(iii)(B) of this section,
- c = the value in paragraph (b)(2)(iii)(C) of this section,
- d = the value in paragraph (b)(2)(iii)(D) of this section, and
- e = the value in paragraph (b)(2)(iii)(E) of this section.

- (G) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions specified by §141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(2)(iii) (A)-(F) of this section do not apply.
 - (iv) A system need not report the data listed in paragraph (b)(2)(i) of this section if all data listed in paragraphs (b)(2) (i)-(iii) of this section remain on file at the system and the State determines that the system has submitted all the information required by paragraphs (b)(2) (i)-(iii) of this section for at least 12 months.
- (3)
- (i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the State as soon as possible, but no later than by the end of the next business day.
 - (ii) If at any time the turbidity exceeds 5 NTU, the system must consult with the primacy agency as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under §141.203(b)(3).

- (iii) If at any time the residual falls below 0.2 mg/l in the water entering the distribution system, the system must notify the State as soon as possible, but no later than by the end of the next business day. The system also must notify the State by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

[54 FR 27527, June 29, 1989, as amended at 65 FR 26022, May 4, 2000; 69 FR 38856, June 29, 2004]

§141.76 Recycle provisions.

- (a) **Applicability.** All subpart H systems that employ conventional filtration or direct filtration treatment and that recycle spent filter backwash water, thickener supernatant, or liquids from dewatering processes must meet the requirements in paragraphs (b) through (d) of this section.
- (b) **Reporting.** A system must notify the State in writing by December 8, 2003, if the system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the information specified in paragraphs (b)(1) and (2) of this section.
 - (1) A plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are re-introduced back into the treatment plant.
 - (2) Typical recycle flow in gallons per minute (gpm), the highest observed plant flow experienced in the previous year (gpm), design flow for the treatment plant (gpm), and State-approved operating capacity for the plant where the State has made such determinations.
- (c) **Treatment technique requirement.** Any system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes must return these flows through the processes of a system's existing conventional or direct filtration system as defined in §141.2 or at an alternate location approved by the State by June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.
- (d) **Recordkeeping.** The system must collect and retain on file recycle flow information specified in paragraphs (d)(1) through (6) of this section for review and evaluation by the State beginning June 8, 2004.
 - (1) Copy of the recycle notification and information submitted to the State under paragraph (b) of this section.
 - (2) List of all recycle flows and the frequency with which they are returned.
 - (3) Average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in minutes.
 - (4) Typical filter run length and a written summary of how filter run length is determined.
 - (5) The type of treatment provided for the recycle flow.
 - (6) Data on the physical dimensions of the equalization and/or treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used and average dose and frequency of use, and frequency at which solids are removed, if applicable.

[66 FR 31103, June 8, 2001]

Subpart I—Control of Lead and Copper

SOURCE: 56 FR 26548, June 7, 1991, unless otherwise noted.

§141.80 General requirements.

- (a) **Applicability and effective dates.** (1) The requirements of this subpart I constitute the national primary drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of this subpart applies to community water systems and non-transient, non-community water systems (hereinafter referred to as “water systems” or “systems”).
 - (2) [Reserved]

- (b) **Scope.** These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These requirements are triggered, in some cases, by lead and copper action levels measured in samples collected at consumers' taps.
- (c) **Lead and copper action levels.** (1) The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with §141.86 is greater than 0.015 mg/L (*i.e.*, if the “90th percentile” lead level is greater than 0.015 mg/L).
 - (2) The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with §141.86 is greater than 1.3 mg/L (*i.e.*, if the “90th percentile” copper level is greater than 1.3 mg/L).
 - (3) The 90th percentile lead and copper levels shall be computed as follows:
 - (i) The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.
 - (ii) The number of samples taken during the monitoring period shall be multiplied by 0.9.
 - (iii) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(3)(ii) is the 90th percentile contaminant level.
 - (iv) For water systems serving fewer than 100 people that collect 5 samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.
 - (v) For a public water system that has been allowed by the State to collect fewer than five samples in accordance with §141.86(c), the sample result with the highest concentration is considered the 90th percentile value.
- (d) **Corrosion control treatment requirements.**
 - (1) All water systems shall install and operate optimal corrosion control treatment as defined in §141.2.
 - (2) Any water system that complies with the applicable corrosion control treatment requirements specified by the State under §§141.81 and 141.82 shall be deemed in compliance with the treatment requirement contained in paragraph (d)(1) of this section.
- (e) **Source water treatment requirements.** Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the State under §141.83.
- (f) **Lead service line replacement requirements.** Any system exceeding the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the lead service line replacement requirements contained in §141.84.
- (g) **Public education requirements.** Pursuant to §141.85, all water systems must provide a consumer notice of lead tap water monitoring results to persons served at the sites (taps) that are tested. Any system exceeding the lead action level shall implement the public education requirements.
- (h) **Monitoring and analytical requirements.** Tap water monitoring for lead and copper, monitoring for water quality parameters, source water monitoring for lead and copper, and analyses of the monitoring results under this subpart shall be completed in compliance with §§141.86, 141.87, 141.88, and 141.89.
- (i) **Reporting requirements.** Systems shall report to the State any information required by the treatment provisions of this subpart and §141.90.
- (j) **Recordkeeping requirements.** Systems shall maintain records in accordance with §141.91.
- (k) **Violation of national primary drinking water regulations.** Failure to comply with the applicable requirements of §§141.80-141.91, including requirements established by the State pursuant to these provisions, shall constitute a violation of the national primary drinking water regulations for lead and/or copper.

[56 FR 26548, June 7, 1991; 57 FR 28788, June 29, 1992, as amended at 72 FR 57814, Oct. 10, 2007]

§141.81 Applicability of corrosion control treatment steps to small, medium-size and large water systems.

- (a) Systems shall complete the applicable corrosion control treatment requirements described in §141.82 by the deadlines established in this section.

- (1) A large system (serving >50,000 persons) shall complete the corrosion control treatment steps specified in paragraph (d) of this section, unless it is deemed to have optimized corrosion control under paragraph (b)(2) or (b)(3) of this section.
 - (2) A small system (serving ≤3300 persons) and a medium-size system (serving >3,300 and ≤50,000 persons) shall complete the corrosion control treatment steps specified in paragraph (e) of this section, unless it is deemed to have optimized corrosion control under paragraph (b)(1), (b)(2), or (b)(3) of this section.
- (b) A system is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in this section if the system satisfies one of the criteria specified in paragraphs (b)(1) through (b)(3) of this section. Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the State determines appropriate to ensure optimal corrosion control treatment is maintained.
- (1) A small or medium-size water system is deemed to have optimized corrosion control if the system meets the lead and copper action levels during each of two consecutive six-month monitoring periods conducted in accordance with §141.86.
 - (2) Any water system may be deemed by the State to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the State that it has conducted activities equivalent to the corrosion control steps applicable to such system under this section. If the State makes this determination, it shall provide the system with written notice explaining the basis for its decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with §141.82(f). Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the State-designated optimal water quality control parameters in accordance with §141.82(g) and continue to conduct lead and copper tap and water quality parameter sampling in accordance with §141.86(d)(3) and §141.87(d), respectively. A system shall provide the State with the following information in order to support a determination under this paragraph:
 - (i) The results of all test samples collected for each of the water quality parameters in §141.82(c)(3).
 - (ii) A report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in §141.82(c)(1), the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment;
 - (iii) A report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps; and
 - (iv) The results of tap water samples collected in accordance with §141.86 at least once every six months for one year after corrosion control has been installed.
 - (3) Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with §141.86 and source water monitoring conducted in accordance with §141.88 that demonstrates for two consecutive 6-month monitoring periods that the difference between the 90th percentile tap water lead level computed under §141.80(c)(3), and the highest source water lead concentration is less than the Practical Quantitation Level for lead specified in §141.89(a)(1)(ii).
 - (i) Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if the 90th percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two consecutive 6-month monitoring periods.
 - (ii) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall continue monitoring for lead and copper at the tap no less frequently than once every three calendar years using the reduced number of sites specified in §141.86(c) and collecting the samples at times and locations specified in §141.86(d)(4)(iv). Any such system that has not conducted a round of monitoring pursuant to §141.86(d) since September 30, 1997, shall complete a round of monitoring pursuant to this paragraph no later than September 30, 2000.
 - (iii) Any water system deemed to have optimized corrosion control pursuant to this paragraph shall notify the State in writing pursuant to §141.90(a)(3) of any upcoming long-term change in

treatment or addition of a new source as described in that section. The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State may require any such system to conduct additional monitoring or to take other action the State deems appropriate to ensure that such systems maintain minimal levels of corrosion in the distribution system.

- (iv) As of July 12, 2001, a system is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment pursuant to paragraph (b)(3)(v) of this section unless it meets the copper action level.
 - (v) Any system triggered into corrosion control because it is no longer deemed to have optimized corrosion control under this paragraph shall implement corrosion control treatment in accordance with the deadlines in paragraph (e) of this section. Any such large system shall adhere to the schedule specified in that paragraph for medium-size systems, with the time periods for completing each step being triggered by the date the system is no longer deemed to have optimized corrosion control under this paragraph.
- (c) Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two consecutive monitoring periods conducted pursuant to §141.86 and submits the results to the State. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system (or the State, as the case may be) shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The State may require a system to repeat treatment steps previously completed by the system where the State determines that this is necessary to implement properly the treatment requirements of this section. The State shall notify the system in writing of such a determination and explain the basis for its decision. The requirement for any small- or medium-size system to implement corrosion control treatment steps in accordance with paragraph (e) of this section (including systems deemed to have optimized corrosion control under paragraph (b)(1) of this section) is triggered whenever any small- or medium-size system exceeds the lead or copper action level.
- (d) ***Treatment steps and deadlines for large systems.*** Except as provided in paragraph (b) (2) and (3) of this section, large systems shall complete the following corrosion control treatment steps (described in the referenced portions of §§141.82, 141.86, and 141.87) by the indicated dates.
- (1) *Step 1:* The system shall conduct initial monitoring (§141.86(d)(1) and §141.87(b)) during two consecutive six-month monitoring periods by January 1, 1993.
 - (2) *Step 2:* The system shall complete corrosion control studies (§141.82(c)) by July 1, 1994.
 - (3) *Step 3:* The State shall designate optimal corrosion control treatment (§141.82(d)) by January 1, 1995.
 - (4) *Step 4:* The system shall install optimal corrosion control treatment (§141.82(e)) by January 1, 1997.
 - (5) *Step 5:* The system shall complete follow-up sampling (§141.86(d)(2) and §141.87(c)) by January 1, 1998.
 - (6) *Step 6:* The State shall review installation of treatment and designate optimal water quality control parameters (§141.82(f)) by July 1, 1998.
 - (7) *Step 7:* The system shall operate in compliance with the State-specified optimal water quality control parameters (§141.82(g)) and continue to conduct tap sampling (§141.86(d)(3) and §141.87(d)).
- (e) ***Treatment Steps and deadlines for small and medium-size systems.*** Except as provided in paragraph (b) of this section, small and medium-size systems shall complete the following corrosion control treatment steps (described in the referenced portions of §§141.82, 141.86 and 141.87) by the indicated time periods.
- (1) *Step 1:* The system shall conduct initial tap sampling (§141.86(d)(1) and §141.87(b)) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under §141.86(d)(4). A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (§141.82(a)) within six months after the end of the monitoring period during which it exceeds one of the action levels.
 - (2) *Step 2:* Within 12 months after the end of the monitoring period during which a system exceeds the lead or copper action level, the State may require the system to perform corrosion control studies (§141.82(b)). If the State does not require the system to perform such studies, the State shall specify optimal corrosion control treatment (§141.82(d)) within the following timeframes:

- (i) For medium-size systems, within 18 months after the end of the monitoring period during which such system exceeds the lead or copper action level.
- (ii) For small systems, within 24 months after the end of the monitoring period during which such system exceeds the lead or copper action level.
- (3) *Step 3:* If the State requires a system to perform corrosion control studies under step 2, the system shall complete the studies (§141.82(c)) within 18 months after the State requires that such studies be conducted.
- (4) *Step 4:* If the system has performed corrosion control studies under step 2, the State shall designate optimal corrosion control treatment (§141.82(d)) within 6 months after completion of step 3.
- (5) *Step 5:* The system shall install optimal corrosion control treatment (§141.82(e)) within 24 months after the State designates such treatment.
- (6) *Step 6:* The system shall complete follow-up sampling (§141.86(d)(2) and §141.87(c)) within 36 months after the State designates optimal corrosion control treatment.
- (7) *Step 7:* The State shall review the system's installation of treatment and designate optimal water quality control parameters (§141.82(f)) within 6 months after completion of step 6.
- (8) *Step 8:* The system shall operate in compliance with the State-designated optimal water quality control parameters (§141.82(g)) and continue to conduct tap sampling (§141.86(d)(3) and §141.87(d)).

[56 FR 26548, June 7, 1991, as amended at 59 FR 33862, June 30, 1994; 65 FR 2004, Jan. 12, 2000; 72 FR 57814, Oct. 10, 2007]

§141.82 Description of corrosion control treatment requirements.

Each system shall complete the corrosion control treatment requirements described below which are applicable to such system under §141.81.

- (a) ***System recommendation regarding corrosion control treatment.*** Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one or more of the corrosion control treatments listed in paragraph (c)(1) of this section which the system believes constitutes optimal corrosion control for that system. The State may require the system to conduct additional water quality parameter monitoring in accordance with §141.87(b) to assist the State in reviewing the system's recommendation.
- (b) ***State decision to require studies of corrosion control treatment (applicable to small and medium-size systems).*** The State may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under paragraph (c) of this section to identify optimal corrosion control treatment for the system.
- (c) ***Performance of corrosion control studies.***
 - (1) Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:
 - (i) Alkalinity and pH adjustment;
 - (ii) Calcium hardness adjustment; and
 - (iii) The addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.
 - (2) The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry and distribution system configuration.
 - (3) The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:
 - (i) Lead;
 - (ii) Copper;
 - (iii) pH;
 - (iv) Alkalinity;
 - (v) Calcium;
 - (vi) Conductivity;
 - (vii) Orthophosphate (when an inhibitor containing a phosphate compound is used);

- (viii) Silicate (when an inhibitor containing a silicate compound is used);
- (ix) Water temperature.
- (4) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:
 - (ii) Data and documentation showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; and/or
 - (iii)
 - (iv) Data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.
- (5) The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.
- (6) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the State in writing the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in paragraphs (c) (1) through (5) of this section.
- (d) ***State designation of optimal corrosion control treatment.*** (1) Based upon consideration of available information including, where applicable, studies performed under paragraph (c) of this section and a system's recommended treatment alternative, the State shall either approve the corrosion control treatment option recommended by the system, or designate alternative corrosion control treatment(s) from among those listed in paragraph (c)(1) of this section. When designating optimal treatment, the State shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.
 - (2) The State shall notify the system of its decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the State requests additional information to aid its review, the water system shall provide the information.
- (e) ***Installation of optimal corrosion control.*** Each system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated by the State under paragraph (d) of this section.
- (f) ***State review of treatment and specification of optimal water quality control parameters.*** The State shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the water system and determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the State in paragraph (d) of this section. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the State shall designate:
 - (1) A minimum value or a range of values for pH measured at each entry point to the distribution system;
 - (2) A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the State determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;
 - (3) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the State determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;
 - (4) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples;
 - (5) If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed above shall be those that the State determines to reflect optimal corrosion control treatment for the system. The State may designate values for additional water quality control parameters determined by the State to reflect optimal corrosion control for the system. The State shall notify the system in writing of these determinations and explain the basis for its decisions.

- (g) **Continued operation and monitoring.** All systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the State under paragraph (f) of this section, in accordance with this paragraph for all samples collected under §141.87(d) through (f). Compliance with the requirements of this paragraph shall be determined every six months, as specified under §141.87(d). A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any State-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the State. Daily values are calculated as follows. States have discretion to delete results of obvious sampling errors from this calculation.
- (1) On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both. If EPA has approved an alternative formula under §142.16 of this chapter in the State's application for a program revision submitted pursuant to §142.12 of this chapter, the State's formula shall be used to aggregate multiple measurements taken at a sampling point for the water quality parameter in lieu of the formula in this paragraph.
 - (2) On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.
 - (3) On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the sample site.
- (h) **Modification of State treatment decisions.** Upon its own initiative or in response to a request by a water system or other interested party, a State may modify its determination of the optimal corrosion control treatment under paragraph (d) of this section or optimal water quality control parameters under paragraph (f) of this section. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The State may modify its determination where it concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the State's decision, and provide an implementation schedule for completing the treatment modifications.
- (i) **Treatment decisions by EPA in lieu of the State.** Pursuant to the procedures in §142.19, the EPA Regional Administrator may review treatment determinations made by a State under paragraphs (d), (f), or (h) of this section and issue federal treatment determinations consistent with the requirements of those paragraphs where the Regional Administrator finds that:
- (1) A State has failed to issue a treatment determination by the applicable deadlines contained in §141.81,
 - (2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population, or
 - (3) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

[56 FR 26548, June 7, 1991, as amended at 65 FR 2004, Jan. 12, 2000]

§141.83 Source water treatment requirements.

Systems shall complete the applicable source water monitoring and treatment requirements (described in the referenced portions of paragraph (b) of this section, and in §§141.86, and 141.88) by the following deadlines.

(a) **Deadlines for completing source water treatment steps—**

- (1) *Step 1:* A system exceeding the lead or copper action level shall complete lead and copper source water monitoring (§141.88(b)) and make a treatment recommendation to the State (§141.83(b)(1)) no later than 180 days after the end of the monitoring period during which the lead or copper action level was exceeded.
- (2) *Step 2:* The State shall make a determination regarding source water treatment (§141.83(b)(2)) within 6 months after submission of monitoring results under step 1.

- (3) *Step 3:* If the State requires installation of source water treatment, the system shall install the treatment (§141.83(b)(3)) within 24 months after completion of step 2.
 - (4) *Step 4:* The system shall complete follow-up tap water monitoring (§141.86(d)(2)) and source water monitoring (§141.88(c)) within 36 months after completion of step 2.
 - (5) *Step 5:* The State shall review the system's installation and operation of source water treatment and specify maximum permissible source water levels (§141.83(b)(4)) within 6 months after completion of step 4.
 - (6) *Step 6:* The system shall operate in compliance with the State-specified maximum permissible lead and copper source water levels (§141.83(b)(4)) and continue source water monitoring (§141.88(d)).
- (b) ***Description of source water treatment requirements—***
- (1) *System treatment recommendation.* Any system which exceeds the lead or copper action level shall recommend in writing to the State the installation and operation of one of the source water treatments listed in paragraph (b)(2) of this section. A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at users' taps.
 - (2) ***State determination regarding source water treatment.*** The State shall complete an evaluation of the results of all source water samples submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the State determines that treatment is needed, the State shall either require installation and operation of the source water treatment recommended by the system (if any) or require the installation and operation of another source water treatment from among the following: Ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the State requests additional information to aid in its review, the water system shall provide the information by the date specified by the State in its request. The State shall notify the system in writing of its determination and set forth the basis for its decision.
 - (3) *Installation of source water treatment.* Each system shall properly install and operate the source water treatment designated by the State under paragraph (b)(2) of this section.
 - (4) *State review of source water treatment and specification of maximum permissible source water levels.* The State shall review the source water samples taken by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment designated by the State. Based upon its review, the State shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and maintained. The State shall notify the system in writing and explain the basis for its decision.
 - (5) *Continued operation and maintenance.* Each water system shall maintain lead and copper levels below the maximum permissible concentrations designated by the State at each sampling point monitored in accordance with §141.88. The system is out of compliance with this paragraph if the level of lead or copper at any sampling point is greater than the maximum permissible concentration designated by the State.
 - (6) *Modification of State treatment decisions.* Upon its own initiative or in response to a request by a water system or other interested party, a State may modify its determination of the source water treatment under paragraph (b)(2) of this section, or maximum permissible lead and copper concentrations for finished water entering the distribution system under paragraph (b)(4) of this section. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The State may modify its determination where it concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the State's decision, and provide an implementation schedule for completing the treatment modifications.
 - (7) *Treatment decisions by EPA in lieu of the State.* Pursuant to the procedures in §142.19, the EPA Regional Administrator may review treatment determinations made by a State under paragraphs (b)(2), (4), or (6) of this section and issue Federal treatment determinations consistent with the requirements of those paragraphs where the Administrator finds that:

- (i) A State has failed to issue a treatment determination by the applicable deadlines contained in §141.83(a),
- (ii) A state has abused its discretion in a substantial number of cases or in cases affecting a substantial population, or
- (iii) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

[56 FR 26548, June 7, 1991, as amended at 72 FR 57815, Oct. 10, 2007]

§141.84 Lead service line replacement requirements.

- (a) Systems that fail to meet the lead action level in tap samples taken pursuant to §141.86(d)(2), after installing corrosion control and/or source water treatment (whichever sampling occurs later), shall replace lead service lines in accordance with the requirements of this section. If a system is in violation of §141.81 or §141.83 for failure to install source water or corrosion control treatment, the State may require the system to commence lead service line replacement under this section after the date by which the system was required to conduct monitoring under §141.86(d)(2) has passed.
- (b)
 - (1) A water system shall replace annually at least 7 percent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The system shall identify the initial number of lead service lines in its distribution system, including an identification of the portion(s) owned by the system, based on a materials evaluation, including the evaluation required under §141.86(a) and relevant legal authorities (e.g., contracts, local ordinances) regarding the portion owned by the system. The first year of lead service line replacement shall begin on the first day following the end of the monitoring period in which the action level was exceeded under paragraph (a) of this section. If monitoring is required annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs. If the State has established an alternate monitoring period, then the end of the monitoring period will be the last day of that period.
 - (2) Any water system resuming a lead service line replacement program after the cessation of its lead service line replacement program as allowed by paragraph (f) of this section shall update its inventory of lead service lines to include those sites that were previously determined not to require replacement through the sampling provision under paragraph (c) of this section. The system will then divide the updated number of remaining lead service lines by the number of remaining years in the program to determine the number of lines that must be replaced per year (7 percent lead service line replacement is based on a 15-year replacement program, so, for example, systems resuming lead service line replacement after previously conducting two years of replacement would divide the updated inventory by 13). For those systems that have completed a 15-year lead service line replacement program, the State will determine a schedule for replacing or retesting lines that were previously tested out under the replacement program when the system re-exceeds the action level
- (c) A system is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to §141.86(b)(3), is less than or equal to 0.015 mg/L.
- (d) A water system shall replace that portion of the lead service line that it owns. In cases where the system does not own the entire lead service line, the system shall notify the owner of the line, or the owner's authorized agent, that the system will replace the portion of the service line that it owns and shall offer to replace the owner's portion of the line. A system is not required to bear the cost of replacing the privately-owned portion of the line, nor is it required to replace the privately-owned portion where the owner chooses not to pay the cost of replacing the privately-owned portion of the line, or where replacing the privately-owned portion would be precluded by State, local or common law. A water system that does not replace the entire length of the service line also shall complete the following tasks.
 - (1) At least 45 days prior to commencing with the partial replacement of a lead service line, the water system shall provide notice to the resident(s) of all buildings served by the line explaining that they may experience a temporary increase of lead levels in their drinking water, along with guidance on measures consumers can take to minimize their exposure to lead. The State may allow the water system to provide notice under the previous sentence 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 a sample from each partially-replaced lead service line that is representative of the water in the service line for analysis of lead content, as prescribed under §141.86(b)(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 post-marked within three business days of receiving the results shall be considered "on time."

- (2) The water system shall provide the information required by paragraph (d)(1) of this section to the residents of individual dwellings by mail or by other methods approved by the State. In instances where multi-family dwellings are served by the line, the water system shall have the option to post the information at a conspicuous location.
- (e) The State shall require a system to replace lead service lines on a shorter schedule than that required by this section, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The State shall make this determination in writing and notify the system of its finding within 6 months after the system is triggered into lead service line replacement based on monitoring referenced in paragraph (a) of this section.
- (f) Any system may cease replacing lead service lines whenever first draw samples collected pursuant to §141.86(b)(2) meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the State. If first draw tap samples collected in any such system thereafter exceeds the lead action level, the system shall recommence replacing lead service lines pursuant to paragraph (b)(2) of this section.
- (g) To demonstrate compliance with paragraphs (a) through (d) of this section, a system shall report to the State the information specified in §141.90(e).

[56 FR 26548, June 7, 1991; 57 FR 28788, June 29, 1992, as amended at 65 FR 2005, Jan. 12, 2000; 72 FR 57815, Oct. 10, 2007]

§141.85 Public education and supplemental monitoring requirements.

All water systems must deliver a consumer notice of lead tap water monitoring results to persons served by the water system at sites that are tested, as specified in paragraph (d) of this section. A water system that exceeds the lead action level based on tap water samples collected in accordance with §141.86 shall deliver the public education materials contained in paragraph (a) of this section in accordance with the requirements in paragraph (b) of this section. Water systems that exceed the lead action level must sample the tap water of any customer who requests it in accordance with paragraph (c) of this section.

(a) *Content of written public education materials—*

- (1) ***Community water systems and non-transient non-community water systems.*** Water systems must include the following elements in printed materials (e.g., brochures and pamphlets) in the same order as listed below. In addition, language in paragraphs (a)(1)(i) through (ii) and (a)(1)(vi) of this section must be included in the materials, exactly as written, except for the text in brackets in these paragraphs for which the water system must include system-specific information. Any additional information presented by a water system must be consistent with the information below and be in plain language that can be understood by the general public. Water systems must submit all written public education materials to the State prior to delivery. The State may require the system to obtain approval of the content of written public materials prior to delivery.

- (i) **IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER.** [INSERT NAME OF WATER SYSTEM] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and young children. Please read this information closely to see what you can do to reduce lead in your drinking water.

- (ii) **Health effects of lead.** Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists

have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

- (iii) **Sources of lead.** (A) Explain what lead is.
 - (B) Explain possible sources of lead in drinking water and how lead enters drinking water. Include information on home/building plumbing materials and service lines that may contain lead.
 - (C) Discuss other important sources of lead exposure in addition to drinking water (e.g., paint).
 - (iv) Discuss the steps the consumer can take to reduce their exposure to lead in drinking water.
 - (A) Encourage running the water to flush out the lead.
 - (B) Explain concerns with using hot water from the tap and specifically caution against the use of hot water for preparing baby formula.
 - (C) Explain that boiling water does not reduce lead levels.
 - (D) Discuss other options consumers can take to reduce exposure to lead in drinking water, such as alternative sources or treatment of water.
 - (E) Suggest that parents have their child's blood tested for lead.
 - (v) Explain why there are elevated levels of lead in the system's drinking water (if known) and what the water system is doing to reduce the lead levels in homes/buildings in this area.
 - (vi) For more information, call us at [INSERT YOUR NUMBER] [(IF APPLICABLE), or visit our Web site at [INSERT YOUR WEB SITE HERE]]. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at <http://www.epa.gov/lead> or contact your health care provider.
- (2) **Community water systems.** In addition to including the elements specified in paragraph (a)(1) of this section, community water systems must:
- (i) Tell consumers how to get their water tested.
 - (ii) Discuss lead in plumbing components and the difference between low lead and lead free.
- (b) **Delivery of public education materials.**
- (1) For public water systems serving a large proportion of non-English speaking consumers, as determined by the State, the public education materials must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the public education materials or to request assistance in the appropriate language.
 - (2) A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with §141.86, and that is not already conducting public education tasks under this section, must conduct the public education tasks under this section within 60 days after the end of the monitoring period in which the exceedance occurred:
 - (i) Deliver printed materials meeting the content requirements of paragraph (a) of this section to all bill paying customers.
 - (ii)
 - (A) Contact customers who are most at risk by delivering education materials that meet the content requirements of paragraph (a) of this section to local public health agencies even if they are not located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users. The water system must contact the local public health agencies directly by phone or in person. The local public health agencies may provide a specific list of additional community based organizations serving target populations, which may include organizations outside the service area of the water system. If such lists are provided, systems must deliver education materials that meet the content requirements of paragraph (a) of this section to all organizations on the provided lists.
 - (B) Contact customers who are most at risk by delivering materials that meet the content requirements of paragraph (a) of this section to the following organizations listed in 1

through 6 that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users:

- (1) Public and private schools or school boards.
 - (2) Women, Infants and Children (WIC) and Head Start programs
 - (3) Public and private hospitals and medical clinics.
 - (4) Pediatricians.
 - (5) Family planning clinics.
 - (6) Local welfare agencies.
 - (C) Make a good faith effort to locate the following organizations within the service area and deliver materials that meet the content requirements of paragraph (a) of this section to them, along with an informational notice that encourages distribution to all potentially affected customers or users. The good faith effort to contact at-risk customers may include requesting a specific contact list of these organizations from the local public health agencies, even if the agencies are not located within the water system's service area:
 - (1) Licensed childcare centers
 - (2) Public and private preschools.
 - (3) Obstetricians-Gynecologists and Midwives.
- (iii) No less often than quarterly, provide information on or in each water bill as long as the system exceeds the action level for lead. The message on the water bill must include the following statement exactly as written except for the text in brackets for which the water system must include system-specific information: [INSERT NAME OF WATER SYSTEM] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information, please call [INSERT NAME OF WATER SYSTEM] [or visit (INSERT YOUR WEB SITE HERE)]. The message or delivery mechanism can be modified in consultation with the State; specifically, the State may allow a separate mailing of public education materials to customers if the water system cannot place the information on water bills.
- (iv) Post material meeting the content requirements of paragraph (a) of this section on the water system's Web site if the system serves a population greater than 100,000.
- (v) Submit a press release to newspaper, television and radio stations.
- (vi) In addition to paragraphs (b)(2)(i) through (v) of this section, systems must implement at least three activities from one or more categories listed below. The educational content and selection of these activities must be determined in consultation with the State.
- (A) Public Service Announcements.
 - (B) Paid advertisements.
 - (C) Public Area Information Displays.
 - (D) E-mails to customers.
 - (E) Public Meetings.
 - (F) Household Deliveries.
 - (G) Targeted Individual Customer Contact.
 - (H) Direct material distribution to all multi-family homes and institutions.
 - (I) Other methods approved by the State.
- (vii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the State has established an alternate monitoring period, the last day of that period.
- (3) As long as a community water system exceeds the action level, it must repeat the activities pursuant to paragraph (b)(2) of this section as described in paragraphs (b)(3)(i) through (iv) of this section.
- (i) A community water system shall repeat the tasks contained in paragraphs (b)(2)(i), (ii) and (vi) of this section every 12 months.
 - (ii) A community water system shall repeat tasks contained in paragraph (b)(2)(iii) of this section with each billing cycle.

- (iii) A community water system serving a population greater than 100,000 shall post and retain material on a publicly accessible Web site pursuant to paragraph (b)(2)(iv) of this section.
 - (iv) The community water system shall repeat the task in paragraph (b)(2)(v) of this section twice every 12 months on a schedule agreed upon with the State. The State can allow activities in paragraph (b)(2) of this section to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the State in advance of the 60-day deadline.
- (4) Within 60 days after the end of the monitoring period in which the exceedance occurred (unless it already is repeating public education tasks pursuant to paragraph (b)(5) of this section), a non-transient non-community water system shall deliver the public education materials specified by paragraph (a) of this section as follows:
- (i) Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system; and
 - (ii) Distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the non-transient non-community water system. The State may allow the system to utilize electronic transmission in lieu of or combined with printed materials as long as it achieves at least the same coverage.
 - (iii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the State has established an alternate monitoring period, the last day of that period.
- (5) A non-transient non-community water system shall repeat the tasks contained in paragraph (b)(4) of this section at least once during each calendar year in which the system exceeds the lead action level. The State can allow activities in (b)(4) of this section to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the State in advance of the 60-day deadline.
- (6) A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six-month monitoring period conducted pursuant to §141.86. Such a system shall recommence public education in accordance with this section if it subsequently exceeds the lead action level during any monitoring period.
- (7) A community water system may apply to the State, in writing (unless the State has waived the requirement for prior State approval), to use only the text specified in paragraph (a)(1) of this section in lieu of the text in paragraphs (a)(1) and (a)(2) of this section and to perform the tasks listed in paragraphs (b)(4) and (b)(5) of this section in lieu of the tasks in paragraphs (b)(2) and (b)(3) of this section if:
- (i) The system is a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing or installing point of use treatment devices; and
 - (ii) The system provides water as part of the cost of services provided and does not separately charge for water consumption.
- (8) A community water system serving 3,300 or fewer people may limit certain aspects of their public education programs as follows:
- (i) With respect to the requirements of paragraph (b)(2)(vi) of this section, a system serving 3,300 or fewer must implement at least one of the activities listed in that paragraph.
 - (ii) With respect to the requirements of paragraph (b)(2)(ii) of this section, a system serving 3,300 or fewer people may limit the distribution of the public education materials required under that paragraph to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children.
 - (iii) With respect to the requirements of paragraph (b)(2)(v) of this section, the State may waive this requirement for systems serving 3,300 or fewer persons as long as system distributes notices to every household served by the system.
- (c) ***Supplemental monitoring and notification of results.*** A water system that fails to meet the lead action level on the basis of tap samples collected in accordance with §141.86 shall offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

- (d) **Notification of results— (1) Reporting requirement.** All water systems must provide a notice of the individual tap results from lead tap water monitoring carried out under the requirements of §141.86 to the persons served by the water system at the specific sampling site from which the sample was taken (e.g., the occupants of the residence where the tap was tested).
- (2) **Timing of notification.** A water system must provide the consumer notice as soon as practical, but no later than 30 days after the system learns of the tap monitoring results.
- (3) **Content.** The consumer notice must include the results of lead tap water monitoring for the tap that was tested, an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water and contact information for the water utility. The notice must also provide the maximum contaminant level goal and the action level for lead and the definitions for these two terms from §141.153(c).
- (4) **Delivery.** The consumer notice must be provided to persons served at the tap that was tested, either by mail or by another method approved by the State. For example, upon approval by the State, a non-transient non-community water system could post the results on a bulletin board in the facility to allow users to review the information. The system must provide the notice to customers at sample taps tested, including consumers who do not receive water bills.

[72 FR 57815, Oct. 10, 2007]

§141.86 Monitoring requirements for lead and copper in tap water.

(a) **Sample site location.**

- (1) By the applicable date for commencement of monitoring under paragraph (d)(1) of this section, each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this section, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in paragraph (c) of this section. All sites from which first draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.
- (2) A water system shall use the information on lead, copper, and galvanized steel that it is required to collect under §141.42(d) of this part [special monitoring for corrosivity characteristics] when conducting a materials evaluation. When an evaluation of the information collected pursuant to §141.42(d) is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in paragraph (a) of this section, the water system shall review the sources of information listed below in order to identify a sufficient number of sampling sites. In addition, the system shall seek to collect such information where possible in the course of its normal operations (e.g., checking service line materials when reading water meters or performing maintenance activities):
- (i) All plumbing codes, permits, and records in the files of the building department(s) which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system;
- (ii) All inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and
- (iii) All existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.
- (3) The sampling sites selected for a community water system's sampling pool ("tier 1 sampling sites") shall consist of single family structures that:
- (i) Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or
- (ii) Are served by a lead service line. When multiple-family residences comprise at least 20 percent of the structures served by a water system, the system may include these types of structures in its sampling pool.
- (4) Any community water system with insufficient tier 1 sampling sites shall complete its sampling pool with "tier 2 sampling sites", consisting of buildings, including multiple-family residences that:
- (i) Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or
- (ii) Are served by a lead service line.

- (5) Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with “tier 3 sampling sites”, consisting of single family structures that contain copper pipes with lead solder installed before 1983. A community water system with insufficient tier 1, tier 2, and tier 3 sampling sites shall complete its sampling pool with representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.
 - (6) The sampling sites selected for a non-transient noncommunity water system (“tier 1 sampling sites”) shall consist of buildings that:
 - (i) Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or
 - (ii) Are served by a lead service line.
 - (7) A non-transient non-community water system with insufficient tier 1 sites that meet the targeting criteria in paragraph (a)(6) of this section shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983. If additional sites are needed to complete the sampling pool, the non-transient non-community water system shall use representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.
 - (8) Any water system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first-draw samples from all of the sites identified as being served by such lines.
- (b) ***Sample collection methods.***
- (1) All tap samples for lead and copper collected in accordance with this subpart, with the exception of lead service line samples collected under §141.84(c) and samples collected under paragraph (b)(5) of this section, shall be first-draw samples.
 - (2) Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. First-draw samples from residential housing shall be collected from the cold water kitchen tap or bathroom sink tap. First-draw samples from a nonresidential building shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to paragraph (b)(5) of this section shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. First-draw samples may be collected by the system or the system may allow residents to collect first-draw samples after instructing the residents of the sampling procedures specified in this paragraph. To avoid problems of residents handling nitric acid, acidification of first-draw samples may be done up to 14 days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.
 - (3) Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:
 - (i) At the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line;
 - (ii) Tapping directly into the lead service line; or
 - (iii) If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.
 - (4) A water system shall collect each first draw tap sample from the same sampling site from which it collected a previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another

sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

- (5) A non-transient non-community water system, or a community water system that meets the criteria of §141.85(b)(7), that does not have enough taps that can supply first-draw samples, as defined in §141.2, may apply to the State in writing to substitute non-first-draw samples. Such systems must collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites. The State has the discretion to waive the requirement for prior State approval of non-first-draw sample sites selected by the system, either through State regulation or written notification to the system.

- (c) **Number of samples.** Water systems shall collect at least one sample during each monitoring period specified in paragraph (d) of this section from the number of sites listed in the first column (“standard monitoring”) of the table in this paragraph. A system conducting reduced monitoring under paragraph (d)(4) of this section shall collect at least one sample from the number of sites specified in the second column (“reduced monitoring”) of the table in this paragraph during each monitoring period specified in paragraph (d)(4) of this section. Such reduced monitoring sites shall be representative of the sites required for standard monitoring. A public water system that has fewer than five drinking water taps, that can be used for human consumption meeting the sample site criteria of paragraph (a) of this section to reach the required number of sample sites listed in paragraph (c) of this section, must collect at least one sample from each tap and then must collect additional samples from those taps on different days during the monitoring period to meet the required number of sites. Alternatively, the State may allow these public water systems to collect a number of samples less than the number of sites specified in paragraph (c) of this section, provided that 100 percent of all taps that can be used for human consumption are sampled. The State must approve this reduction of the minimum number of samples in writing based on a request from the system or onsite verification by the State. States may specify sampling locations when a system is conducting reduced monitoring. The table is as follows:

System size (number of people served)	Number of sites (standard monitoring)	Number of sites (reduced monitoring)
>100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
≤100	5	5

- (d) **Timing of monitoring—**

- (1) **Initial tap sampling.** The first six-month monitoring period for small, medium-size and large systems shall begin on the following dates:

System size (No. people served)	First six-month monitoring period begins on
>50,000	January 1, 1992.
3,301 to 50,000	July 1, 1992.
≤3,300	July 1, 1993.

- (i) All large systems shall monitor during two consecutive six-month periods.
(ii) All small and medium-size systems shall monitor during each six-month monitoring period until:

- (A) The system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under §141.81, in which case the system shall continue monitoring in accordance with paragraph (d)(2) of this section, or
 - (B) The system meets the lead and copper action levels during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with paragraph (d)(4) of this section.
- (2) ***Monitoring after installation of corrosion control and source water treatment.*** (i) Any large system which installs optimal corrosion control treatment pursuant to §141.81(d)(4) shall monitor during two consecutive six-month monitoring periods by the date specified in §141.81(d)(5).
- (ii) Any small or medium-size system which installs optimal corrosion control treatment pursuant to §141.81(e)(5) shall monitor during two consecutive six-month monitoring periods by the date specified in §141.81(e)(6).
 - (iii) Any system which installs source water treatment pursuant to §141.83(a)(3) shall monitor during two consecutive six-month monitoring periods by the date specified in §141.83(a)(4).
- (3) ***Monitoring after State specifies water quality parameter values for optimal corrosion control.*** After the State specifies the values for water quality control parameters under §141.82(f), the system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the State specifies the optimal values under §141.82(f).
- (4) ***Reduced monitoring.***
- (i) A small or medium-size water system that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the number of samples in accordance with paragraph (c) of this section, and reduce the frequency of sampling to once per year. A small or medium water system collecting fewer than five samples as specified in paragraph (c) of this section, that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the frequency of sampling to once per year. In no case can the system reduce the number of samples required below the minimum of one sample per available tap. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.
 - (ii) Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f) during each of two consecutive six-month monitoring periods may reduce the frequency of monitoring to once per year and reduce the number of lead and copper samples in accordance with paragraph (c) of this section if it receives written approval from the State. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. The State shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with §141.90, and shall notify the system in writing when it determines the system is eligible to commence reduced monitoring pursuant to this paragraph. The State shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.
 - (iii) A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f) during three consecutive years of monitoring may reduce the frequency of monitoring from annually to once every three years if it receives written approval from the State. Samples collected once every three years shall be collected no later than every third calendar year. The State shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with §141.90, and shall notify the system in writing when it determines the system is eligible to reduce the frequency of monitoring to once every three years. The State shall review, and where appropriate, revise its determination when the system submits new monitoring or

treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

- (iv) A water system that reduces the number and frequency of sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in paragraph (a) of this section. Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August, or September unless the State has approved a different sampling period in accordance with paragraph (d)(4)(iv)(A) of this section.
 - (A) The State, at its discretion, may approve a different period for conducting the lead and copper tap sampling for systems collecting a reduced number of samples. Such a period shall be no longer than four consecutive months and must represent a time of normal operation where the highest levels of lead are most likely to occur. For a non-transient non-community water system that does not operate during the months of June through September, and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the State shall designate a period that represents a time of normal operation for the system. This sampling shall begin during the period approved or designated by the State in the calendar year immediately following the end of the second consecutive six-month monitoring period for systems initiating annual monitoring and during the three-year period following the end of the third consecutive calendar year of annual monitoring for systems initiating triennial monitoring.
 - (B) Systems monitoring annually, that have been collecting samples during the months of June through September and that receive State approval to alter their sample collection period under paragraph (d)(4)(iv)(A) of this section, must collect their next round of samples during a time period that ends no later than 21 months after the previous round of sampling. Systems monitoring triennially that have been collecting samples during the months of June through September, and receive State approval to alter the sampling collection period as per paragraph (d)(4)(iv)(A) of this section, must collect their next round of samples during a time period that ends no later than 45 months after the previous round of sampling. Subsequent rounds of sampling must be collected annually or triennially, as required by this section. Small systems with waivers, granted pursuant to paragraph (g) of this section, that have been collecting samples during the months of June through September and receive State approval to alter their sample collection period under paragraph (d)(4)(iv)(A) of this section must collect their next round of samples before the end of the 9-year period.
- (v) Any water system that demonstrates for two consecutive 6-month monitoring periods that the tap water lead level computed under §141.80(c)(3) is less than or equal to 0.005 mg/L and the tap water copper level computed under §141.80(c)(3) is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with paragraph (c) of this section and reduce the frequency of sampling to once every three calendar years.
- (vi)
 - (A) A small or medium-size water system subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling in accordance with paragraph (d)(3) of this section and collect the number of samples specified for standard monitoring under paragraph (c) of this section. Such a system shall also conduct water quality parameter monitoring in accordance with §141.87(b), (c) or (d) (as appropriate) during the monitoring period in which it exceeded the action level. Any such system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (c) of this section after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of paragraph (d)(4)(i) of this section and/or may resume triennial monitoring for lead and copper at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (d)(4)(iii) or (d)(4)(v) of this section.

- (B) Any water system subject to the reduced monitoring frequency that fails to meet the lead action level during any four-month monitoring period or that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the State under §141.82(f) for more than nine days in any six-month period specified in §141.87(d) shall conduct tap water sampling for lead and copper at the frequency specified in paragraph (d)(3) of this section, collect the number of samples specified for standard monitoring under paragraph (c) of this section, and shall resume monitoring for water quality parameters within the distribution system in accordance with §141.87(d). This standard tap water sampling shall begin no later than the six-month period beginning January 1 of the calendar year following the lead action level exceedance or water quality parameter excursion. Such a system may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:
- (1) The system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (c) of this section after it has completed two subsequent six-month rounds of monitoring that meet the criteria of paragraph (d)(4)(ii) of this section and the system has received written approval from the State that it is appropriate to resume reduced monitoring on an annual frequency. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.
 - (2) The system may resume triennial monitoring for lead and copper at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (d)(4)(iii) or (d)(4)(v) of this section and the system has received written approval from the State that it is appropriate to resume triennial monitoring.
 - (3) The system may reduce the number of water quality parameter tap water samples required in accordance with §141.87(e)(1) and the frequency with which it collects such samples in accordance with §141.87(e)(2). Such a system may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of §141.87(e)(2), that it has re-qualified for triennial monitoring.
- (vii) Any water system subject to a reduced monitoring frequency under paragraph (d)(4) of this section shall notify the State in writing in accordance with §141.90(a)(3) of any upcoming long-term change in treatment or addition of a new source as described in that section. The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State may require the system to resume sampling in accordance with paragraph (d)(3) of this section and collect the number of samples specified for standard monitoring under paragraph (c) of this section or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation of its corrosion control treatment given the potentially different water quality considerations.
- (e) **Additional monitoring by systems.** The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the State in making any determinations (*i.e.*, calculating the 90th percentile lead or copper level) under this subpart.
- (f) **Invalidation of lead or copper tap water samples.** A sample invalidated under this paragraph does not count toward determining lead or copper 90th percentile levels under §141.80(c)(3) or toward meeting the minimum monitoring requirements of paragraph (c) of this section.
- (1) The State may invalidate a lead or copper tap water sample at least if one of the following conditions is met.
 - (i) The laboratory establishes that improper sample analysis caused erroneous results.
 - (ii) The State determines that the sample was taken from a site that did not meet the site selection criteria of this section.
 - (iii) The sample container was damaged in transit.
 - (iv) There is substantial reason to believe that the sample was subject to tampering.

- (2) The system must report the results of all samples to the State and all supporting documentation for samples the system believes should be invalidated.
 - (3) To invalidate a sample under paragraph (f)(1) of this section, the decision and the rationale for the decision must be documented in writing. States may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.
 - (4) The water system must collect replacement samples for any samples invalidated under this section if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of paragraph (c) of this section. Any such replacement samples must be taken as soon as possible, but no later than 20 days after the date the State invalidates the sample or by the end of the applicable monitoring period, whichever occurs later. Replacement samples taken after the end of the applicable monitoring period shall not also be used to meet the monitoring requirements of a subsequent monitoring period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the monitoring period.
- (g) **Monitoring waivers for small systems.** Any small system that meets the criteria of this paragraph may apply to the State to reduce the frequency of monitoring for lead and copper under this section to once every nine years (*i.e.*, a “full waiver”) if it meets all of the materials criteria specified in paragraph (g)(1) of this section and all of the monitoring criteria specified in paragraph (g)(2) of this section. If State regulations permit, any small system that meets the criteria in paragraphs (g)(1) and (2) of this section only for lead, or only for copper, may apply to the State for a waiver to reduce the frequency of tap water monitoring to once every nine years for that contaminant only (*i.e.*, a “partial waiver”).
- (1) **Materials criteria.** The system must demonstrate that its distribution system and service lines and all drinking water supply plumbing, including plumbing conveying drinking water within all residences and buildings connected to the system, are free of lead-containing materials and/or copper-containing materials, as those terms are defined in this paragraph, as follows:
 - (i) **Lead.** To qualify for a full waiver, or a waiver of the tap water monitoring requirements for lead (*i.e.*, a “lead waiver”), the water system must provide certification and supporting documentation to the State that the system is free of all lead-containing materials, as follows:
 - (A) It contains no plastic pipes which contain lead plasticizers, or plastic service lines which contain lead plasticizers; and
 - (B) It is free of lead service lines, lead pipes, lead soldered pipe joints, and leaded brass or bronze alloy fittings and fixtures, unless such fittings and fixtures meet the specifications of any standard established pursuant to 42 U.S.C. 300g-6(e) (SDWA section 1417(e)).
 - (ii) **Copper.** To qualify for a full waiver, or a waiver of the tap water monitoring requirements for copper (*i.e.*, a “copper waiver”), the water system must provide certification and supporting documentation to the State that the system contains no copper pipes or copper service lines.
 - (2) **Monitoring criteria for waiver issuance.** The system must have completed at least one 6-month round of standard tap water monitoring for lead and copper at sites approved by the State and from the number of sites required by paragraph (c) of this section and demonstrate that the 90th percentile levels for any and all rounds of monitoring conducted since the system became free of all lead-containing and/or copper-containing materials, as appropriate, meet the following criteria.
 - (i) **Lead levels.** To qualify for a full waiver, or a lead waiver, the system must demonstrate that the 90th percentile lead level does not exceed 0.005 mg/L.
 - (ii) **Copper levels.** To qualify for a full waiver, or a copper waiver, the system must demonstrate that the 90th percentile copper level does not exceed 0.65 mg/L.
 - (3) **State approval of waiver application.** The State shall notify the system of its waiver determination, in writing, setting forth the basis of its decision and any condition of the waiver. As a condition of the waiver, the State may require the system to perform specific activities (e.g., limited monitoring, periodic outreach to customers to remind them to avoid installation of materials that might void the waiver) to avoid the risk of lead or copper concentration of concern in tap water. The small system must continue monitoring for lead and copper at the tap as required by paragraphs (d)(1) through (d)(4) of this section, as appropriate, until it receives written notification from the State that the waiver has been approved.

- (4) **Monitoring frequency for systems with waivers.** (i) A system with a full waiver must conduct tap water monitoring for lead and copper in accordance with paragraph (d)(4)(iv) of this section at the reduced number of sampling sites identified in paragraph (c) of this section at least once every nine years and provide the materials certification specified in paragraph (g)(1) of this section for both lead and copper to the State along with the monitoring results. Samples collected every nine years shall be collected no later than every ninth calendar year.
- (ii) A system with a partial waiver must conduct tap water monitoring for the waived contaminant in accordance with paragraph (d)(4)(iv) of this section at the reduced number of sampling sites specified in paragraph (c) of this section at least once every nine years and provide the materials certification specified in paragraph (g)(1) of this section pertaining to the waived contaminant along with the monitoring results. Such a system also must continue to monitor for the non-waived contaminant in accordance with requirements of paragraph (d)(1) through (d)(4) of this section, as appropriate.
- (iii) Any water system with a full or partial waiver shall notify the State in writing in accordance with §141.90(a)(3) of any upcoming long-term change in treatment or addition of a new source, as described in that section. The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State has the authority to require the system to add or modify waiver conditions (e.g., require recertification that the system is free of lead-containing and/or copper-containing materials, require additional round(s) of monitoring), if it deems such modifications are necessary to address treatment or source water changes at the system.
- (iv) If a system with a full or partial waiver becomes aware that it is no longer free of lead-containing or copper-containing materials, as appropriate, (e.g., as a result of new construction or repairs), the system shall notify the State in writing no later than 60 days after becoming aware of such a change.
- (5) **Continued eligibility.** If the system continues to satisfy the requirements of paragraph (g)(4) of this section, the waiver will be renewed automatically, unless any of the conditions listed in paragraph (g)(5)(i) through (g)(5)(iii) of this section occurs. A system whose waiver has been revoked may re-apply for a waiver at such time as it again meets the appropriate materials and monitoring criteria of paragraphs (g)(1) and (g)(2) of this section.
- (i) A system with a full waiver or a lead waiver no longer satisfies the materials criteria of paragraph (g)(1)(i) of this section or has a 90th percentile lead level greater than 0.005 mg/L.
- (ii) A system with a full waiver or a copper waiver no longer satisfies the materials criteria of paragraph (g)(1)(ii) of this section or has a 90th percentile copper level greater than 0.65 mg/L.
- (iii) The State notifies the system, in writing, that the waiver has been revoked, setting forth the basis of its decision.
- (6) **Requirements following waiver revocation.** A system whose full or partial waiver has been revoked by the State is subject to the corrosion control treatment and lead and copper tap water monitoring requirements, as follows:
- (i) If the system exceeds the lead and/or copper action level, the system must implement corrosion control treatment in accordance with the deadlines specified in §141.81(e), and any other applicable requirements of this subpart.
- (ii) If the system meets both the lead and the copper action level, the system must monitor for lead and copper at the tap no less frequently than once every three years using the reduced number of sample sites specified in paragraph (c) of this section.
- (7) **Pre-existing waivers.** Small system waivers approved by the State in writing prior to April 11, 2000 shall remain in effect under the following conditions:
- (i) If the system has demonstrated that it is both free of lead-containing and copper-containing materials, as required by paragraph (g)(1) of this section and that its 90th percentile lead levels and 90th percentile copper levels meet the criteria of paragraph (g)(2) of this section, the waiver remains in effect so long as the system continues to meet the waiver eligibility criteria of paragraph (g)(5) of this section. The first round of tap water monitoring conducted pursuant to paragraph (g)(4) of this section shall be completed no later than nine years after the last time the system has monitored for lead and copper at the tap.

- (ii) If the system has met the materials criteria of paragraph (g)(1) of this section but has not met the monitoring criteria of paragraph (g)(2) of this section, the system shall conduct a round of monitoring for lead and copper at the tap demonstrating that it meets the criteria of paragraph (g)(2) of this section no later than September 30, 2000. Thereafter, the waiver shall remain in effect as long as the system meets the continued eligibility criteria of paragraph (g)(5) of this section. The first round of tap water monitoring conducted pursuant to paragraph (g)(4) of this section shall be completed no later than nine years after the round of monitoring conducted pursuant to paragraph (g)(2) of this section.

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§141.87 Monitoring requirements for water quality parameters.

All large water systems, and all small- and medium-size systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this section. The requirements of this section are summarized in the table at the end of this section.

(a) General requirements—

(1) Sample collection methods.

- (i) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system, and seasonal variability. Tap sampling under this section is not required to be conducted at taps targeted for lead and copper sampling under §141.86(a). [Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for coliform sampling under 40 CFR 141.21.]
- (ii) Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.*, when water is representative of all sources being used).

(2) Number of samples.

- (i) Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under paragraphs (b) through (e) of this section from the following number of sites.

System size (No. people served)	No. of sites for water quality parameters
>100,000	25
10,001-100,000	10
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
≤100	1

- (ii) Except as provided in paragraph (c)(3) of this section, systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in paragraph (b) of this section. During each monitoring period specified in paragraphs (c)-(e) of this section, systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system.

- (b) **Initial sampling** All large water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in §141.86(d)(1). All small and medium-size systems shall measure the applicable water quality parameters at the locations specified below during each six-month monitoring period specified in §141.86(d)(1) during which the system exceeds the lead or copper action level.

- (1) At taps:
 - (i) pH;
 - (ii) Alkalinity;
 - (iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;
 - (iv) Silica, when an inhibitor containing a silicate compound is used;
 - (v) Calcium;
 - (vi) Conductivity; and
 - (vii) Water temperature.
 - (2) At each entry point to the distribution system: all of the applicable parameters listed in paragraph (b)(1) of this section.
- (c) **Monitoring after installation of corrosion control.** Any large system which installs optimal corrosion control treatment pursuant to §141.81(d)(4) shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in §141.86(d)(2)(i). Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in §141.86(d)(2)(ii) in which the system exceeds the lead or copper action level.
- (1) At taps, two samples for:
 - (i) pH;
 - (ii) Alkalinity;
 - (iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;
 - (iv) Silica, when an inhibitor containing a silicate compound is used;
 - (v) Calcium, when calcium carbonate stabilization is used as part of corrosion control.
 - (2) Except as provided in paragraph (c)(3) of this section, at each entry point to the distribution system, at least one sample no less frequently than every two weeks (biweekly) for:
 - (i) pH;
 - (ii) When alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and
 - (iii) When a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).
 - (3) Any ground water system can limit entry point sampling described in paragraph (c)(2) of this section to those entry points that are representative of water quality and treatment conditions throughout the system. If water from untreated ground water sources mixes with water from treated ground water sources, the system must monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of any monitoring under this paragraph, the system shall provide to the State written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.
- (d) **Monitoring after State specifies water quality parameter values for optimal corrosion control.** After the State specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under §141.82(f), all large systems shall measure the applicable water quality parameters in accordance with paragraph (c) of this section and determine compliance with the requirements of §141.82(g) every six months with the first six-month period to begin on either January 1 or July 1, whichever comes first, after the State specifies the optimal values under §141.82(f). Any small or medium-size system shall conduct such monitoring during each six-month period specified in this paragraph in which the system exceeds the lead or copper action level. For any such small and medium-size system that is subject to a reduced monitoring frequency pursuant to §141.86(d)(4) at the time of the action level exceedance, the start of the applicable six-month monitoring period under this paragraph shall coincide with the start of the applicable monitoring period under §141.86(d)(4). Compliance with State-designated optimal water quality parameter values shall be determined as specified under §141.82(g).
- (e) **Reduced monitoring.**
- (1) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods

under paragraph (d) of this section shall continue monitoring at the entry point(s) to the distribution system as specified in paragraph (c)(2) of this section. Such system may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period.

System size (No. of people served)	Reduced No. of sites for water quality parameters
>100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
≤100	1

(2)

- (i) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f) during three consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in this paragraph (e)(1) of this section from every six months to annually. This sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of six-month monitoring occurs. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f), during three consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in paragraph (e)(1) of this section from annually to every three years. This sampling begins no later than the third calendar year following the end of the monitoring period in which the third consecutive year of monitoring occurs.
 - (ii) A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in paragraph (e)(1) of this section to every three years if it demonstrates during two consecutive monitoring periods that its tap water lead level at the 90th percentile is less than or equal to the PQL for lead specified in §141.89 (a)(1)(ii), that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L for copper in §141.80(c)(2), and that it also has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f). Monitoring conducted every three years shall be done no later than every third calendar year.
- (3) A water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.
- (4) Any water system subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the State in §141.82(f) for more than nine days in any six-month period specified in §141.82(g) shall resume distribution system tap water sampling in accordance with the number and frequency requirements in paragraph (d) of this section. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in paragraph (e)(1) of this section after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of that paragraph and/or may resume triennial monitoring for water quality parameters at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (e)(2)(i) or (e)(2)(ii) of this section.

- (f) **Additional monitoring by systems.** The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the State in making any determinations (*i.e.*, determining concentrations of water quality parameters) under this section or §141.82.

Summary of Monitoring Requirements for Water Quality Parameters¹

Monitoring period	Parameters ²	Location	Frequency
Initial monitoring	pH, alkalinity, orthophosphate or silica ³ , calcium, conductivity, temperature	Taps and at entry point(s) to distribution system	Every 6 months.
After installation of corrosion control	pH, alkalinity, orthophosphate or silica ³ , calcium ⁴	Taps	Every 6 months.
	pH, alkalinity, dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual ⁵	Entry point(s) to distribution system ⁶	No less frequently than every two weeks.
After State specifies parameter values for optimal corrosion control	pH, alkalinity, orthophosphate or silica ³ , calcium ⁴	Taps	Every 6 months.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual ⁵	Entry point(s) to distribution system ⁶	No less frequently than every two weeks.
Reduced monitoring	pH, alkalinity, orthophosphate or silica ³ , calcium ⁴	Taps	Every 6 months, annually ⁷ or every 3 years ⁸ ; reduced number of sites.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual ⁵	Entry point(s) to distribution system ⁶	No less frequently than every two weeks.

¹Table is for illustrative purposes; consult the text of this section for precise regulatory requirements.

²Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.

³Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.

⁴Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.

⁵Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.

⁶Ground water systems may limit monitoring to representative locations throughout the system.

⁷Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of monitoring.

⁸Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every 3 years if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of annual monitoring. Water systems may accelerate to triennial monitoring for water quality parameters at the tap if they have maintained 90th percentile lead levels less than or equal to 0.005 mg/L, 90th percentile copper levels less than or equal to 0.65 mg/L, and the range of water quality parameters designated by the State under §141.82(f) as representing optimal corrosion control during two consecutive six-month monitoring periods.

§141.88 Monitoring requirements for lead and copper in source water.

(a) *Sample location, collection methods, and number of samples.*

(1) A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with §141.86 shall collect lead and copper source water samples in accordance with the following requirements regarding sample location, number of samples, and collection methods:

(i) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). The system shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(ii) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

NOTE TO PARAGRAPH (a)(1)(ii): For the purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.

(iii) If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.*, when water is representative of all sources being used).

(iv) The State may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples must be done by certified laboratory personnel. Composite samples from a maximum of five samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 mg/L or the copper concentration is greater than or equal to 0.160 mg/L, then either:

(A) A follow-up sample shall be taken and analyzed within 14 days at each sampling point included in the composite; or

(B) If duplicates of or sufficient quantities from the original samples from each sampling point used in the composite are available, the system may use these instead of resampling.

(2) Where the results of sampling indicate an exceedance of maximum permissible source water levels established under §141.83(b)(4), the State may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point. If a State-required confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the State-specified maximum permissible levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL.

(b) *Monitoring frequency after system exceeds tap water action level.* Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or if the State has established an alternate monitoring period, the last day of that period.

(c) *Monitoring frequency after installation of source water treatment.* Any system which installs source water treatment pursuant to §141.83(a)(3) shall collect an additional source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified in §141.83(a)(4).

(d) *Monitoring frequency after State specifies maximum permissible source water levels or determines that source water treatment is not needed.*

- (1) A system shall monitor at the frequency specified below in cases where the State specifies maximum permissible source water levels under §141.83(b)(4) or determines that the system is not required to install source water treatment under §141.83(b)(2).
 - (i) A water system using only groundwater shall collect samples once during the three-year compliance period (as that term is defined in §141.2) in effect when the applicable State determination under paragraph (d)(1) of this section is made. Such systems shall collect samples once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.
 - (ii) A water system using surface water (or a combination of surface and ground water) shall collect samples once during each calendar year, the first annual monitoring period to begin during the year in which the applicable State determination is made under paragraph (d)(1) of this section.
- (2) A system is not required to conduct source water sampling for lead and/or copper if the system meets the action level for the specific contaminant in tap water samples during the entire source water sampling period applicable to the system under paragraph (d)(1) (i) or (ii) of this section.
- (e) **Reduced monitoring frequency.**
 - (1) A water system using only ground water may reduce the monitoring frequency for lead and copper in source water to once during each nine-year compliance cycle (as that term is defined in §141.2) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:
 - (i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the State in §141.83(b)(4) during at least three consecutive compliance periods under paragraph (d)(1) of this section; or
 - (ii) The State has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive compliance periods in which sampling was conducted under paragraph (d)(1) of this section, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.
 - (2) A water system using surface water (or a combination of surface water and ground water) may reduce the monitoring frequency in paragraph (d)(1) of this section to once during each nine-year compliance cycle (as that term is defined in §141.2) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:
 - (i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the State in §141.83(b)(4) for at least three consecutive years; or
 - (ii) The State has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive years, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.
 - (3) A water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the State in §141.83(a)(5).

[56 FR 26548, June 7, 1991; 57 FR 28788 and 28789, June 29, 1992, as amended at 65 FR 2012, Jan. 12, 2000; 72 FR 57819, Oct. 10, 2007]

§141.89 Analytical methods.

- (a) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica, and temperature shall be conducted with the methods in §141.23(k)(1).
 - (1) Analyses for alkalinity, calcium, conductivity, orthophosphate, pH, silica, and temperature may be performed by any person acceptable to the State. Analyses under this section for lead and copper shall

only be conducted by laboratories that have been certified by EPA or the State. To obtain certification to conduct analyses for lead and copper, laboratories must:

- (i) Analyze Performance Evaluation samples, which include lead and copper, provided by or acceptable to EPA or the State at least once a year by each method for which the laboratory desires certification; and
 - (ii) Achieve quantitative acceptance limits as follows:
 - (A) For lead: ± 30 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.005 mg/L. The Practical Quantitation Level, or PQL for lead is 0.005 mg/L.
 - (B) For Copper: ± 10 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.050 mg/L. The Practical Quantitation Level, or PQL for copper is 0.050 mg/L.
 - (iii) Achieve the method detection limit for lead of 0.001 mg/L according to the procedures in appendix B of part 136 of this title. This need only be accomplished if the laboratory will be processing source water composite samples under §141.88(a)(1)(iv).
 - (iv) Be currently certified by EPA or the State to perform analyses to the specifications described in paragraph (a)(1) of this section.
- (2) States have the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected and analyzed in accordance with the requirements of this subpart.
 - (3) All lead and copper levels measured between the PQL and MDL must be either reported as measured or they can be reported as one-half the PQL specified for lead and copper in paragraph (a)(1)(ii) of this section. All levels below the lead and copper MDLs must be reported as zero.
 - (4) All copper levels measured between the PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL (0.025 mg/L). All levels below the copper MDL must be reported as zero.

(b) [Reserved]

§141.90 Reporting requirements.

All water systems shall report all of the following information to the State in accordance with this section.

- (a) **Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.**
 - (1) Except as provided in paragraph (a)(1)(viii) of this section, a water system shall report the information specified below for all tap water samples specified in §141.86 and for all water quality parameter samples specified in §141.87 within the first 10 days following the end of each applicable monitoring period specified in §141.86 and §141.87 (*i.e.*, every six months, annually, every 3 years, or every 9 years). For monitoring periods with a duration less than six months, the end of the monitoring period is the last date samples can be collected during that period as specified in §§141.86 and 141.87.
 - (i) The results of all tap samples for lead and copper including the location of each site and the criteria under §141.86(a) (3), (4), (5), (6), and/or (7) under which the site was selected for the system's sampling pool;
 - (ii) Documentation for each tap water lead or copper sample for which the water system requests invalidation pursuant to §141.86(f)(2);
 - (iii) [Reserved]
 - (iv) The 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with §141.80(c)(3)), unless the State calculates the system's 90th percentile lead and copper levels under paragraph (h) of this section;
 - (v) With the exception of initial tap sampling conducted pursuant to §141.86(d)(1), the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;
 - (vi) The results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under §141.87 (b)-(e);

- (vii) The results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under §141.87 (b)-(e);
 - (viii) A water system shall report the results of all water quality parameter samples collected under §141.87(c) through (f) during each six-month monitoring period specified in §141.87(d) within the first 10 days following the end of the monitoring period unless the State has specified a more frequent reporting requirement.
- (2) For a non-transient non-community water system, or a community water system meeting the criteria of §141.85(b)(7), that does not have enough taps that can provide first-draw samples, the system must either:
- (i) Provide written documentation to the State identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under §141.86(b)(5) by the start of the first applicable monitoring period under §141.86(d) that commences after April 11, 2000, unless the State has waived prior State approval of non-first-draw sample sites selected by the system pursuant to §141.86(b)(5); or
 - (ii) If the State has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to §141.86(b)(5) and include this information with the lead and copper tap sample results required to be submitted pursuant to paragraph (a)(1)(i) of this section.
- (3) At a time specified by the State, or if no specific time is designated by the State, then as early as possible prior to the addition of a new source or any long-term change in water treatment, a water system deemed to have optimized corrosion control under §141.81(b)(3), a water system subject to reduced monitoring pursuant to §141.86(d)(4), or a water system subject to a monitoring waiver pursuant to §141.86(g), shall submit written documentation to the State describing the change or addition. The State must review and approve the addition of a new source or long-term change in treatment before it is implemented by the water system. Examples of long-term treatment changes include the addition of a new treatment process or modification of an existing treatment process. Examples of modifications include switching secondary disinfectants, switching coagulants (e.g., alum to ferric chloride), and switching corrosion inhibitor products (e.g., orthophosphate to blended phosphate). Long-term changes can include dose changes to existing chemicals if the system is planning long-term changes to its finished water pH or residual inhibitor concentration. Long-term treatment changes would not include chemical dose fluctuations associated with daily raw water quality changes.
- (4) Any small system applying for a monitoring waiver under §141.86(g), or subject to a waiver granted pursuant to §141.86(g)(3), shall provide the following information to the State in writing by the specified deadline:
- (i) By the start of the first applicable monitoring period in §141.86(d), any small water system applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of §§141.86(g)(1) and (2).
 - (ii) No later than nine years after the monitoring previously conducted pursuant to §141.86(g)(2) or §141.86(g)(4)(i), each small system desiring to maintain its monitoring waiver shall provide the information required by §§141.86(g)(4)(i) and (ii).
 - (iii) No later than 60 days after it becomes aware that it is no longer free of lead-containing and/or copper-containing material, as appropriate, each small system with a monitoring waiver shall provide written notification to the State, setting forth the circumstances resulting in the lead-containing and/or copper-containing materials being introduced into the system and what corrective action, if any, the system plans to remove these materials.
 - (iv) By October 10, 2000, any small system with a waiver granted prior to April 11, 2000 and that has not previously met the requirements of §141.86(g)(2) shall provide the information required by that paragraph.
- (5) Each ground water system that limits water quality parameter monitoring to a subset of entry points under §141.87(c)(3) shall provide, by the commencement of such monitoring, written correspondence to the State that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

- (b) **Source water monitoring reporting requirements.**
- (1) A water system shall report the sampling results for all source water samples collected in accordance with §141.88 within the first 10 days following the end of each source water monitoring period (*i.e.*, annually, per compliance period, per compliance cycle) specified in §141.88.
 - (2) With the exception of the first round of source water sampling conducted pursuant to §141.88(b), the system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.
- (c) **Corrosion control treatment reporting requirements.** By the applicable dates under §141.81, systems shall report the following information:
- (1) For systems demonstrating that they have already optimized corrosion control, information required in §141.81(b) (2) or (3).
 - (2) For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under §141.82(a).
 - (3) For systems required to evaluate the effectiveness of corrosion control treatments under §141.82(c), the information required by that paragraph.
 - (4) For systems required to install optimal corrosion control designated by the State under §141.82(d), a letter certifying that the system has completed installing that treatment.
- (d) **Source water treatment reporting requirements.** By the applicable dates in §141.83, systems shall provide the following information to the State:
- (1) If required under §141.83(b)(1), their recommendation regarding source water treatment;
 - (2) For systems required to install source water treatment under §141.83(b)(2), a letter certifying that the system has completed installing the treatment designated by the State within 24 months after the State designated the treatment.
- (e) **Lead service line replacement reporting requirements.** Systems shall report the following information to the State to demonstrate compliance with the requirements of §141.84:
- (1) No later than 12 months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in §141.84(a), the system must submit written documentation to the State of the material evaluation conducted as required in §141.86(a), identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level, and provide the system's schedule for annually replacing at least 7 percent of the initial number of lead service lines in its distribution system.
 - (2) No later than 12 months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in §141.84(a), and every 12 months thereafter, the system shall demonstrate to the State in writing that the system has either:
 - (i) Replaced in the previous 12 months at least 7 percent of the initial lead service lines (or a greater number of lines specified by the State under §141.84(e)) in its distribution system, or
 - (ii) Conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to §141.86(b)(3), is less than or equal to 0.015 mg/L. In such cases, the total number of lines replaced and/or which meet the criteria in §141.84(c) shall equal at least 7 percent of the initial number of lead lines identified under paragraph (e)(1) of this section (or the percentage specified by the State under §141.84(e)).
 - (3) The annual letter submitted to the State under paragraph (e)(2) of this section shall contain the following information:
 - (i) The number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule;
 - (ii) The number and location of each lead service line replaced during the previous year of the system's replacement schedule;
 - (iii) If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.
 - (4) Any system which collects lead service line samples following partial lead service line replacement required by §141.84 shall report the results to the State within the first ten days of the month following the month in which the system receives the laboratory results, or as specified by the State. States, at their discretion may eliminate this requirement to report these monitoring results. Systems shall also

report any additional information as specified by the State, and in a time and manner prescribed by the State, to verify that all partial lead service line replacement activities have taken place.

- (f) **Public education program reporting requirements.** (1) Any water system that is subject to the public education requirements in §141.85 shall, within ten days after the end of each period in which the system is required to perform public education in accordance with §141.85(b), send written documentation to the State that contains:
- (i) A demonstration that the system has delivered the public education materials that meet the content requirements in §141.85(a) and the delivery requirements in §141.85(b); and
 - (ii) A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the system delivered public education materials during the period in which the system was required to perform public education tasks.
- (2) Unless required by the State, a system that previously has submitted the information required by paragraph (f)(1)(ii) of this section need not resubmit the information required by paragraph (f)(1)(ii) of this section, as long as there have been no changes in the distribution list and the system certifies that the public education materials were distributed to the same list submitted previously.
- (3) No later than 3 months following the end of the monitoring period, each system must mail a sample copy of the consumer notification of tap results to the State along with a certification that the notification has been distributed in a manner consistent with the requirements of §141.85(d).
- (g) **Reporting of additional monitoring data.** Any system which collects sampling data in addition to that required by this subpart shall report the results to the State within the first ten days following the end of the applicable monitoring period under §§141.86, 141.87 and 141.88 during which the samples are collected.
- (h) **Reporting of 90th percentile lead and copper concentrations where the State calculates a system's 90th percentile concentrations.** A water system is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by paragraph (a)(1)(iv) of this section if:
- (1) The State has previously notified the water system that it will calculate the water system's 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to paragraph (h)(2)(i) of this section, and has specified a date before the end of the applicable monitoring period by which the system must provide the results of lead and copper tap water samples;
 - (2) The system has provided the following information to the State by the date specified in paragraph (h)(1) of this section:
 - (i) The results of all tap samples for lead and copper including the location of each site and the criteria under §141.86(a)(3), (4), (5), (6), and/or (7) under which the site was selected for the system's sampling pool, pursuant to paragraph (a)(1)(i) of this section; and
 - (ii) An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed; and
 - (3) The State has provided the results of the 90th percentile lead and copper calculations, in writing, to the water system before the end of the monitoring period.

[56 FR 26548, June 7, 1991; 57 FR 28789, June 29, 1992, as amended at 59 FR 33864, June 30, 1994; 65 FR 2012, Jan. 12, 2000; 72 FR 57819, Oct. 10, 2007]

§141.91 Recordkeeping requirements.

Any system subject to the requirements of this subpart shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, State determinations, and any other information required by §§141.81 through 141.88. Each water system shall retain the records required by this section for no fewer than 12 years.

Subpart J—Use of Non-Centralized Treatment Devices

SOURCE: 52 FR 25716, July 8, 1987, unless otherwise noted.

§141.100 Criteria and procedures for public water systems using point-of-entry devices.

- (a) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this section.
- (b) It is the responsibility of the public water system to operate and maintain the point-of-entry treatment system.
- (c) The public water system must develop and obtain State approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the State, point-of-entry devices must provide health protection equivalent to central water treatment. "Equivalent" means that the water would meet all national primary drinking water regulations and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. In addition to the VOCs, monitoring must include physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.
- (d) Effective technology must be properly applied under a plan approved by the State and the microbiological safety of the water must be maintained.
 - (1) The State must require adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-entry devices.
 - (2) The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.
- (e) *All consumers shall be protected.* Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The State must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

§141.101 Use of bottled water.

Public water systems shall not use bottled water to achieve compliance with an MCL. Bottled water may be used on a temporary basis to avoid unreasonable risk to health.

[63 FR 31934, June 11, 1998]

Subpart K—Treatment Techniques

SOURCE: 56 FR 3594, Jan. 30, 1991, unless otherwise noted.

§141.110 General requirements.

The requirements of subpart K of this part constitute national primary drinking water regulations. These regulations establish treatment techniques in lieu of maximum contaminant levels for specified contaminants.

§141.111 Treatment techniques for acrylamide and Epichlorohydrin.

Each public water system must certify annually in writing to the State (using third party or manufacturer's certification) that when acrylamide and Epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified as follows:

- Acrylamide = 0.05% dosed at 1 ppm (or equivalent)
- Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent)

Certifications can rely on manufacturers or third parties, as approved by the State.

Subpart L—Disinfectant Residuals, Disinfection Byproducts, And Disinfection Byproduct Precursors

§141.130 General requirements.

- (a) The requirements of this subpart L constitute national primary drinking water regulations.
 - (1) The regulations in this subpart establish criteria under which community water systems (CWSs) and nontransient, noncommunity water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet MCLs

and MRDLs in §§141.64 and 141.65, respectively, and must meet the treatment technique requirements for disinfection byproduct precursors in §141.135.

- (2) The regulations in this subpart establish criteria under which transient NCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in §141.65.
 - (3) EPA has established MCLs for TTHM and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform; bromodichloromethane; dibromochloromethane; bromoform; dichloroacetic acid; and trichloroacetic acid.
- (b) **Compliance dates—**
- (1) **CWSs and NTNCWSs.** Unless otherwise noted, systems must comply with the requirements of this subpart as follows. Subpart H systems serving 10,000 or more persons must comply with this subpart beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subpart beginning January 1, 2004.
 - (2) **Transient NCWSs.** Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this subpart beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this subpart beginning January 1, 2004.
- (c) Each CWS and NTNCWS regulated under paragraph (a) of this section must be operated by qualified personnel who meet the requirements specified by the State and are included in a State register of qualified operators.
- (d) **Control of disinfectant residuals.** Notwithstanding the MRDLs in §141.65, systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001]

§141.131 Analytical requirements.

(a) **General.**

- (1) Systems must use only the analytical methods specified in this section, or their equivalent as approved by EPA, to demonstrate compliance with the requirements of this subpart and with the requirements of subparts U and V of this part. These methods are effective for compliance monitoring February 16, 1999, unless a different effective date is specified in this section or by the State.
- (2) The following documents are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. EPA Method 552.1 is in Methods for the Determination of Organic Compounds in Drinking Water-Supplement II, USEPA, August 1992, EPA/600/R-92/129 (available through National Information Technical Service (NTIS), PB92-207703). EPA Methods 502.2, 524.2, 551.1, and 552.2 are in Methods for the Determination of Organic Compounds in Drinking Water-Supplement III, USEPA, August 1995, EPA/600/R-95/131 (available through NTIS, PB95-261616). EPA Method 300.0 is in Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA, August 1993, EPA/600/R-93/100 (available through NTIS, PB94-121811). EPA Methods 300.1 and 321.8 are in 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). EPA Method

317.0, Revision 2.0, “Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis,” USEPA, July 2001, EPA 815-B-01-001, EPA Method 326.0, Revision 1.0, “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,” USEPA, June 2002, EPA 815-R-03-007, EPA Method 327.0, Revision 1.1, “Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry,” USEPA, May 2005, EPA 815-R-05-008 and EPA Method 552.3, Revision 1.0, “Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection,” USEPA, July 2003, EPA-815-B-03-002 can be accessed and downloaded directly on-line at <http://www.epa.gov/safewater/methods/sourcalt.html>. EPA Method 415.3, Revision 1.1, “Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,” USEPA, February 2005, EPA/600/R-05/055 can be accessed and downloaded directly on-line at www.epa.gov/nerlcwww/ordmeth.htm. Standard Methods 4500-CI D, 4500-CI E, 4500-CI F, 4500-CI G, 4500-CI H, 500-CI I, 4500-CIO₂ D, 4500-CIO₂ E, 6251 B, and 5910 B shall be followed in accordance with Standard Methods for the Examination of Water and Wastewater, 19th or 20th Editions, American Public Health Association, 1995 and 1998, respectively. The cited methods published in either edition may be used. Standard Methods 5310 B, 5310 C, and 5310 D shall be followed in accordance with the Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater, or the Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, 1996 and 1998, respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. Standard Methods 4500-CI D-00, 4500-CI E-00, 4500-CI F-00, 4500-CI G-00, 4500-CI H-00, 4500-CI I-00, 4500-CIO₂ E-00, 6251 B-94, 5310 B-00, 5310 C-00, 5310 D-00 and 5910 B-00 are available at <http://www.standardmethods.org> or at EPA's Water Docket. 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. ASTM Methods D 1253-86 and D 1253-86 (Reapproved 1996) shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 1996 or any ASTM edition containing the IBR-approved version of the method may be used. ASTM Method D1253-03 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2004 or any ASTM edition containing the IBR-approved version of the method may be used. ASTM Method D 6581-00 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2001 or any ASTM edition containing the IBR-approved version of the method may be used; copies may be obtained from the American Society for Testing and Materials International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

(b) Disinfection byproducts.

- (1)** Systems must measure disinfection byproducts by the methods (as modified by the footnotes) listed in the following table or one of the alternative methods listed in appendix A to subpart C of this part:

Approved Methods for Disinfection Byproduct Compliance Monitoring

Contaminant and methodology ¹	EPA method	Standard method ²	SM online ⁹	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	6251 B-94	
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
Ion chromatography & post column reaction	317.0 Rev 2.0 ⁶ , 326.0 ⁶			
IC/ICP-MS	321.8 ^{6 7}			
Chlorite				
Amperometric titration		4500-ClO ₂ E ⁸	4500-ClO ₂ E-00 ⁸	
Spectrophotometry	327.0 Rev 1.1 ⁸			
Ion chromatography	300.0, 300.1, 317.0 Rev 2.0, 326.0			D 6581-00

¹P&T = purge and trap; GC = gas chromatography; EICD = electrolytic conductivity detector; PID = photoionization detector; MS = mass spectrometer; LLE = liquid/liquid extraction; ECD = electron capture detector; SPE = solid phase extraction; IC = ion chromatography; ICP-MS = inductively coupled plasma/mass spectrometer.

²19th and 20th editions of Standard Methods for the Examination of Water and Wastewater, 1995 and 1998, respectively, American Public Health Association; either of these editions may be used.

³Annual Book of ASTM Standards, 2001 or any year containing the cited version of the method, Vol 11.01.

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 & post column reaction or IC/ICP-MS must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in §141.132(b)(3)(ii).

⁷Samples must be preserved at the time of sampling 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 §141.132(b)(2)(i)(A). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in §141.132(b)(2)(i)(B) and (b)(2)(ii).

⁹The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at <http://www.standardmethods.org>.

(2) Analyses under this section for disinfection byproducts must be conducted by laboratories that have received certification by EPA or the State, except as specified under paragraph (b)(3) of this section. To receive certification to conduct analyses for the DBP contaminants in §§141.64, 141.135, and subparts U and V of this part, the laboratory must:

(i) Analyze Performance Evaluation (PE) samples that are acceptable to EPA or the State at least once during each consecutive 12-month period by each method for which the laboratory desires certification.

(ii) Until March 31, 2007, in these analyses of PE samples, the laboratory must achieve quantitative results within the acceptance limit on a minimum of 80% of the analytes included in each PE sample. The acceptance limit is defined as the 95% confidence interval calculated

around the mean of the PE study between a maximum and minimum acceptance limit of $\pm 50\%$ and $\pm 15\%$ of the study mean.

- (iii) Beginning April 1, 2007, the laboratory must achieve quantitative results on the PE sample analyses that are within the following acceptance limits.

DBP	Acceptance limits (percent of true value)	Comments
TTHM		
Chloroform	± 20	Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a PE sample for TTHM
Bromodichloromethane	± 20	
Dibromochloromethane	± 20	
Bromoform	± 20	
HAA5		
Monochloroacetic Acid	± 40	Laboratory must meet the acceptance limits for 4 out of 5 of the HAA5 compounds in order to successfully pass a PE sample for HAA5
Dichloroacetic Acid	± 40	
Trichloroacetic Acid	± 40	
Monobromoacetic Acid	± 40	
Dibromoacetic Acid	± 40	
Chlorite	± 30	
Bromate	± 30	

- (iv) Beginning April 1, 2007, report quantitative data for concentrations at least as low as the ones listed in the following table for all DBP samples analyzed for compliance with §§141.64, 141.135, and subparts U and V of this part:

DBP	Minimum reporting level (mg/L) ¹	Comments
TTHM²		
Chloroform	0.0010	
Bromodichloromethane	0.0010	
Dibromochloromethane	0.0010	
Bromoform	0.0010	
HAA5²		
Monochloroacetic Acid	0.0020	
Dichloroacetic Acid	0.0010	
Trichloroacetic Acid	0.0010	

Monobromoacetic Acid	0.0010	
Dibromoacetic Acid	0.0010	
Chlorite	0.020	Applicable to monitoring as prescribed in §141.132(b)(2)(1)(B) and (b)(2)(ii).
Bromate	0.0050 or 0.0010	Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 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 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be $\pm 50\%$ of the expected value, if any field sample in the batch has a concentration less than 5 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 trihalomethane 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 DBP, unless otherwise specified by the State.

- (3) A party approved by EPA or the State must measure daily chlorite samples at the entrance to the distribution system.

(c) **Disinfectant residuals.**

- (1) Systems must measure residual disinfectant concentration for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table or one of the alternative methods listed in appendix A to subpart C of this part:

Methodology	SM (19th or 20th ed)	SM Online ²	ASTM method	EPA method	Residual measured ¹			
					Free Cl ₂	Combined Cl ₂	Total Cl ₂	ClO ₂
Amperometric Titration	4500-C1 D	4500-C1 D-00	D 1253-86 (96), 03		X	X	X	
Low Level Amperometric Titration	4500-C1 E	4500-C1 E-00					X	
DPD Ferrous Titrimetric	4500-C1 F	4500-C1 F-00			X	X	X	
DPD Colorimetric	4500-C1 G	4500-C1 G-00			X	X	X	
Syringaldazine (FACTS)	4500-C1 H	4500-C1 H-00			X			
Iodometric Electrode	4500-C1 I	4500-C1 I-00					X	
DPD	4500-ClO ₂ D							X
Amperometric Method II	4500-ClO ₂ E	4500-ClO ₂ E-00						X
Lissamine Green Spectrophotometric				327.0 Rev 1.1				X

¹X indicates method is approved for measuring specified disinfectant residual. 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.

²The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at <http://www.standardmethods.org>.

- (2) If approved by the State, systems may also measure residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide by using DPD colorimetric test kits.
- (3) A party approved by EPA or the State must measure residual disinfectant concentration.
- (d) **Additional analytical methods.** Systems required to analyze parameters not included in paragraphs (b) and (c) of this section must use the following methods or one of the alternative methods listed in appendix A to subpart C of this part. A party approved by EPA or the State must measure these parameters.
 - (1) **Alkalinity.** All methods allowed in §141.89(a) for measuring alkalinity.
 - (2) **Bromide.** EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0, or ASTM D 6581-00.
 - (3) **Total Organic Carbon (TOC).** Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples must be acidified at the time of sample collection 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 TOC samples must be analyzed within 28 days.
 - (4) **Specific Ultraviolet Absorbance (SUVA).** SUVA is equal to the UV absorption at 254nm (UV_{254}) (measured in m^{-1} divided by the dissolved organic carbon (DOC) concentration (measured as mg/L). In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in paragraph (d)(4)(i) of this section to measure DOC and the method stipulated in paragraph (d)(4)(ii) of this section to measure UV_{254} . SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV_{254} samples used to determine a SUVA value must be taken at the same time and at the same location.
 - (i) **Dissolved Organic Carbon (DOC).** Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. DOC samples must be filtered through the 0.45 μm 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 of sample collection. 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 the following criteria: $DOC < 0.5$ mg/L.
 - (ii) **Ultraviolet Absorption at 254 nm (UV_{254}).** Standard Method 5910 B or 5910 B-00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV_{254} samples must be filtered through a 0.45 μm pore-diameter filter. The pH of UV_{254} samples may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed 48 hours.
- (5) **pH.** All methods allowed in §141.23(k)(1) for measuring pH.
- (6) **Magnesium.** All methods allowed in §141.23(k)(1) for measuring magnesium.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001; 71 FR 479, Jan. 4, 2006; 71 FR 37168, June 29, 2006; 74 FR 30958, June 29, 2009]

§141.132 Monitoring requirements.

- (a) **General requirements.**
 - (1) Systems must take all samples during normal operating conditions.

- (2) Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required, with State approval in accordance with criteria developed under §142.16(h)(5) of this chapter.
 - (3) Failure to monitor in accordance with the monitoring plan required under paragraph (f) of this section is a monitoring violation.
 - (4) Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.
 - (5) Systems may use only data collected under the provisions of this subpart to qualify for reduced monitoring.
- (b) **Monitoring requirements for disinfection byproducts—**
- (1) **TTHMs and HAA5—**
 - (i) **Routine monitoring.** Systems must monitor at the frequency indicated in the following table:

Routine Monitoring Frequency for TTHM and HAA5

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

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

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

- (ii) Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

Reduced Monitoring Frequency for TTHM and HAA5

If you are a...	You may reduce monitoring if you have monitored at least one year and your...	To this level
Subpart H system serving at least 10,000 persons which has a source water annual average TOC level, before any treatment, ≤ 4.0 mg/L	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L	One sample per treatment plant per quarter at distribution system location reflecting maximum residence time.
Subpart H system serving from 500 to 9,999 persons which has a source water annual average TOC level, before any treatment, ≤ 4.0 mg/L	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. NOTE: Any Subpart H system serving fewer than 500 persons may not reduce its monitoring to less than one sample per treatment plant per year.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L for two consecutive years OR TTHM annual average ≤ 0.020 mg/L and HAA5 annual average ≤ 0.015 mg/L for one year	One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring.

- (iii) *Monitoring requirements for source water TOC.* In order to qualify for reduced monitoring for TTHM and HAA5 under paragraph (b)(1)(ii) of this section, subpart H systems not monitoring under the provisions of paragraph (d) of this section must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the State. In addition to meeting other criteria for reduced monitoring in paragraph (b)(1)(ii) of this section, the source water TOC running annual average must be ≤ 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. Once qualified for reduced monitoring for TTHM and HAA5 under paragraph (b)(1)(ii) of this section, a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.
- (iv) Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (b)(1)(i) of this section (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L or 0.045 mg/L for TTHMs and HAA5, respectively. For systems using only ground water not under the direct influence of

surface water and serving fewer than 10,000 persons, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to the increased monitoring identified in paragraph (b)(1)(i) of this section (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5 respectively.

- (v) Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring their TTHM annual average is ≤ 0.060 mg/L and their HAA5 annual average is ≤ 0.045 mg/L.
 - (vi) The State may return a system to routine monitoring at the State's discretion.
- (2) **Chlorite.** Community and nontransient noncommunity water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.
- (i) **Routine monitoring.**
 - (A) **Daily monitoring.** Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by paragraph (b)(2)(ii) of this section, in addition to the sample required at the entrance to the distribution system.
 - (B) **Monthly monitoring.** Systems must take a three-sample set each month in the distribution system. The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under paragraph (b)(2)(ii) of this section to meet the requirement for monitoring in this paragraph.
 - (ii) **Additional monitoring.** On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).
 - (iii) **(Reduced monitoring).**
 - (A) Chlorite monitoring at the entrance to the distribution system required by paragraph (b)(2)(i)(A) of this section may not be reduced.
 - (B) Chlorite monitoring in the distribution system required by paragraph (b)(2)(i)(B) of this section may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under paragraph (b)(2)(i)(B) of this section has exceeded the chlorite MCL and the system has not been required to conduct monitoring under paragraph (b)(2)(ii) of this section. The system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under paragraph (b)(2)(i)(B) of this section exceeds the chlorite MCL or the system is required to conduct monitoring under paragraph (b)(2)(ii) of this section, at which time the system must revert to routine monitoring.
- (3) **Bromate—**
- (i) **Routine monitoring.** Community and nontransient noncommunity systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.
 - (ii) **Reduced monitoring.**
 - (A) Until March 31, 2009, systems required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's average source water bromide concentration is less than 0.05 mg/L based on representative monthly bromide measurements for one year. The system may remain on reduced bromate monitoring until the running annual average source water bromide

concentration, computed quarterly, is equal to or greater than 0.05 mg/L based on representative monthly measurements. If the running annual average source water bromide concentration is ≥ 0.05 mg/L, the system must resume routine monitoring required by paragraph (b)(3)(i) of this section in the following month.

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

(c) **Monitoring requirements for disinfectant residuals —**

(1) **Chlorine and chloramines—**

- (i) **Routine monitoring.** Until March 31, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in §141.21. Beginning April 1, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in §§141.854 through 141.858. Subpart H systems of this part may use the results of residual disinfectant concentration sampling conducted under §141.74(b)(6)(i) for unfiltered systems or §141.74(c)(3)(i) for systems which filter, in lieu of taking separate samples.
- (ii) **Reduced monitoring.** Monitoring may not be reduced.

(2) **Chlorine dioxide—**

- (i) **Routine monitoring.** Community, nontransient noncommunity, and transient noncommunity water systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by paragraph (c)(2)(ii) of this section, in addition to the sample required at the entrance to the distribution system.
- (ii) **Additional monitoring.** On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (*i.e.*, no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (*i.e.*, booster chlorination), the system must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).
- (iii) **Reduced monitoring.** Chlorine dioxide monitoring may not be reduced.

(d) **Monitoring requirements for disinfection byproduct precursors (DBPP)—**

- (1) **Routine monitoring.** Subpart H systems which use conventional filtration treatment (as defined in §141.2) must monitor each treatment plant for TOC no later than the point of combined filter effluent

turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph (d)(1) must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

- (2) **Reduced monitoring.** Subpart H systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC \geq 2.0 mg/L.
- (e) **Bromide.** Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.
- (f) **Monitoring plans.** Each system required to monitor under this subpart must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the State and the general public no later than 30 days following the applicable compliance dates in §141.130(b). All Subpart H systems serving more than 3300 people must submit a copy of the monitoring plan to the State no later than the date of the first report required under §141.134. The State may also require the plan to be submitted by any other system. After review, the State may require changes in any plan elements. The plan must include at least the following elements.
 - (1) Specific locations and schedules for collecting samples for any parameters included in this subpart.
 - (2) How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.
 - (3) If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions of §141.29, the sampling plan must reflect the entire distribution system.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001; 69 FR 38856, June 29, 2004; 71 FR 482, Jan. 4, 2006; 78 FR 10348, Feb. 13, 2013]

§141.133 Compliance requirements.

- (a) **General requirements.**
 - (1) Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHM, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.
 - (2) All samples taken and analyzed under the provisions of this subpart must be included in determining compliance, even if that number is greater than the minimum required.
 - (3) If, during the first year of monitoring under §141.132, any individual quarter's average will cause the running annual average of that system to exceed the MCL for total trihalomethanes, haloacetic acids (five), or bromate; or the MRDL for chlorine or chloramine, the system is out of compliance at the end of that quarter.
- (c) **Disinfection byproducts—**
 - (1) **TTHMs and HAA5.**
 - (i) For systems monitoring quarterly, compliance with MCLs in §141.64 must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by §141.132(b)(1).
 - (ii) For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of §141.132(b)(1) does not exceed the MCLs in §141.64. If the average of these samples exceeds the MCL, the system

must increase monitoring to once per quarter per treatment plant and such a system is not in violation of the MCL until it has completed one year of quarterly monitoring, unless the result of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring.

(iii) If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to §141.32 or §141.202, whichever is effective for your system, in addition to reporting to the State pursuant to §141.134. If a PWS fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(2) **Bromate. Compliance** must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average of all samples taken during the month) collected by the system as prescribed by §141.132(b)(3). If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to subpart Q, in addition to reporting to the State pursuant to §141.134. If a PWS fails to complete 12 consecutive months' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(3) **Chlorite.** Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by §141.132(b)(2)(i)(B) and §141.132(b)(2)(ii). If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to subpart Q, in addition to reporting to the State pursuant to §141.134.

(d) **Disinfectant residuals —**

(1) **Chlorine and chloramines.**

(i) Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under §141.132(c)(1). If the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to subpart Q, in addition to reporting to the State pursuant to §141.134.

(ii) In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to §141.134 must clearly indicate which residual disinfectant was analyzed for each sample.

(2) **Chlorine dioxide.**

(i) **Acute violations.** Compliance must be based on consecutive daily samples collected by the system under §141.132(c)(2). If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and must notify the public pursuant to the procedures for acute health risks in subpart Q in addition to reporting to the State pursuant to §141.134. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under subpart Q in addition to reporting to the State pursuant to §141.134.

(ii) **Nonacute violations.** Compliance must be based on consecutive daily samples collected by the system under §141.132(c)(2). If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the

level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in subpart Q in addition to reporting to the State pursuant to §141.134. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under §141.32(e)(78) in addition to reporting to the State pursuant to §141.134.

- (e) **Disinfection byproduct precursors (DBPP).** Compliance must be determined as specified by §141.135(c). Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in §141.135(b)(2) and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to §141.135(b)(3) and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under §141.135(c)(1)(iv) is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to subpart Q of this part, in addition to reporting to the State pursuant to §141.134.

[63 FR 69466, Dec. 16, 1998, as amended at 65 FR 26022, May 4, 2000; 65 FR 40521, June 30, 2000; 66 FR 3777, Jan. 16, 2001; 69 FR 38856, June 29, 2004; 71 FR 482, Jan. 4, 2006]

§141.134 Reporting and recordkeeping requirements.

- (a) Systems required to sample quarterly or more frequently must report to the State within 10 days after the end of each quarter in which samples were collected, notwithstanding the provisions of §141.31. Systems required to sample less frequently than quarterly must report to the State within 10 days after the end of each monitoring period in which samples were collected.
- (b) **Disinfection byproducts.** Systems must report the information specified in the following table:

If you are a * * *	You must report * * *
(1) System monitoring for TTHMs and HAA5 under the requirements of §141.132(b) on a quarterly or more frequent basis.	(i) The number of samples taken during the last quarter. (ii) The location, date, and result of each sample taken during the last quarter. (iii) The arithmetic average of all samples taken in the last quarter. (iv) The annual arithmetic average of the quarterly arithmetic averages of this section for the last four quarters. (v) Whether, based on §141.133(b)(1), the MCL was violated.
(2) System monitoring for TTHMs and HAA5 under the requirements of §141.132(b) less frequently than quarterly (but as least annually).	(i) The number of samples taken during the last year. (ii) The location, date, and result of each sample taken during the last monitoring period. (iii) The arithmetic average of all samples taken over the last year. (iv) Whether, based on §141.133(b)(1), the MCL was violated.
(3) System monitoring for TTHMs and HAA5 under the requirements of §141.132(b) less frequently than annually.	(i) The location, date, and result of each sample taken (ii) Whether, based on §141.133(b)(1), the MCL was violated.
(4) System monitoring for chlorite under the requirements of §141.132(b)	(i) The number of entry point samples taken each month for the last 3 months. (ii) The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. (iii) For each month in the reporting period, the arithmetic average of all samples taken in each three samples set taken in the distribution system.

	(iv) Whether, based on §141.133(b)(3), the MCL was violated, in which month, and how many times it was violated each month.
(5) System monitoring for bromate under the requirements of §141.132(b).	(i) The number of samples taken during the last quarter. (ii) The location, date, and result of each sample taken during the last quarter. (iii) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. (iv) Whether, based on §141.133(b)(2), the MCL was violated.

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

(c) **Disinfectants.** Systems must report the information specified in the following table:

If you are a * * *	You must report * * *
(1) System monitoring for chlorine or chloramines under the requirements of §141.132(c)	(i) The number of samples taken during each month of the last quarter. (ii) The month arithmetic average of all samples taken in each month for the last 12 months. (iii) The arithmetic average of the monthly averages for the last 12 months. (iv) Whether, based on §141.133(c)(1), the MRD was violated.
(2) System monitoring for chlorine dioxide under the requirements of §141.132(c).	(i) The dates, result, and locations of samples taken during the last quarter. (ii) Whether, based on §141.133(c)(2), the MRDL was violated. (iii) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

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

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

If you are a...	You must report... ¹
(1) System monitoring monthly or quarterly for TOC under the requirements of §141.132(d) and required to meet the enhanced coagulation or enhanced softening requirements in §141.135(b)(2) or (3)	(i) The number of paired (source water and treated water) samples taken during the last quarter. (ii) The location, date, and results of each paired sample and associated alkalinity taken during the last quarter. (iii) For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal. (iv) Calculations for determining compliance with the TOC percent removal requirements, as provided in §141.135(c)(1). (v) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in §141.135(b) for the last four quarters.
(2) System monitoring monthly or quarterly for TOC under the requirements of	(i) The alternative compliance criterion that the system is using. (ii) The number of paired samples taken during the last quarter. (iii) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. (iv) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in §§141.135(a)(2)(i) or (iii) or of treated water TOC for systems meeting the

§141.132(d) and meeting one or more of the alternative compliance criteria in §141.135(a)(2) or (3)	critterion in §141.135(a)(2)(ii).
	(v) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in §141.135(a)(2)(v) or of treated water SUVA for systems meeting the criterion in §141.135(a)(2)(vi).
	(vi) The running annual average of source water alkalinity for systems meeting the criterion in §141.135(a)(2)(iii) and of treated water alkalinity for systems meeting the criterion in §141.135(a)(3)(i).
	(vii) The running annual average for both TTHM and HAA5 for systems meeting the criterion in §141.135(a)(2)(iii) or (iv).
	(viii) The running annual average of the amount of magnesium hardness removal (as CaCO ₃ , in mg/L) for systems meeting the criterion in §141.135(a)(3)(ii).
	(ix) Whether the system is in compliance with the particular alternative compliance criterion in §141.135(a)(2) or (3).

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

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3778, Jan. 16, 2001; 66 FR 9903, Feb. 12, 2001]

§141.135 Treatment technique for control of disinfection byproduct (DBP) precursors.

(a) Applicability.

- (1)** Subpart H systems using conventional filtration treatment (as defined in §141.2) must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in paragraph (b) of this section unless the system meets at least one of the alternative compliance criteria listed in paragraph (a)(2) or (a)(3) of this section.
- (2) Alternative compliance criteria for enhanced coagulation and enhanced softening systems.** Subpart H systems using conventional filtration treatment may use the alternative compliance criteria in paragraphs (a)(2)(i) through (vi) of this section to comply with this section in lieu of complying with paragraph (b) of this section. Systems must still comply with monitoring requirements in §141.132(d).
 - (i)** The system's source water TOC level, measured according to §141.131(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.
 - (ii)** The system's treated water TOC level, measured according to §141.131(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.
 - (iii)** The system's source water TOC level, measured according to §141.131(d)(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to §141.131(d)(1), is greater than 60 mg/L (as CaCO₃), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in §141.130(b), the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in §141.130(b) to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the State for approval not later than the effective date for compliance in §141.130(b). These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of National Primary Drinking Water Regulations.
 - (iv)** The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

- (v) The system's source water SUVA, prior to any treatment and measured monthly according to §141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.
- (vi) The system's finished water SUVA, measured monthly according to §141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.
- (3) **Additional alternative compliance criteria for softening systems.** Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (b)(2) of this section may use the alternative compliance criteria in paragraphs (a)(3)(i) and (ii) of this section in lieu of complying with paragraph (b) of this section. Systems must still comply with monitoring requirements in §141.132(d).
 - (i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO₃), measured monthly according to §141.131(d)(1) and calculated quarterly as a running annual average.
 - (ii) Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO₃), measured monthly according to §141.131(d)(6) and calculated quarterly as a running annual average.
- (b) **Enhanced coagulation and enhanced softening performance requirements.**
 - (1) Systems must achieve the percent reduction of TOC specified in paragraph (b)(2) of this section between the source water and the combined filter effluent, unless the State approves a system's request for alternate minimum TOC removal (Step 2) requirements under paragraph (b)(3) of this section.
 - (2) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with §141.131(d). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

**Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening
for Subpart H Systems Using Conventional Treatment^{1 2}**

Source-water TOC, mg/L	Source-water alkalinity, mg/L as CaCO ₃ (in percentages)		
	0-60	>60-120	>120 ³
>2.0-4.0	35.0	25.0	15.0
>4.0-8.0	45.0	35.0	25.0
>8.0.	50.0	40.0	30.0

¹Systems meeting at least one of the conditions in paragraph (a)(2)(i)-(vi) of this section are not required to operate with enhanced coagulation.

²Softening system meeting one of the alternative compliance criteria in paragraph (a)(3) of this section are not required to operate with enhanced softening.

³System practicing softening must meet the TOC removal requirements in this column.

- 4) Subpart H conventional treatment systems that cannot achieve the Step 1 TOC removals required by paragraph (b)(2) of this section due to water quality parameters or operational constraints must apply to the State, within three months of failure to achieve the TOC removals required by paragraph (b)(2) of this section, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the State approves the alternative minimum TOC removal (Step 2) requirements, the State may make those requirements retroactive for the purposes of determining compliance. Until the State approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in paragraph (b)(2) of this section.
- 5) **Alternate minimum TOC removal (Step 2) requirements.** Applications made to the State by enhanced coagulation systems for approval of alternate minimum TOC removal (Step 2) requirements under

paragraph (b)(3) of this section must include, at a minimum, results of bench- or pilot-scale testing conducted under paragraph (b)(4)(i) of this section. The submitted bench- or pilot-scale testing must be used to determine the alternate enhanced coagulation level.

- (i) **Alternate enhanced coagulation level is defined as** coagulation at a coagulant dose and pH as determined by the method described in paragraphs (b)(4)(i) through (v) of this section such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of ≤ 0.3 mg/L. The percent removal of TOC at this point on the “TOC removal versus coagulant dose” curve is then defined as the minimum TOC removal required for the system. Once approved by the State, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (b)(2) of this section. This requirement will be effective until such time as the State approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve State-set alternative minimum TOC removal levels is a violation of National Primary Drinking Water Regulations.
- (ii) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

Enhanced Coagulation Step 2 target pH

Alkalinity (mg/L as CaCO ₃)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

- (iii) For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalent addition of iron coagulant) is reached.
- (iv) The system may operate at any coagulant dose or pH necessary (consistent with other NPDWRs) to achieve the minimum TOC percent removal approved under paragraph (b)(3) of this section.
- (v) If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the State for a waiver of enhanced coagulation requirements.

(c) **Compliance calculations.**

- (1) Subpart H systems other than those identified in paragraph (a)(2) or (a)(3) of this section must comply with requirements contained in paragraph (b)(2) or (b)(3) of this section. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:
 - (i) Determine actual monthly TOC percent removal, equal to:

$$(1 - (\text{treated water TOC} / \text{source water TOC})) \times 100$$
 - (ii) Determine the required monthly TOC percent removal (from either the table in paragraph (b)(2) of this section or from paragraph (b)(3) of this section).
 - (iii) Divide the value in paragraph (c)(1)(i) of this section by the value in paragraph (c)(1)(ii) of this section.
 - (iv) Add together the results of paragraph (c)(1)(iii) of this section for the last 12 months and divide by 12.

- (v) If the value calculated in paragraph (c)(1)(iv) of this section is less than 1.00, the system is not in compliance with the TOC percent removal requirements.
- (2) Systems may use the provisions in paragraphs (c)(2)(i) through (v) of this section in lieu of the calculations in paragraph (c)(1)(i) through (v) of this section to determine compliance with TOC percent removal requirements.
 - (i) In any month that the system's treated or source water TOC level, measured according to §141.131(d)(3), is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.
 - (ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.
 - (iii) In any month that the system's source water SUVA, prior to any treatment and measured according to §141.131(d)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.
 - (iv) In any month that the system's finished water SUVA, measured according to §141.131(d)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.
 - (v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.
- (3) Subpart H systems using conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (a)(2) or (3) of this section.
- (d) **Treatment technique requirements for DBP precursors.** The Administrator identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For Subpart H systems using conventional treatment, enhanced coagulation or enhanced softening.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001; 71 FR 482, Jan. 4, 2006]

Subpart O—Consumer Confidence Reports

SOURCE: 63 FR 44526, Aug. 19, 1998, unless otherwise noted.

§141.151 Purpose and applicability of this subpart.

- (a) This subpart establishes the minimum requirements for the content of annual reports that community water systems must deliver to their customers. These reports must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner.
- (b) Notwithstanding the provisions of §141.3, this subpart applies only to community water systems.
- (c) For the purpose of this subpart, *customers* are defined as billing units or service connections to which water is delivered by a community water system.
- (d) For the purpose of this subpart, detected means: at or above the levels prescribed by §141.23(a)(4) for inorganic contaminants, at or above the levels prescribed by §141.24(f)(7) for the contaminants listed in §141.61(a), at or above the levels prescribed by §141.24(h)(18) for the contaminants listed in §141.61(c), at or above the levels prescribed by §141.131(b)(2)(iv) for the contaminants or contaminant groups listed in §141.64, and at or above the levels prescribed by §141.25(c) for radioactive contaminants.
- (e) A State that has primary enforcement responsibility may adopt by rule, after notice and comment, alternative requirements for the form and content of the reports. The alternative requirements must provide the same type

and amount of information as required by §§141.153 and 141.154, and must be designed to achieve an equivalent level of public information and education as would be achieved under this subpart.

- (f) For purpose of §§141.154 and 141.155 of this subpart, the term “primacy agency” refers to the State or tribal government entity that has jurisdiction over, and primary enforcement responsibility for, public water systems, even if that government does not have interim or final primary enforcement responsibility for this rule. Where the State or tribe does not have primary enforcement responsibility for public water systems, the term “primacy agency” refers to the appropriate EPA regional office.

[63 FR 44526, Aug. 19, 1998, as amended at 71 FR 483, Jan. 4, 2006]

§141.152 Effective dates.

- (a) The regulations in this subpart shall take effect on September 18, 1998.
- (b) Each existing community water system must deliver its first report by October 19, 1999, its second report by July 1, 2000, and subsequent reports by July 1 annually thereafter. The first report must contain data collected during, or prior to, calendar year 1998 as prescribed in §141.153(d)(3). Each report thereafter must contain data collected during, or prior to, the previous calendar year.
- (c) A new community water system must deliver its first report by July 1 of the year after its first full calendar year in operation and annually thereafter.
- (d) A community water system that sells water to another community water system must deliver the applicable information required in §141.153 to the buyer system:
- (1) No later than April 19, 1999, by April 1, 2000, and by April 1 annually thereafter or
 - (2) On a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

§141.153 Content of the reports.

- (a) Each community water system must provide to its customers an annual report that contains the information specified in this section and §141.154.
- (b) Information on the source of the water delivered:
- (1) Each report must identify the source(s) of the water delivered by the community water system by providing information on:
 - (i) The type of the water: e.g., surface water, ground water; and
 - (ii) The commonly used name (if any) and location of the body (or bodies) of water.
 - (2) If a source water assessment has been completed, the report must notify consumers of the availability of this information and the means to obtain it. In addition, systems are encouraged to highlight in the report significant sources of contamination in the source water area if they have readily available information. Where a system has received a source water assessment from the primacy agency, the report must include a brief summary of the system's susceptibility to potential sources of contamination, using language provided by the primacy agency or written by the operator.
- (c) **Definitions.**
- (1) Each report must include the following definitions:
 - (i) **Maximum Contaminant Level Goal or MCLG:** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
 - (ii) **Maximum Contaminant Level or MCL:** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
 - (2) A report for a community water system operating under a variance or an exemption issued under §1415 or 1416 of SDWA must include the following definition: *Variances and Exemptions:* State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
 - (3) A report that contains data on contaminants that EPA regulates using any of the following terms must include the applicable definitions:
 - (i) **Treatment Technique:** A required process intended to reduce the level of a contaminant in drinking water.

- (ii) **Action Level:** The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
 - (iii) **Maximum residual disinfectant level goal or MRDLG:** The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
 - (iv) **Maximum residual disinfectant level or MRDL:** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- (4) A report that contains information regarding a Level 1 or Level 2 Assessment required under Subpart Y of this part must include the applicable definitions:
- (ii) **Level 1 Assessment:** A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
 - (iii) **Level 2 Assessment:** A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an *E. coli* MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.
- (d) **Information on detected contaminants.**
- (1) This sub-section specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*). It applies to:
 - (i) Contaminants subject to a MCL, action level, maximum residual disinfectant level, or treatment technique (regulated contaminants).
 - (ii) Contaminants for which monitoring is required by §141.40 (unregulated contaminants); and
 - (iii) Disinfection by-products or microbial contaminants for which monitoring is required by §§141.142 and 141.143, except as provided under paragraph (e)(1) of this section, and which are detected in the finished water.
 - (2) The data relating to these contaminants must be displayed in one table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report must be displayed separately.
 - (3) The data must be derived from data collected to comply with EPA and State monitoring and analytical requirements during calendar year 1998 for the first report and subsequent calendar years thereafter except that:
 - (i) Where a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) must include the date and results of the most recent sampling and the report must include a brief statement indicating that the data presented in the report are from the most recent testing done in accordance with the regulations. No data older than 5 years need be included.
 - (ii) Results of monitoring in compliance with §§141.142 and 141.143 need only be included for 5 years from the date of last sample or until any of the detected contaminants becomes regulated and subject to routine monitoring requirements, whichever comes first.
 - (4) For detected regulated contaminants (listed in appendix A to this subpart), the table(s) must contain:
 - (i) The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in appendix A to this subpart);
 - (ii) The MCLG for that contaminant expressed in the same units as the MCL;
 - (iii) If there is no MCL for a detected contaminant, the table must indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the report must include the definitions for treatment technique and/or action level, as appropriate, specified in paragraph (c)(3) of this section;
 - (iv) For contaminants subject to an MCL, except turbidity, total coliform, fecal coliform and *E. coli*, the highest contaminant level used to determine compliance with an NPDWR and the range of detected levels, as follows:
 - (A) 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.

- (B) When compliance with the MCL is determined by calculating a running annual average of all samples taken at a monitoring location: the highest average of any of the monitoring locations and the range of all monitoring locations expressed in the same units as the MCL. For the MCLs for TTHM and HAA5 in §141.64(b)(2), 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.
- (C) When compliance with the MCL is determined on a system-wide basis by calculating a running annual average of all samples at all monitoring locations: the average and range of detection expressed in the same units as the MCL. The system is required to include individual sample results for the IDSE conducted under subpart U of this part when determining the range of TTHM and HAA5 results to be reported in the annual consumer confidence report for the calendar year that the IDSE samples were taken.

NOTE TO PARAGRAPH (d)(4)(iv): 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 A of this subpart.

- (v) For turbidity.
 - (A) When it is reported pursuant to §141.13: The highest average monthly value.
 - (B) When it is reported pursuant to the requirements of §141.71: the highest monthly value. The report should include an explanation of the reasons for measuring turbidity.
 - (C) When it is reported pursuant to §141.73 or §141.173 or §141.551: the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in §141.73 or §141.173, or §141.551 for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity;
- (vi) For lead and copper: the 90th percentile value of the most recent round of sampling and the number of sampling sites exceeding the action level;
- (vii) For total coliform analytical results until March 31, 2016:
 - (A) The highest monthly number of positive samples for systems collecting fewer than 40 samples per month; or
 - (B) The highest monthly percentage of positive samples for systems collecting at least 40 samples per month;
- (viii) For fecal coliform and *E. coli* until March 31, 2016: The total number of positive samples;
- (ix) The likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report must include one or more of the typical sources for that contaminant listed in appendix A to this subpart that is most applicable to the system.
- (x) For *E. coli* analytical results under subpart Y: The total number of positive samples.
- (5) If a community water system distributes water to its customers from multiple hydraulically independent distribution systems that are fed by different raw water sources, the table should contain a separate column for each service area and the report should identify each separate distribution system. Alternatively, systems could produce separate reports tailored to include data for each service area.
- (6) The table(s) must clearly identify any data indicating violations of MCLs, MRDLs, or treatment techniques, and the report must contain a clear and readily understandable explanation of the violation including: the length of the violation, the potential adverse health effects, and actions taken by the system to address the violation. To describe the potential health effects, the system must use the relevant language of appendix A to this subpart.
- (7) For detected unregulated contaminants for which monitoring is required (except *Cryptosporidium*), the table(s) must contain the average and range at which the contaminant was detected. The report may include a brief explanation of the reasons for monitoring for unregulated contaminants.

- (e) **Information on *Cryptosporidium*, radon, and other contaminants:**
- (1) If the system has performed any monitoring for *Cryptosporidium*, including monitoring performed to satisfy the requirements of §141.143, which indicates that *Cryptosporidium* may be present in the source water or the finished water, the report must include:
 - (i) A summary of the results of the monitoring; and
 - (ii) An explanation of the significance of the results.
 - (2) If the system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report must include:
 - (i) The results of the monitoring; and
 - (ii) An explanation of the significance of the results.
 - (3) If the system has performed additional monitoring which indicates the presence of other contaminants in the finished water, EPA strongly encourages systems to report any results which may indicate a health concern. To determine if results may indicate a health concern, EPA recommends that systems find out if EPA has proposed an NPDWR or issued a health advisory for that contaminant by calling the Safe Drinking Water Hotline (800-426-4791). EPA considers detects above a proposed MCL or health advisory level to indicate possible health concerns. For such contaminants, EPA recommends that the report include:
 - (i) The results of the monitoring; and
 - (ii) An explanation of the significance of the results noting the existence of a health advisory or a proposed regulation.
- (f) **Compliance with NPDWR.** In addition to the requirements of §141.153(d)(6), the report must note any violation that occurred during the year covered by the report of a requirement listed below, and include a clear and readily understandable explanation of the violation, any potential adverse health effects, and the steps the system has taken to correct the violation.
- (1) Monitoring and reporting of compliance data;
 - (2) Filtration and disinfection prescribed by subpart H of this part. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report must include the following language as part of the explanation of potential adverse health effects: Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
 - (3) Lead and copper control requirements prescribed by subpart I of this part. For systems that fail to take one or more actions prescribed by §§141.80(d), 141.81, 141.82, 141.83 or 141.84, the report must include the applicable language of appendix A to this subpart for lead, copper, or both.
 - (4) Treatment techniques for Acrylamide and Epichlorohydrin prescribed by subpart K of this part. For systems that violate the requirements of subpart K of this part, the report must include the relevant language from appendix A to this subpart.
 - (5) Recordkeeping of compliance data.
 - (6) Special monitoring requirements prescribed by §§141.40 and 141.41; and
 - (7) Violation of the terms of a variance, an exemption, or an administrative or judicial order.
- (g) **Variances and Exemptions.** If a system is operating under the terms of a variance or an exemption issued under §1415 or 1416 of SDWA, the report must contain:
- (1) An explanation of the reasons for the variance or exemption;
 - (2) The date on which the variance or exemption was issued;
 - (3) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and
 - (4) A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.
- (h) **Additional information:**
- (1) The report must contain a brief explanation regarding contaminants which may reasonably be expected to be found in drinking water including bottled water. This explanation may include the language of paragraphs (h)(1) (i) through (iii) or systems may use their own comparable language. The report also must include the language of paragraph (h)(1)(iv) of this section.
 - (i) The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through

- the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.
- (ii) Contaminants that may be present in source water include:
 - (A) **Microbial contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
 - (B) **Inorganic contaminants**, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
 - (C) **Pesticides and herbicides**, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
 - (D) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
 - (E) **Radioactive contaminants**, which can be naturally-occurring or be the result of oil and gas production and mining activities.
 - (iii) In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.
 - (iv) Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).
- (2) The report must include the telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report.
 - (3) In communities with a large proportion of non-English speaking residents, as determined by the Primacy Agency, the report must contain information in the appropriate language(s) regarding the importance of the report or contain a telephone number or address where such residents may contact the system to obtain a translated copy of the report or assistance in the appropriate language.
 - (4) The report must include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.
 - (5) The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.
 - (6) **Systems required to comply with subpart S.**
 - (i) Any ground water system that receives notice from the State of a significant deficiency or notice from a laboratory of a fecal indicator-positive ground water source sample that is not invalidated by the State under §141.402(d) must inform its customers of any significant deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive ground water source sample in the next report. The system must continue to inform the public annually until the State determines that particular significant deficiency is corrected or the fecal contamination in the ground water source is addressed under §141.403(a). Each report must include the following elements.
 - (A) The nature of the particular significant deficiency or the source of the fecal contamination (if the source is known) and the date the significant deficiency was identified by the State or the dates of the fecal indicator-positive ground water source samples;
 - (B) If the fecal contamination in the ground water source has been addressed under §141.403(a) and the date of such action;
 - (C) For each significant deficiency or fecal contamination in the ground water source that has not been addressed under §141.403(a), the State-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed; and

- (D) If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the State under §141.402(d), the potential health effects using the health effects language of Appendix A of subpart O.
 - (ii) If directed by the State, a system with significant deficiencies that have been corrected before the next report is issued must inform its customers of the significant deficiency, how the deficiency was corrected, and the date of correction under paragraph (h)(6)(i) of this section.
- (7) **Systems required to comply with subpart Y.**
- (i) Any system required to comply with the Level 1 assessment requirement or a Level 2 assessment requirement that is not due to an *E. coli* MCL violation must include in the report the text found in paragraph (h)(7)(i)(A) and paragraphs (h)(7)(i)(B) and (C) of this section as appropriate, filling in the blanks accordingly and the text found in paragraphs (h)(7)(i)(D)(1) and (2) of this section if appropriate.
 - (A) Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.
 - (B) During the past year we were required to conduct [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s). [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s) were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.
 - (C) During the past year [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were required to be completed for our water system. [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.
 - (E) Any system that has failed to complete all the required assessments or correct all identified sanitary defects, is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:
 - (1) During the past year we failed to conduct all of the required assessment(s).
 - (2) During the past year we failed to correct all identified defects that were found during the assessment.
 - (ii) Any system required to conduct a Level 2 assessment due to an *E. coli* MCL violation must include in the report the text found in paragraphs (h)(7)(ii)(A) and (B) of this section, filling in the blanks accordingly and the text found in paragraphs (h)(7)(ii)(C)(1) and (2) of this section, if appropriate.
 - (A) *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We found *E. coli* bacteria, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.
 - (B) We were required to complete a Level 2 assessment because we found *E. coli* in our water system. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

- (C) Any system that has failed to complete the required assessment or correct all identified sanitary defects, is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:
 - (1) We failed to conduct the required assessment.
 - (2) We failed to correct all sanitary defects that were identified during the assessment that we conducted.
- (iii) If a system detects *E. coli* and has violated the *E. coli MCL*, in addition to completing the table as required in paragraph (d)(4) of this section, the system must include one or more of the following statements to describe any noncompliance, as applicable:
 - (A) We had an *E. coli*-positive repeat sample following a total coliform-positive routine sample.
 - (B) We had a total coliform-positive repeat sample following an *E. coli*-positive routine sample.
 - (C) We failed to take all required repeat samples following an *E. coli*-positive routine sample.
 - (D) We failed to test for *E. coli* when any repeat sample tests positive for total coliform.
- (iv) If a system detects *E. coli* and has not violated the *E. coli MCL*, in addition to completing the table as required in paragraph (d)(4) of this section, the system may include a statement that explains that although they have detected *E. coli*, they are not in violation of the *E. coli MCL*.

[63 FR 44526, Aug. 19, 1998, as amended at 63 FR 69516, Dec. 16, 1998; 64 FR 34733, June 29, 1999; 65 FR 26022, May 4, 2000; 67 FR 1836, Jan. 14, 2002; 71 FR 483, Jan. 4, 2006; 71 FR 65651, Nov. 8, 2006; 78 FR 10348, Feb. 13, 2013]

§141.154 Required additional health information.

- (a) All reports must prominently display the following language: Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).
- (b) Ending in the report due by July 1, 2001, a system which detects arsenic at levels above 0.025 mg/L, but below the 0.05 mg/L, and beginning in the report due by July 1, 2002, a system that detects arsenic above 0.005 mg/L and up to and including 0.010 mg/L:
 - (1) Must include in its report a short informational statement about arsenic, using language such as: While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.
 - (2) May write its own educational statement, but only in consultation with the Primacy Agency.
- (c) A system which detects nitrate at levels above 5 mg/l, but below the MCL:
 - (1) Must include a short informational statement about the impacts of nitrate on children using language such as: Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask advice from your health care provider.
 - (2) May write its own educational statement, but only in consultation with the Primacy Agency.
- (d) Every report must include the following lead-specific information:
 - (1) A short informational statement about lead in drinking water and its effects on children. The statement must include the following information:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home

plumbing. [NAME OF UTILITY] is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

- (2) A system may write its own educational statement, but only in consultation with the State.
- (e) Community water systems that detect TTHM above 0.080 mg/l, but below the MCL in §141.12, as an annual average, monitored and calculated under the provisions of §141.30, must include health effects language for TTHMs prescribed by appendix A.
- (f) Beginning in the report due by July 1, 2002, and ending January 22, 2006, a community water system that detects arsenic above 0.010 mg/L and up to and including 0.05 mg/L must include the arsenic health effects language prescribed by appendix A to subpart O of this part.

[63 FR 44526, Aug. 19, 1998, as amended at 63 FR 69475, Dec. 16, 1998; 64 FR 34733, June 29, 1999; 65 FR 26023, May 4, 2000; 66 FR 7064, Jan. 22, 2001; 68 FR 14506, Mar. 25, 2003; 72 FR 57820, Oct. 10, 2007]

§141.155 Report delivery and recordkeeping.

- (a) Except as provided in paragraph (g) of this section, each community water system must mail or otherwise directly deliver one copy of the report to each customer.
- (b) The system must make a good faith effort to reach consumers who do not get water bills, using means recommended by the primacy agency. EPA expects that an adequate good faith effort will be tailored to the consumers who are served by the system but are not bill-paying customers, such as renters or workers. A good faith effort to reach consumers would include a mix of methods appropriate to the particular system such as: Posting the reports on the Internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings or large private employers; delivery to community organizations.
- (c) No later than the date the system is required to distribute the report to its customers, each community water system must mail a copy of the report to the primacy agency, followed within 3 months by a certification that the report has been distributed to customers, and that the information is correct and consistent with the compliance monitoring data previously submitted to the primacy agency.
- (d) No later than the date the system is required to distribute the report to its customers, each community water system must deliver the report to any other agency or clearinghouse identified by the primacy agency.
- (e) Each community water system must make its reports available to the public upon request.
- (f) Each community water system serving 100,000 or more persons must post its current year's report to a publicly-accessible site on the Internet.
- (g) The Governor of a State or his designee, or the Tribal Leader where the tribe has met the eligibility requirements contained in §142.72 for the purposes of waiving the mailing requirement, can waive the requirement of paragraph (a) of this section for community water systems serving fewer than 10,000 persons. In consultation with the tribal government, the Regional Administrator may waive the requirement of §141.155(a) in areas in Indian country where no tribe has been deemed eligible.
 - (1) Such systems must:
 - (i) Publish the reports in one or more local newspapers serving the area in which the system is located;
 - (ii) Inform the customers that the reports will not be mailed, either in the newspapers in which the reports are published or by other means approved by the State; and
 - (iii) Make the reports available to the public upon request.
 - (2) Systems serving 500 or fewer persons may forego the requirements of paragraphs (g)(1)(i) and (ii) of this section if they provide notice at least once per year to their customers by mail, door-to-door delivery or by posting in an appropriate location that the report is available upon request.
- (h) Any system subject to this subpart must retain copies of its Consumer Confidence Report for no less than 3 years.

[63 FR 44526, Aug. 19, 1998, as amended at 65 FR 26023, May 4, 2000]

Appendix A to Subpart O of Part 141—Regulated Contaminants

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Microbiological contaminants:						
Total Coliform Bacteria †	MCL (systems that collect ≥40 samples/month) 5% of monthly samples are positive; (systems that collect <40 samples/month) 1 positive monthly sample		MCL (systems that collect ≥40 samples/month) 5% of monthly samples are positive; (systems that collect <40 samples/month) 1 positive monthly sample.	0	Naturally present in the environment	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
Total Coliform Bacteria ‡	TT		TT	N/A	Naturally present in the environment	Use language found in §141.153(h)(7)(i)(A)
coliform and <i>E. coli</i> †	0		0	0	Human and animal fecal waste	Fecal coliforms and <i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
<i>E. coli</i> ‡	Routine and repeat samples are total coliform-positive and either is <i>E. coli</i> -positive or system fails to take repeat samples following <i>E. coli</i> -positive routine sample or system fails to analyze total coliform-positive repeat sample		Routine and repeat samples are total coliform-positive and either is <i>E. coli</i> -positive or system fails to take repeat	0	Human and animal fecal waste	<i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may

	for <i>E. coli</i>		samples following <i>E. coli</i> -positive routine sample or system fails to analyze total coliform-positive repeat sample for <i>E. coli</i>			pose a greater health risk for infants, young children, the elderly, and people with severely-compromised immune systems.
Fecal Indicators (enterococci or coliphage)	TT		TT	N/A	Human and animal fecal waste	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
Total organic carbon (ppm)	TT		TT	N/A	Naturally present in the environment	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
Turbidity (NTU)	TT		TT	N/A	Soil runoff	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate

						the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
Radioactive contaminants:						
Beta/photon emitters (mrem/yr)	4 mrem/yr	–	4	0	Decay of natural and man-made deposits	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta particle and photon radioactivity in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha emitters (pCi/L)	15 pCi/L	–	15	0	Erosion of natural deposits	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined radium (pCi/L)	5 pCi/L	–	5	0	Erosion of natural deposits	Some people who drink water containing radium-226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium (pCi/L)	30 µg/L	–	30	0	Erosion of natural deposits	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
Inorganic contaminants:						
Antimony (ppb)	.006	1000	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics;	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood

					solder	cholesterol and decreases in blood sugar.
Arsenic (ppb)	¹ 0.010	1000	¹ 10.	¹ 0	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
Asbestos (MFL)	7 MFL		7	7	Decay of asbestos cement water mains; Erosion of natural deposits	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
Barium (ppm)	2		2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
Beryllium (ppb)	.004	1000	4	4	Discharge from metal refineries and coal-burning factories; Discharge from electrical, aerospace, and defense industries	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions
Bromate (ppb)	.010	1000	10	0	By-product of drinking water disinfection	Some people who drink water of containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
Cadmium (ppb)	.005	1000	5	5	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
Chloramines (ppm)	MRDL = 4		MRDL = 4	MRDLG = 4	Water additive used to control microbes	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their

						eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
Chlorine (ppm)	MRDL = 4		MRDL = 4	MRDLG = 4	Water additive used to control microbes	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
Chlorine dioxide (ppb)	MRDL = .8	1000	MRDL = 800	MRDLG = 800	Water additive used to control microbes	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.
Chlorite (ppm)	1		1	0.8	By-product of drinking water disinfection	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
Chromium (ppb)	.1	1000	100	100	Discharge from steel and pulp mills; Erosion of natural deposits	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
Copper (ppm)	AL = 1.3		AL = 1.3	1.3	Corrosion of household plumbing systems; Erosion of natural	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level

					deposits	over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor.
Cyanide (ppb)	.2	1000	200	200	Discharge from steel/metal factories; Discharge from plastic and fertilizer factories	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
Fluoride (ppm)	4		4	4	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
Lead (ppb)	AL = .015	1000	AL = 15	0	Corrosion of household plumbing systems; Erosion of natural deposits	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
Mercury [inorganic]	.002	1000	2	2	Erosion of natural deposits;	Some people who drink water containing

(ppb)					Dis charge from refineries and factories; Runoff from landfills; Runoff from cropland	inorganic mercury well in excess of the MCL over many years could experience kidney damage.
Nitrate (ppm)	10		10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Nitrite (ppm)	1		1	1	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Selenium (ppb)	.05	1000	50	50	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
Thallium (ppb)	.002	1000	2	0.5	Leaching from ore-processing sites; Discharge from electronics, glass, and drug factories	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
Synthetic organic contaminants including pesticides and herbicides:						
2,4-D (ppb)	.07	1000	70	70	Runoff from herbicide used on row crops	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could

						experience problems with their kidneys, liver, or adrenal glands.
2,4,5-TP [Silvex](ppb)	.05	1000	50	50	Residue of banned herbicide	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
Acrylamide	TT		TT	0	Added to water during sewage/wastewater treatment	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
Alachlor (ppb)	.002	1000	2	0	Runoff from herbicide used on row crops	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
Atrazine (ppb)	.003	1000	3	3	Runoff from herbicide used on row crops	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
Benzo(a)pyrene [PAH] (nanograms/l)	.0002	1,000,000	200	0	Leaching from linings of water storage tanks and distribution lines	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
Carbofuran (ppb)	.04	1000	40	40	Leaching of soil fumigant used on rice and alfalfa	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
Chlordane	.002	1000	2	0	Residue of	Some people who drink

(ppb)					banned termiticide	water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
Dalapon (ppb)	.2	1000	200	200	Runoff from herbicide used on rights of way	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
Di(2- ethylhexyl) adipate (ppb)	.4	1000	400	400	Discharge from chemical factories	Some people who drink water containing di(2- ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or possible reproductive difficulties.
Di(2- ethylhexyl) phthalate (ppb)	.006	1000	6	0	Discharge from rubber and chemical factories	Some people who drink water containing di(2- ethylhexyl) phthalate well in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
Dibromochlor opropane (ppt)	.0002	1,000,000	200	0	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer.
Dinoseb (ppb)	.007	1000	7	7	Runoff from herbicide used on soybeans and vegetables	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
Diquat (ppb)	.02	1000	20	20	Runoff from herbicide use	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
Dioxin	.00000003	1,000,000,000	30	0	Emissions from	Some people who drink

[2,3,7,8-TCDD] (ppq)					waste incineration and other combustion; Discharge from chemical factories	water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
Endothall (ppb)	.1	1000	100	100	Runoff from herbicide use	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
Endrin (ppb)	.002	1000	2	2	Residue of banned insecticide	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
Epichlorohydrin	TT		TT	0	Discharge from industrial chemical factories; An impurity of some water treatment chemicals	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.
Ethylene dibromide (ppt)	.00005	1,000,000	50	0	Discharge from petroleum refineries	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
Glyphosate (ppb)	.7	1000	700	700	Runoff from herbicide use	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
Heptachlor (ppt)	.0004	1,000,000	400	0	Residue of banned pesticide	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.

Heptachlor epoxide (ppt)	.0002	1,000,000	200	0	Breakdown of heptachlor	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
Hexachlorobenzene (ppb)	.001	1000	1	0	Discharge from metal refineries and agricultural chemical factories	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
Hexachlorocyclopentadiene (ppb)	.05	1000	50	50	Discharge from chemical factories	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
Lindane (ppt)	.0002	1,000,000	200	200	Runoff/leaching from insecticide used on cattle, lumber, gardens	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
Methoxychlor (ppb)	.04	1000	40	40	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
Oxamyl [Vydate] (ppb)	.2	1000	200	200	Runoff/leaching from insecticide used on apples, potatoes and tomatoes	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
PCBs [Polychlorinated biphenyls] (ppt)	.0005	1,000,000	500	0	Runoff from landfills; Discharge of waste chemicals	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or

						reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
Pentachlorophenol (ppb)	.001	1000	1	0	Discharge from wood preserving factories	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
Picloram (ppb)	.5	1000	500	500	Herbicide runoff	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
Simazine (ppb)	.004	1000	4	4	Herbicide runoff	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
Toxaphene (ppb)	.003	1000	3	0	Runoff/leaching from insecticide used on cotton and cattle	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
Volatile organic contaminants:						
Benzene (ppb)	.005	1000	5	0	Discharge from factories; Leaching from gas storage tanks and landfills	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
Carbon tetrachloride (ppb)	.005	1000	5	0	Discharge from chemical plants and other industrial activities	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting

						cancer.
Chlorobenzene (ppb)	.1	1000	100	100	Discharge from chemical and agricultural chemical factories	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
o-Dichlorobenzene (ppb)	.6	1000	600	600	Discharge from industrial chemical factories	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
p-Dichlorobenzene (ppb)	.075	1000	75	75	Discharge from industrial chemical factories	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
1,2-Dichloroethane (ppb)	.005	1000	5	0	Discharge from industrial chemical factories	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene (ppb)	.007	1000	7	7	Discharge from industrial chemical factories	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
cis-1,2-Dichloroethylene (ppb)	.07	1000	70	70	Discharge from industrial chemical factories	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
trans-1,2-Dichloroethylene (ppb)	.1	1000	100	100	Discharge from industrial chemical factories	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
Dichloromethane (ppb)	.005	1000	5	0	Discharge from	Some people who drink

ne (ppb)					pharmaceutical and chemical factories	water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
1,2-Dichloropropane (ppb)	.005	1000	5	0	Discharge from industrial chemical factories	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
Ethylbenzene (ppb)	.7	1000	700	700	Discharge from petroleum refineries	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
Haloacetic Acids (HAA) (ppb)	.060	1000	60	N/A	By-product 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.
Styrene (ppb)	.1	1000	100	100	Discharge from rubber and plastic factories; Leaching from landfills	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
Tetrachloroethylene (ppb)	.005	1000	5	0	Discharge from factories and dry cleaners	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
1,2,4-Trichlorobenzene (ppb)	.07	1000	70	70	Discharge from textile-finishing factories	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
1,1,1-Trichloroethane (ppb)	.2	1000	200	200	Discharge from metal degreasing sites and other	Some people who drink water containing 1,1,1-trichloroethane in excess

					factories	of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
1,1,2-Trichloroethane (ppb)	.005	1000	5	3	Discharge from industrial chemical factories	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
Trichloroethylene (ppb)	.005	1000	5	0	Discharge from metal degreasing sites and other factories	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
TTHMs [Total trihalomethanes] (ppb)	0.10/.080	1000	100/80	N/A	By-product 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 systems, and may have an increased risk of getting cancer.
Toluene (ppm)	1		1	1	Discharge from petroleum factories	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
Vinyl Chloride (ppb)	.002	1000	2	0	Leaching from PVC piping; Discharge from plastics factories	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Xylenes (ppm)	10		10	10	Discharge from petroleum factories; Discharge from chemical factories	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

†Until March 31, 2016.

‡Beginning April 1, 2016.

¹These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.

Key:

AL = Action Level

MCL = Maximum Contaminant Level

MCLG = Maximum Contaminant Level Goal

MFL = million fibers per liter

MRDL = Maximum Residual Disinfectant Level

MRDLG = Maximum Residual Disinfectant Level Goal

mrem/year = millirems per year (a measure of radiation absorbed by the body)

N/A = Not Applicable

NTU = Nephelometric Turbidity Units (a measure of water clarity)

pCi/l = picocuries per liter (a measure of radioactivity)

ppm = parts per million, or milligrams per liter (mg/l)

ppb = parts per billion, or micrograms per liter (µg/l)

ppt = parts per trillion, or nanograms per liter

ppq = parts per quadrillion, or picograms per liter

TT = Treatment Technique

[65 FR 26024, May 4, 2000, as amended at 65 FR 76749, Dec. 7, 2000; 66 FR 7064, Jan. 22, 2001; 67 FR 70855, Nov. 27, 2002; 67 FR 73011, Dec. 9, 2002; 68 FR 14506, Mar. 25, 2003; 71 FR 65652, Nov. 8, 2006; 78 FR 10349, Feb. 13, 2013]

Subpart P—Enhanced Filtration and Disinfection—Systems Serving 10,000 or More People

SOURCE: 63 FR 69516, Dec. 16, 1998, unless otherwise noted.

§141.170 General requirements.

- (a) The requirements of this subpart P constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under subpart H of this part. The requirements of this subpart are applicable to subpart H systems serving at least 10,000 people, beginning January 1, 2002 unless otherwise specified in this subpart. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium*, and turbidity. Each subpart H system serving at least 10,000 people must provide treatment of its source water that complies with these treatment technique requirements and are in addition to those identified in §141.70. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:
- (1) At least 99 percent (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems.
 - (2) Compliance with the profiling and benchmark requirements under the provisions of §141.172.
- (b) A public water system subject to the requirements of this subpart is considered to be in compliance with the requirements of paragraph (a) of this section if:
- (1) It meets the requirements for avoiding filtration in §§141.71 and 141.171 and the disinfection requirements in §§141.72 and 141.172; or
 - (2) It meets the applicable filtration requirements in either §141.73 or §141.173 and the disinfection requirements in §§141.72 and 141.172.
- (c) Systems are not permitted to begin construction of uncovered finished water storage facilities beginning February 16, 1999.

- (d) Subpart H systems that did not conduct optional monitoring under §141.172 because they served fewer than 10,000 persons when such monitoring was required, but serve more than 10,000 persons prior to January 1, 2005 must comply with §§141.170, 141.171, 141.173, 141.174, and 141.175. These systems must also consult with the State to establish a disinfection benchmark. A system that decides to make a significant change to its disinfection practice, as described in §141.172(c)(1)(i) through (iv) must consult with the State prior to making such change.

[63 FR 69516, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001; 67 FR 1836, Jan. 14, 2002; 69 FR 38856, June 29, 2004]

§141.171 Criteria for avoiding filtration.

In addition to the requirements of §141.71, a public water system subject to the requirements of this subpart that does not provide filtration must meet all of the conditions of paragraphs (a) and (b) of this section.

- (a) **Site-specific conditions.** In addition to site-specific conditions in §141.71(b), systems must maintain the watershed control program under §141.71(b)(2) to minimize the potential for contamination by *Cryptosporidium* oocysts in the source water. The watershed control program must, for *Cryptosporidium*:
 - (1) Identify watershed characteristics and activities which may have an adverse effect on source water quality; and
 - (2) Monitor the occurrence of activities which may have an adverse effect on source water quality.
- (b) During the onsite inspection conducted under the provisions of §141.71(b)(3), the State must determine whether the watershed control program established under §141.71(b)(2) is adequate to limit potential contamination by *Cryptosporidium* oocysts. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within the watershed.

§141.172 Disinfection profiling and benchmarking.

- (a) **Determination of systems required to profile.** A public water system subject to the requirements of this subpart must determine its TTHM annual average using the procedure in paragraph (a)(1) of this section and its HAA5 annual average using the procedure in paragraph (a)(2) of this section. The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring.
 - (1) The TTHM annual average must be the annual average during the same period as is used for the HAA5 annual average.
 - (i) Those systems that collected data under the provisions of subpart M (Information Collection Rule) must use the results of the samples collected during the last four quarters of required monitoring under §141.142.
 - (ii) Those systems that use “grandfathered” HAA5 occurrence data that meet the provisions of paragraph (a)(2)(ii) of this section must use TTHM data collected at the same time under the provisions of §§141.12 and 141.30.
 - (iii) Those systems that use HAA5 occurrence data that meet the provisions of paragraph (a)(2)(iii)(A) of this section must use TTHM data collected at the same time under the provisions of §§141.12 and 141.30.
 - (2) The HAA5 annual average must be the annual average during the same period as is used for the TTHM annual average.
 - (i) Those systems that collected data under the provisions of subpart M (Information Collection Rule) must use the results of the samples collected during the last four quarters of required monitoring under §141.142.
 - (ii) Those systems that have collected four quarters of HAA5 occurrence data that meets the routine monitoring sample number and location requirements for TTHM in §§141.12 and 141.30 and handling and analytical method requirements of §141.142(b)(1) may use those data to determine whether the requirements of this section apply.
 - (iii) Those systems that have not collected four quarters of HAA5 occurrence data that meets the provisions of either paragraph (a)(2)(i) or (ii) of this section by March 16, 1999 must either:

- (A) Conduct monitoring for HAA5 that meets the routine monitoring sample number and location requirements for TTHM in §§141.12 and 141.30 and handling and analytical method requirements of §141.142(b)(1) to determine the HAA5 annual average and whether the requirements of paragraph (b) of this section apply. This monitoring must be completed so that the applicability determination can be made no later than March 31, 2000, or
 - (B) Comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with paragraph (b) of this section.
- (3) The system may request that the State approve a more representative annual data set than the data set determined under paragraph (a)(1) or (2) of this section for the purpose of determining applicability of the requirements of this section.
 - (4) The State may require that a system use a more representative annual data set than the data set determined under paragraph (a)(1) or (2) of this section for the purpose of determining applicability of the requirements of this section.
 - (5) The system must submit data to the State on the schedule in paragraphs (a)(5)(i) through (v) of this section.
 - (i) Those systems that collected TTHM and HAA5 data under the provisions of subpart M (Information Collection Rule), as required by paragraphs (a)(1)(i) and (a)(2)(i) of this section, must submit the results of the samples collected during the last 12 months of required monitoring under §141.142 not later than December 31, 1999.
 - (ii) Those systems that have collected four consecutive quarters of HAA5 occurrence data that meets the routine monitoring sample number and location for TTHM in §§141.12 and 141.30 and handling and analytical method requirements of §141.142(b)(1), as allowed by paragraphs (a)(1)(ii) and (a)(2)(ii) of this section, must submit those data to the State not later than April 16, 1999. Until the State has approved the data, the system must conduct monitoring for HAA5 using the monitoring requirements specified under paragraph (a)(2)(iii) of this section.
 - (iii) Those systems that conduct monitoring for HAA5 using the monitoring requirements specified by paragraphs (a)(1)(iii) and (a)(2)(iii)(A) of this section, must submit TTHM and HAA5 data not later than March 31, 2000.
 - (iv) Those systems that elect to comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with this section, as allowed under paragraphs (a)(2)(iii)(B) of this section, must notify the State in writing of their election not later than December 31, 1999.
 - (v) If the system elects to request that the State approve a more representative annual data set than the data set determined under paragraph (a)(2)(i) of this section, the system must submit this request in writing not later than December 31, 1999.
 - (6) Any system having either a TTHM annual average ≥ 0.064 mg/L or an HAA5 annual average ≥ 0.048 mg/L during the period identified in paragraphs (a)(1) and (2) of this section must comply with paragraph (b) of this section.
- (b) ***Disinfection profiling.***
- (1) Any system that meets the criteria in paragraph (a)(6) of this section must develop a disinfection profile of its disinfection practice for a period of up to three years.
 - (2) The system must monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the CT99.9 values in Tables 1.1-1.6, 2.1, and 3.1 of §141.74(b), as appropriate, through the entire treatment plant. This system must begin this monitoring not later than April 1, 2000. As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring in paragraphs (b)(2)(i) through (iv) of this section. A system with more than one point of disinfectant application must conduct the monitoring in paragraphs (b)(2)(i) through (iv) of this section for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in §141.74(a), as follows:
 - (i) The temperature of the disinfected water must be measured once per day at each residual disinfectant concentration sampling point during peak hourly flow.

- (ii) If the system uses chlorine, the pH of the disinfected water must be measured once per day at each chlorine residual disinfectant concentration sampling point during peak hourly flow.
 - (iii) The disinfectant contact time(s) (“T”) must be determined for each day during peak hourly flow.
 - (iv) The residual disinfectant concentration(s) (“C”) of the water before or at the first customer and prior to each additional point of disinfection must be measured each day during peak hourly flow.
- (3) In lieu of the monitoring conducted under the provisions of paragraph (b)(2) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (b)(3)(i) of this section. In addition to the monitoring conducted under the provisions of paragraph (b)(2) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (b)(3)(ii) of this section.
- (i) A PWS that has three years of existing operational data may submit those data, a profile generated using those data, and a request that the State approve use of those data in lieu of monitoring under the provisions of paragraph (b)(2) of this section not later than March 31, 2000. The State must determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (b)(2) of this section. These data must also be representative of *Giardia lamblia* inactivation through the entire treatment plant and not just of certain treatment segments. Until the State approves this request, the system is required to conduct monitoring under the provisions of paragraph (b)(2) of this section.
 - (ii) In addition to the disinfection profile generated under paragraph (b)(2) of this section, a PWS that has existing operational data may use those data to develop a disinfection profile for additional years. Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of paragraph (c) of this section. The State must determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (b)(2) of this section. These data must also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.
- (4) The system must calculate the total inactivation ratio as follows:
- (i) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (b)(4)(i)(A) or (b)(4)(i)(B) of this section.
 - (A) Determine one inactivation ratio ($CT_{calc}/CT_{99.9}$) before or at the first customer during peak hourly flow.
 - (B) Determine successive $CT_{calc}/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the system must calculate the total inactivation ratio by determining ($CT_{calc}/CT_{99.9}$) for each sequence and then adding the ($CT_{calc}/CT_{99.9}$) values together to determine ($\Sigma (CT_{calc}/CT_{99.9})$).
 - (ii) If the system uses more than one point of disinfectant application before the first customer, the system must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CT_{calc}/CT_{99.9}$) value of each segment and ($\Sigma(CT_{calc}/CT_{99.9})$) must be calculated using the method in paragraph (b)(4)(i) of this section.
 - (iii) The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (b)(4)(i) or (ii) of this section by 3.0.
- (5) A system that uses either chloramines or ozone for primary disinfection must also calculate the logs of inactivation for viruses using a method approved by the State.
- (6) The system must retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the State for review as part of sanitary surveys conducted by the State.
- (c) **Disinfection benchmarking.**
- (1) Any system required to develop a disinfection profile under the provisions of paragraphs (a) and (b) of this section and that decides to make a significant change to its disinfection practice must consult with the State prior to making such change. Significant changes to disinfection practice are:
 - (i) Changes to the point of disinfection;

- (ii) Changes to the disinfectant(s) used in the treatment plant;
 - (iii) Changes to the disinfection process; and
 - (iv) Any other modification identified by the State.
- (2) Any system that is modifying its disinfection practice must calculate its disinfection benchmark using the procedure specified in paragraphs (c)(2)(i) through (ii) of this section.
- (i) For each year of profiling data collected and calculated under paragraph (b) of this section, the system must determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The system must determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* of inactivation by the number of values calculated for that month.
 - (ii) The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of the monthly logs of *Giardia lamblia* inactivation in each year of profiling data.
- (3) A system that uses either chloramines or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a method approved by the State.
- (4) The system must submit information in paragraphs (c)(4)(i) through (iii) of this section to the State as part of its consultation process.
- (i) A description of the proposed change;
 - (ii) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) under paragraph (b) of this section and benchmark as required by paragraph (c)(2) of this section; and
 - (iii) An analysis of how the proposed change will affect the current levels of disinfection.

[63 FR 69516, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001]

§141.173 Filtration.

A public water system subject to the requirements of this subpart that does not meet all of the criteria in this subpart and subpart H of this part for avoiding filtration must provide treatment consisting of both disinfection, as specified in §141.72(b), and filtration treatment which complies with the requirements of paragraph (a) or (b) of this section or §141.73 (b) or (c) by December 31, 2001.

- (a) **Conventional filtration treatment or direct filtration.**
- (1) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in §141.74(a) and (c).
 - (2) The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU, measured as specified in §141.74(a) and (c).
 - (3) A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the State.
- (b) **Filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration.** A public water system may use a filtration technology not listed in paragraph (a) of this section or in §141.73(b) or (c) if it demonstrates to the State, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of §141.72(b), consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts, and the State approves the use of the filtration technology. For each approval, the State will set turbidity performance requirements that the system must meet at least 95 percent of the time and that the system may not exceed at any time at a level that consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts.

[63 FR 69516, Dec. 16, 1998, as amended at 65 FR 20313, Apr. 14, 2000; 66 FR 3779, Jan. 16, 2001]

§141.174 Filtration sampling requirements.

- (a) Monitoring requirements for systems using filtration treatment. In addition to monitoring required by §141.74, a public water system subject to the requirements of this subpart that provides conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in §141.74(a) and must calibrate turbidimeters using the procedure specified by the manufacturer. Systems must record the results of individual filter monitoring every 15 minutes.
- (b) If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment.

§141.175 Reporting and recordkeeping requirements.

In addition to the reporting and recordkeeping requirements in §141.75, a public water system subject to the requirements of this subpart that provides conventional filtration treatment or direct filtration must report monthly to the State the information specified in paragraphs (a) and (b) of this section beginning January 1, 2002. In addition to the reporting and recordkeeping requirements in §141.75, a public water system subject to the requirements of this subpart that provides filtration approved under §141.173(b) must report monthly to the State the information specified in paragraph (a) of this section beginning January 1, 2002. The reporting in paragraph (a) of this section is in lieu of the reporting specified in §141.75(b)(1).

- (a) Turbidity measurements as required by §141.173 must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:
 - (1) The total number of filtered water turbidity measurements taken during the month.
 - (2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in §141.173(a) or (b).
 - (3) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the State under §141.173(b).
- (b) Systems must maintain the results of individual filter monitoring taken under §141.174 for at least three years. Systems must report that they have conducted individual filter turbidity monitoring under §141.174 within 10 days after the end of each month the system serves water to the public. Systems must report individual filter turbidity measurement results taken under §141.174 within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions in paragraphs (b)(1) through (4) of this section. Systems that use lime softening may apply to the State for alternative exceedance levels for the levels specified in paragraphs (b)(1) through (4) of this section if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.
 - (1) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.
 - (2) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.
 - (3) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of three consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification

and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

- (4) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of two consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must arrange for the conduct of a comprehensive performance evaluation by the State or a third party approved by the State no later than 30 days following the exceedance and have the evaluation completed and submitted to the State no later than 90 days following the exceedance.

(c) **Additional reporting requirements.**

- (1) If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system must inform the State as soon as possible, but no later than the end of the next business day.
- (2) If at any time the turbidity in representative samples of filtered water exceeds the maximum level set by the State under §141.173(b) for filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system must inform the State as soon as possible, but no later than the end of the next business day.

[63 FR 69516, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001]

Subpart Q—Public Notification of Drinking Water Violations

SOURCE: 65 FR 26035, May 4, 2000, unless otherwise noted.

§141.201 General public notification requirements.

Public water systems in States with primacy for the public water system supervision (PWSS) program must comply with the requirements in this subpart no later than May 6, 2002 or on the date the State-adopted rule becomes effective, whichever comes first. Public water systems in jurisdictions where EPA directly implements the PWSS program must comply with the requirements in this subpart on October 31, 2000. Prior to these dates, public water systems must continue to comply with the public notice requirements in §141.32 of this part. The term “primacy agency” is used in this subpart to refer to either EPA or the State or the Tribe in cases where EPA, the State, or the Tribe exercises primary enforcement responsibility for this subpart.

- (a) **Who must give public notice?** Each owner or operator of a public water system (community water systems, non-transient non-community water systems, and transient non-community water systems) must give notice for all violations of national primary drinking water regulations (NPDWR) and for other situations, as listed in Table 1. The term “NPDWR violations” is used in this subpart to include violations of the maximum contaminant level (MCL), maximum residual disinfection level (MRDL), treatment technique (TT), monitoring requirements, and testing procedures in this part 141. Appendix A to this subpart identifies the tier assignment for each specific violation or situation requiring a public notice.

Table 1 to §141.201—Violation Categories and Other Situations Requiring a Public Notice

(1) NPDWR violations:
(i) Failure to comply with an applicable maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL).
(ii) Failure to comply with a prescribed treatment technique (TT).
(iii) Failure to perform water quality monitoring, as required by the drinking water regulations.
(iv) Failure to comply with testing procedures as prescribed by a drinking water regulation.
(2) Variance and exemptions under sections 1415 and 1416 of SDWA:
(i) Operation under a variance or an exemption.

(ii) Failure to comply with the requirements of any schedule that has been set under a variance or exemption.
(3) Special public notices:
(i) Occurrence of a waterborne disease outbreak or other waterborne emergency.
(ii) Exceedance of the nitrate MCL by non-community water systems (NCWS), where granted permission by the primacy agency under 141.11(d) of this part.
(iii) Exceedance of the secondary maximum contaminant level (SMCL) for fluoride.
(iv) Availability of unregulated contaminant monitoring data.
(v) Other violations and situations determined by the primacy agency to require a public notice under this subpart, not already listed in Appendix A.

(b) **What type of public notice is required for each violation or situation?** Public notice requirements are divided into three tiers, to take into account the seriousness of the violation or situation and of any potential adverse health effects that may be involved. The public notice requirements for each violation or situation listed in Table 1 of this section are determined by the tier to which it is assigned. Table 2 of this section provides the definition of each tier. Appendix A of this part identifies the tier assignment for each specific violation or situation.

Table 2 to §141.201—Definition of Public Notice Tiers

(1) <i>Tier 1 public notice</i> —required for NPDWR violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure.
(2) <i>Tier 2 public notice</i> —required for all other NPDWR violations and situations with potential to have serious adverse effects on human health.
(3) <i>Tier 3 public notice</i> —required for all other NPDWR violations and situations not included in Tier 1 and Tier 2.

(c) **Who must be notified?**

- (1) Each public water system must provide public notice to persons served by the water system, in accordance with this subpart. Public water systems that sell or otherwise provide drinking water to other public water systems (*i.e.*, to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice to the persons it serves.
- (2) If a public water system has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system, the primacy agency may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission by the primacy agency for limiting distribution of the notice must be granted in writing.
- (3) A copy of the notice must also be sent to the primacy agency, in accordance with the requirements under §141.31(d).

§141.202 Tier 1 Public Notice—Form, manner, and frequency of notice.

(a) **Which violations or situations require a Tier 1 public notice?** Table 1 of this section lists the violation categories and other situations requiring a Tier 1 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

Table 1 to §141.202—Violation Categories and Other Situations Requiring a Tier 1 Public Notice

(1)
Violation of the MCL for total coliforms when fecal coliform or <i>E. coli</i> are present in the water distribution system (as specified in §141.63(b)), or when the water system fails to test for fecal coliforms or <i>E. coli</i> when any repeat sample tests

positive for coliform (as specified in §141.21(e)); Violation of the MCL for <i>E. coli</i> (as specified in §141.63(c));
(2) Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, as defined in §141.62, or when the water system fails to take a confirmation sample within 24 hours of the system's receipt of the first sample showing an exceedance of the nitrate or nitrite MCL, as specified in §141.23(f)(2);
(3) Exceedance of the nitrate MCL by non-community water systems, where permitted to exceed the MCL by the primacy agency under §141.11(d), as required under §141.209;
(4) Violation of the MRDL for chlorine dioxide, as defined in §141.65(a), when one or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system, as specified in §141.133(c)(2)(i);
(5) Violation of the turbidity MCL under §141.13(b), where the primacy agency determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
(6) Violation of the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR) or Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit (as identified in appendix A), where the primacy agency determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
(7) Occurrence of a waterborne disease outbreak, as defined in §141.2, or other waterborne emergency (such as a failure or significant interruption in key water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination);
(8) Detection of <i>E. coli</i> , enterococci, or coliphage in source water samples as specified in §141.402(a) and §141.402(b);
(9) Other violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the primacy agency either in its regulations or on a case-by-case basis.

- (b) ***When is the Tier 1 public notice to be provided?*** What additional steps are required? Public water systems must:
- (1) Provide a public notice as soon as practical but no later than 24 hours after the system learns of the violation;
 - (2) Initiate consultation with the primacy agency as soon as practical, but no later than 24 hours after the public water system learns of the violation or situation, to determine additional public notice requirements; and
 - (3) Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the primacy agency. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.
- (c) ***What is the form and manner of the public notice?*** Public water systems must provide the notice within 24 hours in a form and manner reasonably calculated to reach all persons served. The form and manner used by the public water system are to fit the specific situation, but must be designed to reach residential, transient, and non-transient users of the water system. In order to reach all persons served, water systems are to use, at a minimum, one or more of the following forms of delivery:
- (1) Appropriate broadcast media (such as radio and television);

- (2) Posting of the notice in conspicuous locations throughout the area served by the water system;
- (3) Hand delivery of the notice to persons served by the water system; or
- (4) Another delivery method approved in writing by the primacy agency.

[65 FR 26035, May 4, 2000, as amended at 67 FR 1836, Jan. 14, 2002; 71 FR 65652, Nov. 8, 2006; 78 FR 10350, Feb. 13, 2013]

§141.203 Tier 2 Public Notice—Form, manner, and frequency of notice.

- (a) *Which violations or situations require a Tier 2 public notice?* Table 1 of this section lists the violation categories and other situations requiring a Tier 2 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

Table 1 to §141.203—Violation Categories and Other Situations Requiring a Tier 2 Public Notice

(1)
All violations of the MCL, MRDL, and treatment technique requirements, except where a Tier 1 notice is required under §141.202(a) or where the primacy agency determines that a Tier 1 notice is required;
(2)
Violations of the monitoring and testing procedure requirements, where the primacy agency determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation; and
(3)
Failure to comply with the terms and conditions of any variance or exemption in place.
(4)
Failure to take corrective action or failure to maintain at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer under §141.403(a).

(b) *When is the Tier 2 public notice to be provided?*

- (1) Public water systems must provide the public notice as soon as practical, but no later than 30 days after the system learns of the violation. If the public notice is posted, the notice must remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved. The primacy agency may, in appropriate circumstances, allow additional time for the initial notice of up to three months from the date the system learns of the violation. It is not appropriate for the primacy agency to grant an extension to the 30-day deadline for any unresolved violation or to allow across-the-board extensions by rule or policy for other violations or situations requiring a Tier 2 public notice. Extensions granted by the primacy agency must be in writing.
- (2) The public water system must repeat the notice every three months as long as the violation or situation persists, unless the primacy agency determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstance may the repeat notice be given less frequently than once per year. It is not appropriate for the primacy agency to allow less frequent repeat notice for an MCL or treatment technique violation under the Total Coliform Rule or subpart Y of this part or a treatment technique violation under the Surface Water Treatment Rule or Interim Enhanced Surface Water Treatment Rule. It is also not appropriate for the primacy agency to allow through its rules or policies across-the-board reductions in the repeat notice frequency for other ongoing violations requiring a Tier 2 repeat notice. Primacy agency determinations allowing repeat notices to be given less frequently than once every three months must be in writing.
- (3) For the turbidity violations specified in this paragraph, public water systems must consult with the primacy agency as soon as practical but no later than 24 hours after the public water system learns of the violation, to determine whether a Tier 1 public notice under §141.202(a) is required to protect public health. When consultation does not take place within the 24-hour period, the water system must distribute a Tier 1 notice of the violation within the next 24 hours (*i.e.*, no later than 48 hours after the

system learns of the violation), following the requirements under §141.202(b) and (c). Consultation with the primacy agency is required for:

- (i) Violation of the turbidity MCL under §141.13(b); or
- (ii) Violation of the SWTR, IESWTR or LT1ESWTR treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit.

(c) **What is the form and manner of the Tier 2 public notice?** Public water systems must provide the initial public notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

- (1) Unless directed otherwise by the primacy agency in writing, community water systems must provide notice by:
 - (i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and
 - (ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (c)(1)(i) of this section. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places served by the system or on the Internet; or delivery to community organizations.
- (2) Unless directed otherwise by the primacy agency in writing, non-community water systems must provide notice by:
 - (i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and
 - (ii) Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in paragraph (c)(2)(i) of this section. Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

[65 FR 26035, May 4, 2000, as amended at 67 FR 1836, Jan. 14, 2002; 71 FR 65652, Nov. 8, 2006; 78 FR 10350, Feb. 13, 2013]

§141.204 Tier 3 Public Notice—Form, manner, and frequency of notice.

(a) **Which violations or situations require a Tier 3 public notice?** Table 1 of this section lists the violation categories and other situations requiring a Tier 3 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

Table 1 to §141.204—Violation Categories and Other Situations Requiring a Tier 3 Public Notice

(1)
Monitoring violations under 40 CFR part 141, except where a Tier 1 notice is required under §141.202(a) or where the primacy agency determines that a Tier 2 notice is required;
(2)
Failure to comply with a testing procedure established in 40 CFR part 141, except where a Tier 1 notice is required under §141.202(a) or where the primacy agency determines that a Tier 2 notice is required;
(3)
Operation under a variance granted under Section 1415 or an exemption granted under Section 1416 of the Safe Drinking

Water Act;
(4) Availability of unregulated contaminant monitoring results, as required under §141.207;
(5) Exceedance of the fluoride secondary maximum contaminant level (SMCL), as required under §141.208; and
(6) Reporting and Recordkeeping violations under subpart Y of 40 CFR part 141.

- (b) ***When is the Tier 3 public notice to be provided?***
- (1) Public water systems must provide the public notice not later than one year after the public water system learns of the violation or situation or begins operating under a variance or exemption. Following the initial notice, the public water system must repeat the notice annually for as long as the violation, variance, exemption, or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, exemption, or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).
 - (2) Instead of individual Tier 3 public notices, a public water system may use an annual report detailing all violations and situations that occurred during the previous twelve months, as long as the timing requirements of paragraph (b)(1) of this section are met.
- (c) ***What is the form and manner of the Tier 3 public notice?*** Public water systems must provide the initial notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:
- (1) Unless directed otherwise by the primacy agency in writing, community water systems must provide notice by:
 - (i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and
 - (ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (c)(1)(i) of this section. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places or on the Internet; or delivery to community organizations.
 - (2) Unless directed otherwise by the primacy agency in writing, non-community water systems must provide notice by:
 - (i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and
 - (ii) Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in paragraph (c)(2)(i) of this section. Such persons may include those who may not see a posted notice because the notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).
- (d) ***In what situations may the Consumer Confidence Report be used to meet the Tier 3 public notice requirements?*** For community water systems, the Consumer Confidence Report (CCR) required under Subpart O of this part may be used as a vehicle for the initial Tier 3 public notice and all required repeat notices, as long as:
- (1) The CCR is provided to persons served no later than 12 months after the system learns of the violation or situation as required under §141.204(b);
 - (2) The Tier 3 notice contained in the CCR follows the content requirements under §141.205; and

- (3) The CCR is distributed following the delivery requirements under §141.204(c).

[65 FR 26035, May 4, 2000; 65 FR 38629, June 21, 2000, as amended at 78 FR 10350, Feb. 13, 2013]

§141.205 Content of the public notice.

- (a) ***What elements must be included in the public notice for violations of National Primary Drinking Water Regulations (NPDWR) or other situations requiring a public notice?*** When a public water system violates a NPDWR or has a situation requiring public notification, each public notice must include the following elements:
- (1) A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);
 - (2) When the violation or situation occurred;
 - (3) Any potential adverse health effects from the violation or situation, including the standard language under paragraph (d)(1) or (d)(2) of this section, whichever is applicable;
 - (4) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;
 - (5) Whether alternative water supplies should be used;
 - (6) What actions consumers should take, including when they should seek medical help, if known
 - (7) What the system is doing to correct the violation or situation;
 - (8) When the water system expects to return to compliance or resolve the situation;
 - (9) The name, business address, and phone number of the water system owner, operator, or designee of the public water system as a source of additional information concerning the notice; and
 - (10) A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under paragraph (d)(3) of this section, where applicable.
- (b) ***What elements must be included in the public notice for public water systems operating under a variance or exemption?***
- (1) If a public water system has been granted a variance or an exemption, the public notice must contain:
 - (i) An explanation of the reasons for the variance or exemption;
 - (ii) The date on which the variance or exemption was issued;
 - (iii) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and
 - (iv) A notice of any opportunity for public input in the review of the variance or exemption.
 - (2) If a public water system violates the conditions of a variance or exemption, the public notice must contain the ten elements listed in paragraph (a) of this section.
- (c) ***How is the public notice to be presented?***
- (1) Each public notice required by this section:
 - (i) Must be displayed in a conspicuous way when printed or posted;
 - (ii) Must not contain overly technical language or very small print;
 - (iii) Must not be formatted in a way that defeats the purpose of the notice;
 - (iv) Must not contain language which nullifies the purpose of the notice.
 - (2) Each public notice required by this section must comply with multilingual requirements, as follows:
 - (i) For public water systems serving a large proportion of non-English speaking consumers, as determined by the primacy agency, the public notice must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the notice or to request assistance in the appropriate language.
 - (ii) In cases where the primacy agency has not determined what constitutes a large proportion of non-English speaking consumers, the public water system must include in the public notice the same information as in paragraph (c)(2)(i) of this section, where appropriate to reach a large proportion of non-English speaking persons served by the water system.
- (d) ***What standard language must public water systems include in their public notice?*** Public water systems are required to include the following standard language in their public notice:

- (1) Standard health effects language for MCL or MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption. Public water systems must include in each public notice the health effects language specified in appendix B to this subpart corresponding to each MCL, MRDL, and treatment technique violation listed in appendix A to this subpart, and for each violation of a condition of a variance or exemption.
- (2) Standard language for monitoring and testing procedure violations. Public water systems must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in appendix A to this subpart:
We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During [compliance period], we “did not monitor or test” or “did not complete all monitoring or testing” for [contaminant(s)], and therefore cannot be sure of the quality of your drinking water during that time.
- (3) Standard language to encourage the distribution of the public notice to all persons served. Public water systems must include in their notice the following language (where applicable):
Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

§141.206 Notice to new billing units or new customers.

- (a) ***What is the requirement for community water systems?*** Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.
- (b) ***What is the requirement for non-community water systems?*** Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

§141.207 Special notice of the availability of unregulated contaminant monitoring results.

- (a) ***What is the requirement for community water systems?*** Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.
- (b) ***What is the requirement for non-community water systems?*** Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

§141.208 Special notice for exceedance of the SMCL for fluoride.

- (a) ***When is the special notice to be given?*** Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of 2 mg/l as specified in §143.3 (determined by the last single sample taken in accordance with §141.23), but do not exceed the maximum contaminant level (MCL) of 4 mg/l for fluoride (as specified in §141.62), must provide the public notice in paragraph (c) of this section to persons served. Public notice must be provided as soon as practical but no later than 12 months from the day the water system learns of the exceedance. A copy of the notice must also be sent to all new billing units and new customers at the time service begins and to the State public health officer. The public water system must repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice must remain in place for as long as the SMCL is exceeded, but in no case less than seven days (even if the exceedance is eliminated). On a case-by-case basis, the primacy agency may require an initial notice sooner than 12 months and repeat notices more frequently than annually.

- (b) ***What is the form and manner of the special notice?*** The form and manner of the public notice (including repeat notices) must follow the requirements for a Tier 3 public notice in §141.204(c) and (d)(1) and (d)(3).
- (c) ***What mandatory language must be contained in the special notice?*** The notice must contain the following language, including the language necessary to fill in the blanks:
This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/l) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your community water system [name] has a fluoride concentration of [insert value] mg/l.
Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water.
Drinking water containing more than 4 mg/L of fluoride (the U.S. Environmental Protection Agency's drinking water standard) can increase your risk of developing bone disease. Your drinking water does not contain more than 4 mg/l of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed 2 mg/l because of this cosmetic dental problem.
For more information, please call [name of water system contact] of [name of community water system] at [phone number]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call NSF International at 1-877-8-NSF-HELP.”

§141.209 Special notice for nitrate exceedances above MCL by non-community water systems (NCWS), where granted permission by the primacy agency under §141.11(d).

- (a) ***When is the special notice to be given?*** The owner or operator of a non-community water system granted permission by the primacy agency under §141.11(d) to exceed the nitrate MCL must provide notice to persons served according to the requirements for a Tier 1 notice under §141.202(a) and (b).
- (b) ***What is the form and manner of the special notice?*** Non-community water systems granted permission by the primacy agency to exceed the nitrate MCL under §141.11(d) must provide continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure, according to the requirements for Tier 1 notice delivery under §141.202(c) and the content requirements under §141.205.

§141.210 Notice by primacy agency on behalf of the public water system.

- (a) ***May the primacy agency give the notice on behalf of the public water system?*** The primacy agency may give the notice required by this subpart on behalf of the owner and operator of the public water system if the primacy agency complies with the requirements of this subpart.
- (b) ***What is the responsibility of the public water system when notice is given by the primacy agency?*** The owner or operator of the public water system remains responsible for ensuring that the requirements of this subpart are met.

§141.211 Special notice for repeated failure to conduct monitoring of the source water for *Cryptosporidium* and for failure to determine bin classification or mean *Cryptosporidium* level.

- (a) ***When is the special notice for repeated failure to monitor to be given?*** The owner or operator of a community or non-community water system that is required to monitor source water under §141.701 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 any 3 months of monitoring as specified in §141.701(c). The notice must be repeated as specified in §141.203(b).
- (b) ***When is the special notice for failure to determine bin classification or mean *Cryptosporidium* level to be given?*** The owner or operator of a community or non-community water system that is required to determine a bin classification under §141.710, or to determine mean *Cryptosporidium* level under §141.712, 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 report the determination as specified in §141.710(e) or §141.712(a), respectively. The notice must be repeated as specified in §141.203(b). The notice is not required if the system is complying with a State-approved schedule to address the violation.

- (c) **What is the form and manner of the special notice?** The form and manner of the public notice must follow the requirements for a Tier 2 public notice prescribed in §141.203(c). The public notice must be presented as required in §141.205(c).
- (d) **What mandatory language must be contained in the special notice?** The notice must contain the following language, including the language necessary to fill in the blanks.
 - (1) The special notice for repeated failure to conduct monitoring must contain the following language: *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 deadline required, (date). For more information, please call (name of water system contact) of (name of water system) at (phone number).*
 - (2) The special notice for failure to determine bin classification or mean *Cryptosporidium* level must contain the following language: *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 (phone number).*
 - (3) 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.

[71 FR 768, Jan. 5, 2006]

Appendix A to Subpart Q of Part 141—NPDWR Violations and Other Situations Requiring Public Notice¹

Contaminant	MCL/MRDL/TT violations ²		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
I.				
Violations of National Primary Drinking Water Regulations (NPDWR):³				
A.				
Microbiological Contaminants				
1.a Total coliform bacteria†	2	141.63(a)	3	141.21(a)-(e).
1.b Total coliform (TT violations resulting from failure to perform assessments or corrective actions, monitoring violations, and reporting	2	141.860(b)(1)	3	141.860(c)(1).
				141.860(d)(1).

violations)‡				
1.c Seasonal system failure to follow State-approved start-up plan prior to serving water to the public or failure to provide certification to State‡	2	141.860(b)(2)	3	141.860(d)(3).
2.a Fecal coliform/ <i>E. coli</i> †	1	141.63(b)	⁴ 1,3	141.21(e)
2.b <i>E. coli</i> (MCL, monitoring, and reporting violations)‡	1	141.860 (a)	3	141.860(c)(2)
				141.860(d)(1).
				141.860(d)(2).
2.c <i>E. coli</i> (TT violations resulting from failure to perform level 2 Assessments or corrective action)‡	2	141.860(b)(1)		
3. Turbidity MCL	2	141.13(a)	3	141.22
4. Turbidity MCL (average of 2 days' samples >5 NTU)	⁵ 2, 1	141.13(b)	3	141.22
5. Turbidity (for TT violations resulting from a single exceedance of maximum allowable turbidity level)	⁶ 2, 1	141.71(a)(2), 141.71(c)(2)(i), 141.73(a)(2), 141.73 (b)(2), 141.73 (c)(2), 141.73(d), 141.173(a)(2), 141.173(b), 141.551(b)	3	141.74(a)(1), 141.74(b)(2), 141.74(c)(1), 141.174, 141.560(a)- (c), 141.561.
6. Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. allowable turbidity level (TT)	2	141.70-141.73	3	141.74
7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. turbidity level (TT)	⁷ 2	141.170-141.173, 141.500-141.553	3	141.172, 141.174, 141.530-141.544, 141.560-141.564.
8. Filter Backwash Recycling Rule violations	2	141.76(c)	3	141.76(b), (d)
9. Long Term 1 Enhanced Surface Water Treatment Rule violations	2	141.500-141.553	3	141.530-141.544, 141.560-141.564.
10. LT2ESWTR violations	2	141.710-141.720	²² 2, 3	141.701-141.705 and 141.708- 141.709.

11. Ground Water Rule violations	2	141.404	3	141.402(h), 141.403(d).
B. Inorganic Chemicals (IOCs)				
1. Antimony	2	141.62(b)	3	141.23(a), (c)
2. Arsenic	2	⁸ 141.62(b)	3	¹¹ 141.23(a), (c)
3. Asbestos (fibers >10 µm)	2	141.62(b)	3	141.23(a)-(b)
4. Barium	2	141.62(b)	3	141.23(a), (c)
5. Beryllium	2	141.62(b)	3	141.23(a), (c)
6. Cadmium	2	141.62(b)	3	141.23(a), (c)
7. Chromium (total)	2	141.62(b)	3	141.23(a), (c)
8. Cyanide	2	141.62(b)	3	141.23(a), (c)
9. Fluoride	2	141.62(b)	3	141.23(a), (c)
10. Mercury (inorganic)	2	141.62(b)	3	141.23(a), (c)
11. Nitrate	1	141.62(b)	¹² 1, 3	141.23(a), (d), 141.23(f)(2)
12. Nitrite	1	141.62(b)	¹² 1, 3	141.23(a), (e), 141.23(f)(2)
13. Total Nitrate and Nitrite	1	141.62(b)	3	141.23(a)
14. Selenium	2	141.62(b)	3	141.23(a), (c)
15. Thallium	2	141.62(b)	3	141.23(a), (c)
C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L)				
1. Lead and Copper Rule (TT)	2	141.80-141.85	3	141.86-141.89
D. Synthetic Organic Chemicals (SOCs)				
1.	2	141.61(c)	3	141.24(h)

2,4-D				
2. 2,4,5-TP (Silvex)	2	141.61(c)	3	141.24(h)
3. Alachlor	2	141.61(c)	3	141.24(h)
4. Atrazine	2	141.61(c)	3	141.24(h)
5. Benzo(a)pyrene (PAHs)	2	141.61(c)	3	141.24(h)
6. Carbofuran	2	141.61(c)	3	141.24(h)
7. Chlordane	2	141.61(c)	3	141.24(h)
8. Dalapon	2	141.61(c)	3	141.24(h)
9. Di (2-ethylhexyl) adipate	2	141.61(c)	3	141.24(h)
10. Di (2-ethylhexyl) phthalate	2	141.61(c)	3	141.24(h)
11. Dibromochloropropane	2	141.61(c)	3	141.24(h)
12. Dinoseb	2	141.61(c)	3	141.24(h)
13. Dioxin (2,3,7,8-TCDD)	2	141.61(c)	3	141.24(h)
14. Diquat	2	141.61(c)	3	141.24(h)
15. Endothall	2	141.61(c)	3	141.24(h)
16. Endrin	2	141.61(c)	3	141.24(h)
17. Ethylene dibromide	2	141.61(c)	3	141.24(h)
18. Glyphosate	2	141.61(c)	3	141.24(h)
19. Heptachlor	2	141.61(c)	3	141.24(h)
20. Heptachlor epoxide	2	141.61(c)	3	141.24(h)
21. Hexachlorobenzene	2	141.61(c)	3	141.24(h)
22.	2	141.61(c)	3	141.24(h)

Hexachlorocyclo-pentadiene				
23. Lindane	2	141.61(c)	3	141.24(h)
24. Methoxychlor	2	141.61(c)	3	141.24(h)
25. Oxamyl (Vydate)	2	141.61(c)	3	141.24(h)
26. Pentachlorophenol	2	141.61(c)	3	141.24(h)
27. Picloram	2	141.61(c)	3	141.24(h)
28. Polychlorinated biphenyls (PCBs)	2	141.61(c)	3	141.24(h)
29. Simazine	2	141.61(c)	3	141.24(h)
30. Toxaphene	2	141.61(c)	3	141.24(h)
E. Volatile Organic Chemicals (VOCs)				
1. Benzene	2	141.61(a)	3	141.24(f)
2. Carbon tetrachloride	2	141.61(a)	3	141.24(f)
3. Chlorobenzene (monochlorobenzene)	2	141.61(a)	3	141.24(f)
4. o-Dichlorobenzene	2	141.61(a)	3	141.24(f)
5. p-Dichlorobenzene	2	141.61(a)	3	141.24(f)
6. 1,2-Dichloroethane	2	141.61(a)	3	141.24(f)
7. 1,1-Dichloroethylene	2	141.61(a)	3	141.24(f)
8. cis-1,2-Dichloroethylene	2	141.61(a)	3	141.24(f)
9. trans-1,2-Dichloroethylene	2	141.61(a)	3	141.24(f)
10. Dichloromethane	2	141.61(a)	3	141.24(f)

11. 1,2-Dichloropropane	2	141.61(a)	3	141.24(f)
12. Ethylbenzene	2	141.61(a)	3	141.24(f)
13. Styrene	2	141.61(a)	3	141.24(f)
14. Tetrachloroethylene	2	141.61(a)	3	141.24(f)
15. Toluene	2	141.61(a)	3	141.24(f)
16. 1,2,4-Trichlorobenzene	2	141.61(a)	3	141.24(f)
17. 1,1,1-Trichloroethane	2	141.61(a)	3	141.24(f)
18. 1,1,2-Trichloroethane	2	141.61(a)	3	141.24(f)
19. Trichloroethylene	2	141.61(a)	3	141.24(f)
20. Vinyl chloride	2	141.61(a)	3	141.24(f)
21. Xylenes (total)	2	141.61(a)	3	141.24(f)
F. Radioactive Contaminants				
1. Beta/photon emitters	2	141.66(d)	3	141.25(a) 141.26(b)
2. Alpha emitters	2	141.66(c)	3	141.25(a) 141.26(a)
3. Combined radium (226 and 228)	2	141.66(b)	3	141.25(a) 141.26(a)
4. Uranium	²³⁸ 2	141.66(e)	²³⁵ 3	141.25(a) 141.26(a)
G. Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs).¹³				
1. Total trihalomethanes (TTHMs)	2	¹⁴ 141.64(b)	3	141.132(a)-(b), 141.600-141.605, 141.620-141.629
2. Haloacetic Acids (HAA5)	2	141.64(b)	3	141.132(a)-(b), 141.600-141.605, 141.620-141.629

3. Bromate	2	141.64(a)	3	141.132(a)-(b)
4. Chlorite	2	141.64(a)	3	141.132(a)-(b)
5. Chlorine (MRDL)	2	141.65(a)	3	141.132(a), (c)
6. Chloramine (MRDL)	2	141.65(a)	3	141.132(a), (c)
7. Chlorine dioxide (MRDL), where any 2 consecutive daily samples at entrance to distribution system only are above MRDL	2	141.65(a), 141.133(c)(3)	2 ¹⁵ , 3	141.132(a), (c), 141.133(c)(2)
8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL	¹⁶ 1	141.65(a), 141.133(c)(3)	1	141.132(a), (c), 141.133(c)(2)
9. Control of DBP precursors—TOC (TT)	2	141.135(a)-(b)	3	141.132(a), (d)
10. Bench marking and disinfection profiling	N/A	N/A	3	141.172 141.530-141.544.
11. Development of monitoring plan	N/A	N/A	3	141.132(f)
H. Other Treatment Techniques				
1. Acrylamide (TT)	2	141.111	N/A	N/A
2. Epichlorohydrin (TT)	2	141.111	N/A	N/A
II. Unregulated Contaminant Monitoring:¹⁷				
A. Unregulated contaminants	N/A	N/A	3	141.40
B. Nickel	N/A	N/A	3	141.23(c), (k)
III. Public Notification for Variances and Exemptions:				
A. Operation under a variance or exemption	3	¹⁸ 1415, 1416,	N/A	N/A
B. Violation of conditions of a variance or exemption	2	1415, 1416, ¹⁹ 142.307	N/A	N/A

IV. Other Situations Requiring Public Notification:				
A. Fluoride secondary maximum contaminant level (SMCL) exceedance	3	143.3	N/A	N/A
B. Exceedance of nitrate MCL for non-community systems, as allowed by primacy agency	1	141.11(d)	N/A	N/A
C. Availability of unregulated contaminant monitoring data	3	141.40	N/A	N/A
D. Waterborne disease outbreak	1	141.2, 141.71(c)(2)(ii)	N/A	N/A
E. Other waterborne emergency ²⁰	1	N/A	N/A	N/A
F. Source Water Sample Positive for GWR Fecal indicators: E. coli, enterococci, or coliphage	1	141.402(g)	N/A	N/A
G. Other situations as determined by primacy agency	²¹ 1, 2, 3	N/A	N/A	N/A

Appendix A—Endnotes

† Until March 31, 2016.

‡ Beginning April 1, 2016.

- (1) Violations and other situations not listed in this table (e.g., failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the primacy agency. Primacy agencies may, at their option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under §141.202(a) and §141.203(a).
- (2) MCL—Maximum contaminant level, MRDL—Maximum residual disinfectant level, TT—Treatment technique
- (3) The term Violations of National Primary Drinking Water Regulations (NPDWR) is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.
- (4) Failure to test for fecal coliform or E. coli is a Tier 1 violation if testing is not done after any repeat sample tests positive for coliform. All other total coliform monitoring and testing procedure violations are Tier 3.
- (5) Systems that violate the turbidity MCL of 5 NTU based on an average of measurements over two consecutive days must consult with the primacy agency within 24 hours after learning of the violation. Based on this consultation, the primacy agency may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the primacy agency in the 24-hour period, the violation is automatically elevated to Tier 1.
- (6) Systems with treatment technique violations involving a single exceedance of a maximum turbidity limit under the Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR), or the Long Term 1 Enhanced Surface Water Treatment Rule

- (LT1ESWTR) are required to consult with the primacy agency within 24 hours after learning of the violation. Based on this consultation, the primacy agency may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the primacy agency in the 24-hour period, the violation is automatically elevated to Tier 1.
- (7) Most of the requirements of the Interim Enhanced Surface Water Treatment Rule (63 *FR* 69477) (§§141.170-141.171, 141.173-141.174) become effective January 1, 2002 for Subpart H systems (surface water systems and ground water systems under the direct influence of surface water) serving at least 10,000 persons. However, §141.172 has some requirements that become effective as early as April 16, 1999. The Surface Water Treatment Rule remains in effect for systems serving at least 10,000 persons even after 2002; the Interim Enhanced Surface Water Treatment Rule adds additional requirements and does not in many cases supersede the SWTR.
 - (8) The arsenic MCL citations are effective January 23, 2006. Until then, the citations are §141.11(b) and §141.23(n).
 - (9) The uranium MCL Tier 2 violation citations are effective December 8, 2003 for all community water systems.
 - (10) The uranium Tier 3 violation citations are effective December 8, 2000 for all community water systems.
 - (11) The arsenic Tier 3 violation MCL citations are effective January 23, 2006. Until then, the citations are §141.23(a), (l).
 - (12) Failure to take a confirmation sample within 24 hours for nitrate or nitrite after an initial sample exceeds the MCL is a Tier 1 violation. Other monitoring violations for nitrate are Tier 3.
 - (13) Subpart H community and non-transient non-community systems serving $\geq 10,000$ must comply with new DBP MCLs, disinfectant MRDLs, and related monitoring requirements beginning January 1, 2002. All other community and non-transient non-community systems must meet the MCLs and MRDLs beginning January 1, 2004. Subpart H transient non-community systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H transient non-community systems serving fewer than 10,000 persons and using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.
 - (14) §§141.64(b)(1) 141.132(a)-(b) apply until §§141.620-141.630 take effect under the schedule in §141.620(c).
 - (15) Failure to monitor for chlorine dioxide at the entrance to the distribution system the day after exceeding the MRDL at the entrance to the distribution system is a Tier 2 violation.
 - (16) If any daily sample taken at the entrance to the distribution system exceeds the MRDL for chlorine dioxide and one or more samples taken in the distribution system the next day exceed the MRDL, Tier 1 notification is required. Failure to take the required samples in the distribution system after the MRDL is exceeded at the entry point also triggers Tier 1 notification.
 - (17) Some water systems must monitor for certain unregulated contaminants listed in §141.40.
 - (18) This citation refers to §§1415 and 1416 of the Safe Drinking Water Act. §§1415 and 1416 require that “a schedule prescribed. . . for a public water system granted a variance [or exemption] shall require compliance by the system. . .”
 - (19) In addition to §§1415 and 1416 of the Safe Drinking Water Act, 40 CFR 142.307 specifies the items and schedule milestones that must be included in a variance for small systems.
 - (20) Other waterborne emergencies require a Tier 1 public notice under §141.202(a) for situations that do not meet the definition of a waterborne disease outbreak given in 40 CFR 141.2 but that still have the potential to have serious adverse effects on health as a result of short-term exposure. These could include outbreaks not related to treatment deficiencies, as well as situations that have the potential to cause outbreaks, such as failures or significant interruption in water treatment processes, natural disasters that disrupt the water supply or distribution system, chemical spills, or unexpected loading of possible pathogens into the source water.
 - (21) Primacy agencies may place other situations in any tier they believe appropriate, based on threat to public health.

- (22) Failure to collect three or more samples for *Cryptosporidium* analysis is a Tier 2 violation requiring special notice as specified in §141.211. All other monitoring and testing procedure violations are Tier 3.

[65 FR 26035, May 4, 2000, as amended at 65 FR 76750, Dec. 7, 2000; 66 FR 7065, Jan. 22, 2001; 66 FR 31104, June 8, 2001; 67 FR 1836, Jan. 14, 2002; 69 FR 38856, June 29, 2004; 71 FR 483, Jan. 4, 2006; 71 FR 768, Jan. 5, 2006; 71 FR 65652, Nov. 8, 2006; 78 FR 10350, Feb. 13, 2013; 79 FR 10669, Feb. 26, 2014]

Appendix B to Subpart Q of Part 141—Standard Health Effects Language for Public Notification

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR)			
A. Microbiological Contaminants			
1a. Total coliform †	Zero	See footnote ³	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/ <i>E. coli</i> †	Zero	Zero	Fecal coliforms and <i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1c. Fecal indicators (GWR): i. <i>E. coli</i> ii. enterococci iii. coliphage	Zero None None	TT TT TT	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1d. Ground Water Rule (GWR) TT violations	None	TT	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.
1e. Subpart Y Coliform Assessment and/or Corrective Action Violations ‡	N/A	TT	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.] We failed to conduct the required assessment. We failed to correct all identified sanitary defects that were

			found during the assessment(s).
1f. Subpart Y <i>E.coli</i> Assessment and/or Corrective Action Violations ‡	N/A	TT	<i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We violated the standard for <i>E. coli</i> , indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct a detailed assessment to identify problems and to correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.] We failed to conduct the required assessment. We failed to correct all identified sanitary defects that were found during the assessment that we conducted.
1g. <i>E. coli</i> ‡	Zero	In compliance unless one of the following conditions occurs: (1) The system has an <i>E. coli</i> -positive repeat sample following a total coliform-positive routine sample. (2) The system has a total coliform-positive repeat sample following an <i>E. coli</i> -positive routine sample. (3) The system fails to take all required repeat samples following an <i>E. coli</i> -positive routine sample. (4) The system fails to test for <i>E. coli</i> when any repeat sample tests positive for total coliform.	<i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems.
1h . Subpart Y Seasonal System TT Violations ‡	N/A	TT	When this violation includes the failure to monitor for total coliforms or <i>E. coli</i> prior to serving water to the public, the mandatory language found at 141.205(d)(2) must be used. When this violation includes failure to complete other actions, the appropriate elements found in 141.205(a) to describe the violation must be used.
2a. Turbidity (MCL) ⁴	None	1 NTU ⁵ /5 NTU	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for

			microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2b. Turbidity (SWTR TT) ⁶	None	TT ⁷	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2c. Turbidity (IESWTR TT and LT1ESWTR TT) ⁸	None	TT	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

B. Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and the Filter Backwash Recycling Rule (FBRR) violations

3. Giardia lamblia (SWTR/IESWTR/LT1ESWTR)	Zero	TT ¹⁰	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
4. Viruses (SWTR/IESWTR/LT1ESWTR)			
5. Heterotrophic plate count (HPC) bacteria ⁹ (SWTR/IESWTR/LT1ESWTR)			
6. Legionella (SWTR/IESWTR/LT1ESWTR)			
7. Cryptosporidium (IESWTR/FBRR/LT1ESWTR)			

C. Inorganic Chemicals (IOCs)

8. Antimony	0.006	0.006	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9. Arsenic ¹¹	0	0.010	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an

			increased risk of getting cancer.
10. Asbestos (10 µm)	7 MFL ¹²	7 MFL	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
11. Barium	2	2	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
12. Beryllium	0.004	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	0.005	0.005	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
15. Cyanide	0.2	0.2	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
16. Fluoride	4.0	4.0	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
17. Mercury (inorganic)	0.002	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
19. Nitrite	1	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
20. Total Nitrate and Nitrite	10	10	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
21. Selenium	0.05	0.05	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
22.	0.0005	0.002	Some people who drink water containing thallium in excess

Thallium			of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
D. Lead and Copper Rule			
23. Lead	Zero	TT ¹³	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
24. Copper	1.3	TT ¹⁴	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
E. Synthetic Organic Chemicals (SOCs)			
25. 2,4-D	0.07	0.07	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5-TP (Silvex)	0.05	0.05	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	Zero	0.002	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
28. Atrazine	0.003	0.003	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
29. Benzo(a)pyrene (PAHs)	Zero	0.0002	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
30. Carbofuran	0.04	0.04	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
31. Chlordane	Zero	0.002	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
32. Dalapon	0.2	0.2	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.

33. Di(2-ethylhexyl) adipate	0.4	0.4	Some people who drink water containing di(2-ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or possible reproductive difficulties.
34. Di(2-ethylhexyl) phthalate	Zero	0.006	Some people who drink water containing di(2-ethylhexyl) phthalate well in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Zero	0.0002	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	0.007	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
37. Dioxin (2,3,7,8-TCDD)	Zero	3×10^{-8}	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
38. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	0.1	0.1	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
40. Endrin	0.002	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	Zero	0.00005	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
42. Glyphosate	0.7	0.7	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
43. Heptachlor	Zero	0.0004	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
44. Heptachlor epoxide	Zero	0.0002	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
45. Hexachlorobenzene	Zero	0.001	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.

46. Hexachlorocyclopentadiene	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
47. Lindane	0.0002	0.0002	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
48. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	0.2	0.2	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
50. Pentachlorophenol	Zero	0.001	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
51. Picloram	0.5	0.5	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
52. Polychlorinated biphenyls (PCBs)	Zero	0.0005	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
53. Simazine	0.004	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	Zero	0.003	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
F. Volatile Organic Chemicals (VOCs)			
55. Benzene	Zero	0.005	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
56. Carbon tetrachloride	Zero	0.005	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
57. Chlorobenzene (monochloro- benzene)	0.1	0.1	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
58. <i>o</i> -Dichlorobenzene	0.6	0.6	Some people who drink water containing <i>o</i> -dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys,

			or circulatory systems.
59. <i>p</i> -Dichlorobenzene	0.075	0.075	Some people who drink water containing <i>p</i> -dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
60. 1,2-Dichloroethane	Zero	0.005	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
61. 1,1-Dichloroethylene	0.007	0.007	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
62. <i>cis</i> -1,2-Dichloroethylene	0.07	0.07	Some people who drink water containing <i>cis</i> -1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
63. <i>trans</i> -1,2-Dichloroethylene	0.1	0.1	Some people who drink water containing <i>trans</i> -1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	Zero	0.005	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
65. 1,2-Dichloropropane	Zero	0.005	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
66. Ethylbenzene	0.7	0.7	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
67. Styrene	0.1	0.1	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
68. Tetrachloroethylene	Zero	0.005	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
69. Toluene	1	1	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
70. 1,2,4-Trichlorobenzene	0.07	0.07	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
71. 1,1,1-Trichloroethane	0.2	0.2	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
72. 1,1,2-Trichloroethane	0.003	0.005	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.

73. Trichloroethylene	Zero	0.005	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
74. Vinyl chloride	Zero	0.002	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
75. Xylenes (total)	10	10	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

G. Radioactive Contaminants

76. Beta/photon emitters	Zero	4 mrem/yr ¹⁵	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
77. Alpha emitters	Zero	17 pCi/L ¹⁷	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
78. Combined radium (226 & 228)	Zero	5 pCi/L	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
79. Uranium ¹⁶	Zero	30 µg/L	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.

H. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals: Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs)¹⁸

80. Total trihalomethanes (TTHMs)	N/A	0.080 ^{19,20}	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.
81. Haloacetic Acids (HAA)	N/A	0.060 ²¹	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
82. Bromate	Zero	0.010	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
83. Chlorite	0.08	1.0	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
84. Chlorine	4 (MRDLG) ²²	4.0 (MRDL) ²³	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to

			their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
85. Chloramines	4 (MRDLG)	4.0 (MRDL)	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
86a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.
			<i>Add for public notification only:</i> The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
86b. Chlorine dioxide, where one or more distribution system samples are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.
			<i>Add for public notification only:</i> The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
87. Control of DBP precursors (TOC)	None	TT	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
I. Other Treatment Techniques			
88. Acrylamide	Zero	TT	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
89.	Zero	TT	Some people who drink water containing high levels of

Epichlorohydrin			epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.
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APPENDIX B—ENDNOTES

† Until March 31, 2016.

‡ Beginning April 1, 2016.

- (1) MCLG—Maximum contaminant level goal
- (2) MCL—Maximum contaminant level
- (3) For water systems analyzing at least 40 samples per month, no more than 5.0 percent of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms.
- (4) There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, and the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule. The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 5 NTU for systems that are required to filter but have not yet installed filtration (40 CFR 141.13).
- (5) NTU—Nephelometric turbidity unit
- (6) There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, and the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule and the 2001 Long Term 1 Enhanced Surface Water Treatment Rule. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95 percent of samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the primacy agency.
- (7) TT—Treatment technique
- (8) There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule (SWTR), the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR) and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). For systems subject to the IESWTR (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the IESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the primacy agency. For systems subject to the LT1ESWTR (systems serving fewer than 10,000 people, using surface water or ground water under the direct influence of surface water) that use conventional filtration or direct filtration, after January 1, 2005, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the LT1ESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the primacy agency.
- (9) The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful. HPC is simply an alternative method of determining disinfectant residual levels. The number of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.
- (10) SWTR, IESWTR, and LT1ESWTR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.
- (11) These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.
- (12) Millions fibers per liter.
- (13) Action Level = 0.015 mg/L

- (14) Action Level = 1.3 mg/L
- (15) Millirems per years
- (16) The uranium MCL is effective December 8, 2003 for all community water systems.
- (17) Picocuries per liter
- (18) Surface water systems and ground water systems under the direct influence of surface water are regulated under subpart H of 40 CFR 141. Subpart H community and non-transient non-community systems serving $\geq 10,000$ must comply with subpart L DBP MCLs and disinfectant maximum residual disinfectant levels (MRDLs) beginning January 1, 2002. All other community and non-transient non-community systems must comply with subpart L DBP MCLs and disinfectant MRDLs beginning January 1, 2004. Subpart H transient non-community systems serving $\geq 10,000$ that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. All other transient non-community systems that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.
- (19) Community and non-transient non-community systems must comply with subpart V TTHM and HAA5 MCLs of 0.080 mg/L and 0.060 mg/L, respectively (with compliance calculated as a locational running annual average) on the schedule in §141.620.
- (20) The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.
- (21) The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.
- (22) MRDLG—Maximum residual disinfectant level goal.
- (23) MRDL—Maximum residual disinfectant level.

[65 FR 26043, May 4, 2000; 65 FR 38629, June 21, 2000; 65 FR 40521, 40522, June 30, 2000, as amended at 65 FR 76751, Dec. 7, 2000; 66 FR 7065, Jan. 22, 2001; 66 FR 31104, June 8, 2001; 67 FR 1838, Jan. 14, 2002; 67 FR 70857, Nov. 27, 2002; 68 FR 14507, Mar. 25, 2003; 69 FR 38856, June 29, 2004; 71 FR 483, Jan. 4, 2006; 71 FR 65653, Nov. 8, 2006; 78 FR 10351, Feb. 13, 2013]

APPENDIX C TO SUBPART Q OF PART 141—LIST OF ACRONYMS USED IN PUBLIC NOTIFICATION REGULATION

CCR	Consumer Confidence Report
CWS	Community Water System
DBP	Disinfection Byproduct
EPA	Environmental Protection Agency
GWR	Ground Water Rule
HPC	Heterotrophic Plate Count
IESWTR	Interim Enhanced Surface Water Treatment Rule
IOC	Inorganic Chemical
LCR	Lead and Copper Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MRDL	Maximum Residual Disinfectant Level
MRDLG	Maximum Residual Disinfectant Level Goal
NCWS	Non-Community Water System
NPDWR	National Primary Drinking Water Regulation
NTNCWS	Non-Transient Non-Community Water System
NTU	Nephelometric Turbidity Unit
OGWDW	Office of Ground Water and Drinking Water
OW	Office of Water
PN	Public Notification
PWS	Public Water System
SDWA	Safe Drinking Water Act
SMCL	Secondary Maximum Contaminant Level
SOC	Synthetic Organic Chemical
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TT	Treatment Technique
TWS	Transient Non-Community Water System

[65 FR 26035, May 4, 2000, as amended at 71 FR 65653, Nov. 8, 2006]

Subpart S—Ground Water Rule

SOURCE: 71 FR 65653, Nov. 8, 2006, unless otherwise noted.

§141.400 General requirements and applicability.

- (a) **Scope of this subpart.** The requirements of this subpart S constitute National Primary Drinking Water Regulations.
- (b) **Applicability.** This subpart applies to all public water systems that use ground water except that it does not apply to public water systems that combine all of their ground water with surface water or with ground water under the direct influence of surface water prior to treatment under subpart H. For the purposes of this subpart, “ground water system” is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.
- (c) **General requirements.** Systems subject to this subpart must comply with the following requirements:
 - (1) Sanitary survey information requirements for all ground water systems as described in §141.401.
 - (2) Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 percent (4-log) treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in §141.402.
 - (3) Treatment technique requirements, described in §141.403, that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under §141.402, or that have significant deficiencies that are identified by the State or that are identified by EPA under SDWA section 1445. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this subpart must implement one or more of the following corrective action options: correct all significant deficiencies; provide an alternate source of water; eliminate the source of contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer.
 - (4) Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in §141.403(b).
 - (5) If requested by the State, ground water systems must provide the State with any existing information that will enable the State to perform a hydrogeologic sensitivity assessment. For the purposes of this subpart, “hydrogeologic sensitivity assessment” is a determination of whether ground water systems obtain water from hydrogeologically sensitive settings.
- (d) **Compliance date.** Ground water systems must comply, unless otherwise noted, with the requirements of this subpart beginning December 1, 2009.

§141.401 Sanitary surveys for ground water systems.

- (a) Ground water systems must provide the State, at the State's request, any existing information that will enable the State to conduct a sanitary survey.
- (b) For the purposes of this subpart, a “sanitary survey,” as conducted by the State, includes but is not limited to, an onsite review of the water source(s) (identifying sources of contamination by using results of source water assessments or other relevant information where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water.
- (c) The sanitary survey must include an evaluation of the applicable components listed in paragraphs (c)(1) through (8) of this section:
 - (1) Source,
 - (2) Treatment,

- (3) Distribution system,
- (4) Finished water storage,
- (5) Pumps, pump facilities, and controls,
- (6) Monitoring, reporting, and data verification,
- (7) System management and operation, and
- (8) Operator compliance with State requirements.

§141.402 Ground water source microbial monitoring and analytical methods.

(a) Triggered source water monitoring—

- (1) **General requirements.** A ground water system must conduct triggered source water monitoring if the conditions identified in paragraphs (a)(1)(i) and either (a)(1)(ii) or (a)(1)(iii) of this section exist.
 - (i) The system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and either
 - (ii) The system is notified that a sample collected under §141.21(a) is total coliform-positive and the sample is not invalidated under §141.21(c) until March 31, 2016, or
 - (iii) The system is notified that a sample collected under §§141.854 through 141.857 is total coliform-positive and the sample is not invalidated under §141.853(c) beginning April 1, 2016.
- (2) **Sampling requirements.** A ground water system must collect, within 24 hours of notification of the total coliform-positive sample, at least one ground water source sample from each ground water source in use at the time the total coliform-positive sample was collected under §141.21(a) until March 31, 2016, or collected under §§141.854 through 141.857 beginning April 1, 2016, except as provided in paragraph (a)(2)(ii) of this section.
 - (i) The State may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the State must specify how much time the system has to collect the sample.
 - (ii) If approved by the State, systems with more than one ground water source may meet the requirements of this paragraph (a)(2) by sampling a representative ground water source or sources. If directed by the State, systems must submit for State approval a triggered source water monitoring plan that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under §141.21(a) until March 31, 2016, or under §141.853 beginning April 1, 2016, and that the system intends to use for representative sampling under this paragraph.
 - (iii) Until March 31, 2016, a ground water system serving 1,000 or fewer people may use a repeat sample collected from a ground water source to meet both the requirements of §141.21(b) and to satisfy the monitoring requirements of paragraph (a)(2) of this section for that ground water source only if the State approves the use of *E. coli* as a fecal indicator for source water monitoring under this paragraph (a). If the repeat sample collected from the ground water source is *E. coli*-positive, the system must comply with paragraph (a)(3) of this section.
 - (iv) Beginning April 1, 2016, a ground water system serving 1,000 or fewer people may use a repeat sample collected from a ground water source to meet both the requirements of subpart Y and to satisfy the monitoring requirements of paragraph (a)(2) of this section for that ground water source only if the State approves the use of *E. coli* as a fecal indicator for source water monitoring under this paragraph (a) and approves the use of a single sample for meeting both the triggered source water monitoring requirements in this paragraph (a) and the repeat monitoring requirements in §141.858. If the repeat sample collected from the ground water source is *E. coli*- positive, the system must comply with paragraph (a)(3) of this section.
- (3) **Additional requirements.** If the State does not require corrective action under §141.403(a)(2) for a fecal indicator-positive source water sample collected under paragraph (a)(2) of this section that is not invalidated under paragraph (d) of this section, the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample.
- (4) **Consecutive and wholesale systems.**

- (i) In addition to the other requirements of this paragraph (a), a consecutive ground water system that has a total coliform-positive sample collected under §141.21(a) until March 31, 2016, or under §§141.854 through 141.857 beginning April 1, 2016, must notify the wholesale system(s) within 24 hours of being notified of the total coliform-positive sample.
- (ii) In addition to the other requirements of this paragraph (a), a wholesale ground water system must comply with paragraphs (a)(4)(ii)(A) and (a)(4)(ii)(B) of this section.
 - (A) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under §141.21(a) until March 31, 2016, or collected under §§141.854 through 141.857 beginning April 1, 2016, is total coliform-positive must, within 24 hours of being notified, collect a sample from its ground water source(s) under paragraph (a)(2) of this section and analyze it for a fecal indicator under paragraph (c) of this section.
 - (B) If the sample collected under paragraph (a)(4)(ii)(A) of this section is fecal indicator-positive, the wholesale ground water system must notify all consecutive systems served by that ground water source of the fecal indicator source water positive within 24 hours of being notified of the ground water source sample monitoring result and must meet the requirements of paragraph (a)(3) of this section.
- (5) ***Exceptions to the triggered source water monitoring requirements.*** A ground water system is not required to comply with the source water monitoring requirements of paragraph (a) of this section if either of the following conditions exists:
 - (i) The State determines, and documents in writing, that the total coliform-positive sample collected under §141.21(a) until March 31, 2016, or under §§141.854 through 141.857 beginning April 1, 2016, is caused by a distribution system deficiency; or
 - (ii) The total coliform-positive sample collected under §141.21(a) until March 31, 2016, or under §§141.854 through 141.857 beginning April 1, 2016, is collected at a location that meets State criteria for distribution system conditions that will cause total coliform-positive samples.
- (b) ***Assessment source water monitoring.*** If directed by the State, ground water systems must conduct assessment source water monitoring that meets State-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under paragraph (a)(2) of this section to meet the requirements of paragraph (b) of this section. State-determined assessment source water monitoring requirements may include:
 - (1) Collection of a total of 12 ground water source samples that represent each month the system provides ground water to the public,
 - (2) Collection of samples from each well unless the system obtains written State approval to conduct monitoring at one or more wells within the ground water system that are representative of multiple wells used by that system and that draw water from the same hydrogeologic setting,
 - (3) Collection of a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used,
 - (4) Analysis of all ground water source samples using one of the analytical methods listed in the in paragraph (c)(2) of this section for the presence of *E. coli*, enterococci, or coliphage,
 - (5) Collection of ground water source samples at a location prior to any treatment of the ground water source unless the State approves a sampling location after treatment, and
 - (6) Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the State approves an alternate sampling location that is representative of the water quality of that well.
- (c) ***Analytical methods.***
 - (1) A ground water system subject to the source water monitoring requirements of paragraph (a) of this section must collect a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used.
 - (2) A ground water system must analyze all ground water source samples collected under paragraph (a) of this section using one of the analytical methods listed in the following table in paragraph (c)(2) of this section or one of the alternative methods listed in appendix A to subpart C of this part for the presence of *E. coli*, enterococci, or coliphage:

Analytical Methods for Source Water Monitoring

Fecal indicator ¹	Methodology	Method citation
<i>E. coli</i>	Colilert ³	9223 B. ²
	Colisure ³	9223 B. ²
	Membrane Filter Method with MI Agar	EPA Method 1604. ⁴
	m-ColiBlue24 Test ⁵	
	E*Colite Test ⁶	
	EC-MUG ⁷	9221 F. ²
	NA-MUG ⁷	9222 G. ²
Enterococci	Multiple-Tube Technique	9230B. ²
	Membrane Filter Technique	9230C. ²
	Membrane Filter Technique	EPA Method 1600. ⁸
	Enterolert ⁹	
Coliphage	Two-Step Enrichment Presence-Absence Procedure	EPA Method 1601. ¹⁰
	Single Agar Layer Procedure	EPA Method 1602. ¹¹

Analyses must be conducted in accordance with the documents listed below. The Director of the Federal Register approves the incorporation by reference of the documents listed in footnotes 2-11 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. Copies may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

¹The time from sample collection to initiation of analysis may not exceed 30 hours. The ground water system is encouraged but is not required to hold samples below 10 °C during transit.

²Methods are described in Standard Methods for the Examination of Water and Wastewater 20th edition (1998) and copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005-2605.

³Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092.

⁴EPA Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium); September 2002, EPA 821-R-02-024. Method is available at <http://www.epa.gov/nerlcwww/1604sp02.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

⁵A description of the m-ColiBlue24 Test, "Total Coliforms and *E. coli* Membrane Filtration Method with m-ColiBlue24[®] Broth," Method No. 10029 Revision 2, August 17, 1999, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

⁶A description of the E*Colite Test, "Charm E*Colite Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Drinking Water, January 9, 1998, is available from Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843-1032 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

⁷EC-MUG (Method 9221F) or NA-MUG (Method 9222G) can be used for *E. coli* testing step as described in §141.21(f)(6)(i) or (ii) after use of Standard Methods 9221 B, 9221 D, 9222 B, or 9222 C.

⁸EPA Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-β-D-Glucoside Agar (mEI) EPA 821-R-02-022 (September 2002) is an approved variation of Standard Method 9230C. The

method is available at <http://www.epa.gov/nerlcwww/1600sp02.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460. The holding time and temperature for ground water samples are specified in footnote 1 above, rather than as specified in Section 8 of EPA Method 1600.

⁹Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. Preparation and use of the medium is set forth in the article "Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters," by Budnick, G.E., Howard, R.T., and Mayo, D.R., 1996, Applied and Environmental Microbiology, 62:3881-3884.

¹⁰EPA Method 1601: Male-specific (F+) and Somatic Coliphage in Water by Two-step Enrichment Procedure; April 2001, EPA 821-R-01-030. Method is available at <http://www.epa.gov/nerlcwww/1601ap01.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

¹¹EPA Method 1602: Male-specific (F +) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure; April 2001, EPA 821-R-01-029. Method is available at <http://www.epa.gov/nerlcwww/1602ap01.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

(d) *Invalidation of a fecal indicator-positive ground water source sample.*

(1) A ground water system may obtain State invalidation of a fecal indicator-positive ground water source sample collected under paragraph (a) of this section only under the conditions specified in paragraphs (d)(1)(i) and (ii) of this section.

(i) The system provides the State with written notice from the laboratory that improper sample analysis occurred; or

(ii) The State determines and documents in writing that there is substantial evidence that a fecal indicator-positive ground water source sample is not related to source water quality.

(2) If the State invalidates a fecal indicator-positive ground water source sample, the ground water system must collect another source water sample under paragraph (a) of this section within 24 hours of being notified by the State of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods in paragraph (c) of this section. The State may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the State must specify how much time the system has to collect the sample.

(e) *Sampling location.*

(1) Any ground water source sample required under paragraph (a) of this section must be collected at a location prior to any treatment of the ground water source unless the State approves a sampling location after treatment.

(2) If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a State-approved location to meet the requirements of paragraph (a) of this section if the sample is representative of the water quality of that well.

(f) *New sources.* If directed by the State, a ground water system that places a new ground water source into service after November 30, 2009, must conduct assessment source water monitoring under paragraph (b) of this section. If directed by the State, the system must begin monitoring before the ground water source is used to provide water to the public.

(g) *Public notification.* A ground water system with a ground water source sample collected under paragraph (a) or (b) of this section that is fecal indicator-positive and that is not invalidated under paragraph (d) of this section, including consecutive systems served by the ground water source, must conduct public notification under §141.202.

(h) *Monitoring violations.* Failure to meet the requirements of paragraphs (a)-(f) of this section is a monitoring violation and requires the ground water system to provide public notification under §141.204.

[71 FR 65653, Nov. 8, 2006; 71 FR 67427, Nov. 21, 2006, as amended at 74 FR 30958, June 29, 2009; 78 FR 10353, Feb. 13, 2013]

§141.403 Treatment technique requirements for ground water systems.

(a) *Ground water systems with significant deficiencies or source water fecal contamination.*

- (1) The treatment technique requirements of this section must be met by ground water systems when a significant deficiency is identified or when a ground water source sample collected under §141.402(a)(3) is fecal indicator-positive.
- (2) If directed by the State, a ground water system with a ground water source sample collected under §141.402(a)(2), §141.402(a)(4), or §141.402(b) that is fecal indicator-positive must comply with the treatment technique requirements of this section.
- (3) When a significant deficiency is identified at a Subpart H public water system that uses both ground water and surface water or ground water under the direct influence of surface water, the system must comply with provisions of this paragraph except in cases where the State determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or ground water under the direct influence of surface water.
- (4) Unless the State directs the ground water system to implement a specific corrective action, the ground water system must consult with the State regarding the appropriate corrective action within 30 days of receiving written notice from the State of a significant deficiency, written notice from a laboratory that a ground water source sample collected under §141.402(a)(3) was found to be fecal indicator-positive, or direction from the State that a fecal indicator-positive collected under §141.402(a)(2), §141.402(a)(4), or §141.402(b) requires corrective action. For the purposes of this subpart, significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the State determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.
- (5) Within 120 days (or earlier if directed by the State) of receiving written notification from the State of a significant deficiency, written notice from a laboratory that a ground water source sample collected under §141.402(a)(3) was found to be fecal indicator-positive, or direction from the State that a fecal indicator-positive sample collected under §141.402(a)(2), §141.402(a)(4), or §141.402(b) requires corrective action, the ground water system must either:
 - (i) Have completed corrective action in accordance with applicable State plan review processes or other State guidance or direction, if any, including State-specified interim measures; or
 - (ii) Be in compliance with a State-approved corrective action plan and schedule subject to the conditions specified in paragraphs (a)(5)(ii)(A) and (a)(5)(ii)(B) of this section.
 - (A) Any subsequent modifications to a State-approved corrective action plan and schedule must also be approved by the State.
 - (B) If the State specifies interim measures for protection of the public health pending State approval of the corrective action plan and schedule or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the State.
- (6) **Corrective action alternatives.** Ground water systems that meet the conditions of paragraph (a)(1) or (a)(2) of this section must implement one or more of the following corrective action alternatives:
 - (i) Correct all significant deficiencies;
 - (ii) Provide an alternate source of water;
 - (iii) Eliminate the source of contamination; or
 - (iv) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.
- (7) **Special notice to the public of significant deficiencies or source water fecal contamination.**
 - (i) In addition to the applicable public notification requirements of §141.202, a community ground water system that receives notice from the State of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the State under §141.402(d) must inform the public served by the water system under §141.153(h)(6) of the fecal indicator-positive source sample or of any significant deficiency that has not been corrected. The system must continue to inform the public annually until the significant deficiency is corrected or the fecal contamination in the ground water source is determined by the State to be corrected under paragraph (a)(5) of this section.

- (ii) In addition to the applicable public notification requirements of §141.202, a non-community ground water system that receives notice from the State of a significant deficiency must inform the public served by the water system in a manner approved by the State of any significant deficiency that has not been corrected within 12 months of being notified by the State, or earlier if directed by the State. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:
 - (A) The nature of the significant deficiency and the date the significant deficiency was identified by the State;
 - (B) The State-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed; and
 - (C) For systems with a large proportion of non-English speaking consumers, as determined by the State, information in the appropriate language(s) regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.
- (iii) If directed by the State, a non-community water system with significant deficiencies that have been corrected must inform its customers of the significant deficiencies, how the deficiencies were corrected, and the dates of correction under paragraph (a)(7)(ii) of this section.

(b) **Compliance monitoring—**

- (1) **Existing ground water sources.** A ground water system that is not required to meet the source water monitoring requirements of this subpart for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for any ground water source before December 1, 2009, must notify the State in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the specified ground water source and begin compliance monitoring in accordance with paragraph (b)(3) of this section by December 1, 2009. Notification to the State must include engineering, operational, or other information that the State requests to evaluate the submission. If the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source, the system must conduct ground water source monitoring as required under §141.402.
- (2) **New ground water sources.** A ground water system that places a ground water source in service after November 30, 2009, that is not required to meet the source water monitoring requirements of this subpart because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source must comply with the requirements of paragraphs (b)(2)(i), (b)(2)(ii) and (b)(2)(iii) of this section.
 - (i) The system must notify the State in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the State must include engineering, operational, or other information that the State requests to evaluate the submission.
 - (ii) The system must conduct compliance monitoring as required under §141.403(b)(3) of this subpart within 30 days of placing the source in service.
 - (iii) The system must conduct ground water source monitoring under §141.402 if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.
- (3) **Monitoring requirements.** A ground water system subject to the requirements of paragraphs (a), (b)(1) or (b)(2) of this section must monitor the effectiveness and reliability of treatment for that ground water source before or at the first customer as follows:
 - (i) **Chemical disinfection—**
 - (A) **Ground water systems serving greater than 3,300 people.** A ground water system that serves greater than 3,300 people must continuously monitor the residual disinfectant

concentration using analytical methods specified in §141.74(a)(2) at a location approved by the State and must record the lowest residual disinfectant concentration each day that water from the ground water source is served to the public. The ground water system must maintain the State-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. If there is a failure in the continuous monitoring equipment, the ground water system must conduct grab sampling every four hours until the continuous monitoring equipment is returned to service. The system must resume continuous residual disinfectant monitoring within 14 days.

(B) **Ground water systems serving 3,300 or fewer people.** A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods specified in §141.74(a)(2) at a location approved by the State and record the residual disinfection concentration each day that water from the ground water source is served to the public. The ground water system must maintain the State-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. The ground water system must take a daily grab sample during the hour of peak flow or at another time specified by the State. If any daily grab sample measurement falls below the State-determined residual disinfectant concentration, the ground water system must take follow-up samples every four hours until the residual disinfectant concentration is restored to the State-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of paragraph (b)(3)(i)(A) of this section.

(ii) **Membrane filtration.** A ground water system that uses membrane filtration to meet the requirements of this subpart must monitor the membrane filtration process in accordance with all State-specified monitoring requirements and must operate the membrane filtration in accordance with all State-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when:

(A) The membrane has an absolute molecular weight cut-off (MWCO), or an alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;

(B) The membrane process is operated in accordance with State-specified compliance requirements; and

(C) The integrity of the membrane is intact.

(iii) **Alternative treatment.** A ground water system that uses a State-approved alternative treatment to meet the requirements of this subpart by providing at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer must:

(A) Monitor the alternative treatment in accordance with all State-specified monitoring requirements; and

(B) Operate the alternative treatment in accordance with all compliance requirements that the State determines to be necessary to achieve at least 4-log treatment of viruses.

(c) **Discontinuing treatment.** A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the State determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring and analytical methods requirements of §141.402 of this subpart.

(d) Failure to meet the monitoring requirements of paragraph (b) of this section is a monitoring violation and requires the ground water system to provide public notification under §141.204.

§141.404 Treatment technique violations for ground water systems.

- (a) A ground water system with a significant deficiency is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the State) of receiving written notice from the State of the significant deficiency, the system:
 - (1) Does not complete corrective action in accordance with any applicable State plan review processes or other State guidance and direction, including State specified interim actions and measures, or
 - (2) Is not in compliance with a State-approved corrective action plan and schedule.
- (b) Unless the State invalidates a fecal indicator-positive ground water source sample under §141.402(d), a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the State) of meeting the conditions of §141.403(a)(1) or §141.403(a)(2), the system:
 - (1) Does not complete corrective action in accordance with any applicable State plan review processes or other State guidance and direction, including State-specified interim measures, or
 - (2) Is not in compliance with a State-approved corrective action plan and schedule.
- (c) A ground water system subject to the requirements of §141.403(b)(3) that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.
- (d) Ground water system must give public notification under §141.203 for the treatment technique violations specified in paragraphs (a), (b) and (c) of this section.

§141.405 Reporting and recordkeeping for ground water systems.

- (a) **Reporting.** In addition to the requirements of §141.31, a ground water system regulated under this subpart must provide the following information to the State:
 - (1) A ground water system conducting compliance monitoring under §141.403(b) must notify the State any time the system fails to meet any State-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system must notify the State as soon as possible, but in no case later than the end of the next business day.
 - (2) After completing any corrective action under §141.403(a), a ground water system must notify the State within 30 days of completion of the corrective action.
 - (3) If a ground water system subject to the requirements of §141.402(a) does not conduct source water monitoring under §141.402(a)(5)(ii), the system must provide documentation to the State within 30 days of the total coliform positive sample that it met the State criteria.
- (b) **Recordkeeping.** In addition to the requirements of §141.33, a ground water system regulated under this subpart must maintain the following information in its records:
 - (1) Documentation of corrective actions. Documentation shall be kept for a period of not less than ten years.
 - (2) Documentation of notice to the public as required under §141.403(a)(7). Documentation shall be kept for a period of not less than three years.
 - (3) Records of decisions under §141.402(a)(5)(ii) and records of invalidation of fecal indicator-positive ground water source samples under §141.402(d). Documentation shall be kept for a period of not less than five years.
 - (4) For consecutive systems, documentation of notification to the wholesale system(s) of total coliform-positive samples that are not invalidated under §141.21(c) until March 31, 2016, or under §141.853 beginning April 1, 2016. Documentation shall be kept for a period of not less than five years.
 - (5) For systems, including wholesale systems, that are required to perform compliance monitoring under §141.403(b):
 - (i) Records of the State-specified minimum disinfectant residual. Documentation shall be kept for a period of not less than ten years.
 - (ii) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the State-prescribed minimum residual disinfectant concentration for a period of more than four hours. Documentation shall be kept for a period of not less than five years.

- (iii) Records of State-specified compliance requirements for membrane filtration and of parameters specified by the State for State-approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation shall be kept for a period of not less than five years.

[71 FR 65653, Nov. 8, 2006, as amended at 78 FR 10353, Feb. 13, 2013]

Subpart T—Enhanced Filtration and Disinfection—Systems Serving Fewer Than 10,000 People

SOURCE: 67 FR 1839, Jan. 14, 2002, unless otherwise noted.

General Requirements

§141.500 General Requirements

The requirements of this subpart constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under subpart H of this part. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacterial, *Legionella*, *Cryptosporidium*, and turbidity. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

- (a) A least 99 percent (2 log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered system, or *Cryptosporidium* control under the watershed control plan for unfiltered systems; and
- (b) Compliance with the profiling and benchmark requirements in §§141.530 through 141.544.

§141.501 Who is subject to the requirements of subpart T?

You are subject to these requirements if your system:

- (a) Is a public water system;
- (b) Uses surface water or GWUDI as a source; and
- (c) Serves fewer than 10,000 persons.

§141.502 When must my system comply with these requirements?

You must comply with these requirements in this subpart beginning January 1, 2005, except where otherwise noted.

[69 FR 38856, June 29, 2004]

§141.503 What does subpart T require?

There are seven requirements of this subpart, and you must comply with all requirements that are applicable to your system. These requirements are:

- (a) You must cover any finished water reservoir that you began to construct on or after March 15, 2002 as described in §§141.510 and 141.511;
- (b) If your system is an unfiltered system, you must comply with the updated watershed control requirements described in §§141.520-141.522;
- (c) If your system is a community or non-transient non-community water systems, you must develop a disinfection profile as described in §§141.530-141.536;
- (d) If your system is considering making a significant change to its disinfection practices, you must develop a disinfection benchmark and consult with the State for approval of the change as described in §§141.540-141.544;
- (e) If your system is a filtered system, you must comply with the combined filter effluent requirements as described in §§141.550-141.553;
- (f) If your system is a filtered system that uses conventional or direct filtration, you must comply with the individual filter turbidity requirements as described in §§141.560-141.564; and

- (g) You must comply with the applicable reporting and recordkeeping requirements as described in §§141.570 and 141.571.

Finished Water Reservoirs

§141.510 Is my system subject to the new finished water reservoir requirements?

All subpart H systems which serve fewer than 10,000 are subject to this requirement.

§141.511 What is required of new finished water reservoirs?

If your system begins construction of a finished water reservoir on or after March 15, 2002 the reservoir must be covered. Finished water reservoirs for which your system began construction prior to March 15, 2002 are not subject to this requirement.

Additional Watershed Control Requirements for Unfiltered Systems

§141.520 Is my system subject to the updated watershed control requirements?

If you are a subpart H system serving fewer than 10,000 persons which does not provide filtration, you must continue to comply with all of the filtration avoidance criteria in §141.71, as well as the additional watershed control requirements in §141.521.

§141.521 What updated watershed control requirements must my unfiltered system implement to continue to avoid filtration?

Your system must take any additional steps necessary to minimize the potential for contamination by *Cryptosporidium* oocysts in the source water. Your system's watershed control program must, for *Cryptosporidium*:

- (a) Identify watershed characteristics and activities which may have an adverse effect on source water quality; and
- (b) Monitor the occurrence of activities which may have an adverse effect on source water quality.

§141.522 How does the State determine whether my system's watershed control requirements are adequate?

During an onsite inspection conducted under the provisions of §141.71(b)(3), the State must determine whether your watershed control program is adequate to limit potential contamination by *Cryptosporidium* oocysts. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of your program to monitor and control detrimental activities occurring in the watershed; and the extent to which your system has maximized land ownership and/or controlled land use within the watershed.

Disinfection Profile

§141.530 What is a disinfection profile and who must develop one?

A disinfection profile is a graphical representation of your system's level of *Giardia lamblia* or virus inactivation measured during the course of a year. If you are a subpart H community or non-transient non-community water system which serves fewer than 10,000 persons, your system must develop a disinfection profile unless your State determines that your system's profile is unnecessary. Your State may approve the use of a more representative data set for disinfection profiling than the data set required under §§141.532-141.536.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§141.531 What criteria must a State use to determine that a profile is unnecessary?

States may only determine that a system's profile is unnecessary if a system's TTHM and HAA5 levels are below 0.064 mg/L and 0.048 mg/L, respectively. To determine these levels, TTHM and HAA5 samples must be collected after January 1, 1998, during the month with the warmest water temperature, and at the point of maximum residence time in your distribution system. Your State may approve a more representative TTHM and HAA5 data set to determine these levels.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§141.532 How does my system develop a disinfection profile and when must it begin?

A disinfection profile consists of three steps:

- (a) First, your system must collect data for several parameters from the plant as discussed in §141.533 over the course of 12 months. If your system serves between 500 and 9,999 persons you must begin to collect data no later than July 1, 2003. If your system serves fewer than 500 persons you must begin to collect data no later than January 1, 2004
- (b) Second, your system must use this data to calculate weekly log inactivation as discussed in §§141.534 and 141.535; and
- (c) Third, your system must use these weekly log inactivations to develop a disinfection profile as specified in §141.536.

§141.533 What data must my system collect to calculate a disinfection profile?

Your system must monitor the following parameters to determine the total log inactivation using the analytical methods in §141.74 (a), once per week on the same calendar day, over 12 consecutive months:

- (a) The temperature of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;
- (b) If your system uses chlorine, the pH of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;
- (c) The disinfectant contact time(s) (“T”) during peak hourly flow; and
- (d) The residual disinfectant concentration(s) (“C”) of the water before or at the first customer and prior to each additional point of disinfection during peak hourly flow.

§141.534 How does my system use this data to calculate an inactivation ratio?

Use the tables in §141.74(b)(3)(v) to determine the appropriate CT_{99.9} value. Calculate the total inactivation ratio as follows, and multiply the value by 3.0 to determine log inactivation of *Giardia lamblia*:

If your system * * *	Your system must determine * * *
(a) Uses only one point of disinfectant application	(1) One inactivation ratio (CT _{calc} /CT _{99.9}) before or at the first customer during peak hourly flow or (2) Successive CT _{calc} /CT _{99.9} values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, your 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 (ΣCT _{calc} /CT _{99.9}).
(b) Uses more than one point of disinfectant application before the first customer	The (CT _{calc} /CT _{99.9}) 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 using the procedure specified in paragraph (a)(2) of this section.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§141.535 What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?

If your system uses chloramines, ozone, or chlorine dioxide for primary disinfection, you must also calculate the logs of inactivation for viruses and develop an additional disinfection profile for viruses using methods approved by the State.

§141.536 My system has developed an inactivation ratio; what must we do now?

Each log inactivation serves as a data point in your disinfection profile. Your system will have obtained 52 measurements (one for every week of the year). This will allow your system and the State the opportunity to evaluate how microbial inactivation varied over the course of the year by looking at all 52 measurements (your Disinfection Profile). Your system must retain the Disinfection Profile data in graphic form, such as a spreadsheet, which must be available for review by the State as part of a sanitary survey. Your system must use this data to calculate a benchmark if you are considering changes to disinfection practices.

Disinfection Benchmark

§141.540 Who has to develop a disinfection benchmark?

If you are a subpart H system required to develop a disinfection profile under §§141.530 through 141.536, your system must develop a Disinfection Benchmark if you decide to make a significant change to your disinfection practice. Your system must consult with the State for approval before you can implement a significant disinfection practice change.

§141.541 What are significant changes to disinfection practice?

Significant changes to disinfection practice include:

- (a) Changes to the point of disinfection;
- (b) Changes to the disinfectant(s) used in the treatment plant;
- (c) Changes to the disinfection process; or
- (d) Any other modification identified by the State.

§141.542 What must my system do if we are considering a significant change to disinfection practices?

If your system is considering a significant change to its disinfection practice, your system must calculate a disinfection benchmark(s) as described in §§141.543 and 141.544 and provide the benchmark(s) to your State. Your system may only make a significant disinfection practice change after consulting with the State for approval. Your system must submit the following information to the State as part of the consultation and approval process:

- (a) A description of the proposed change;
- (b) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) and disinfection benchmark;
- (c) An analysis of how the proposed change will affect the current levels of disinfection; and
- (d) Any additional information requested by the State.

§141.543 How is the disinfection benchmark calculated?

If your system is making a significant change to its disinfection practice, it must calculate a disinfection benchmark using the procedure specified in the following table.

TO CALCULATE A DISINFECTION BENCHMARK YOUR SYSTEM MUST PERFORM THE FOLLOWING STEPS
Step 1: Using the data your system collected to develop the Disinfection Profile, determine the average <i>Giardia lamblia</i> inactivation for each calendar month by dividing the sum of all <i>Giardia lamblia</i> inactivations for that month by the number of values calculated for that month.
Step 2: Determine the lowest monthly average value out of the twelve values. This value becomes the disinfection benchmark.

§141.544 What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?

If your system uses chloramines, ozone or chlorine dioxide for primary disinfection your system must calculate the disinfection benchmark from the data your system collected for viruses to develop the disinfection profile in addition to the *Giardia lamblia* disinfection benchmark calculated under §141.543. This viral benchmark must be calculated in the same manner used to calculate the *Giardia lamblia* disinfection benchmark in §141.543.

Combined Filter Effluent Requirements

§141.550 Is my system required to meet subpart T combined filter effluent turbidity limits?

All subpart H systems which serve populations fewer than 10,000, are required to filter, and utilize filtration other than slow sand filtration or diatomaceous earth filtration must meet the combined filter effluent turbidity requirements of §§141.551-141.553. If your system uses slow sand or diatomaceous earth filtration you are not required to meet the combined filter effluent turbidity limits of subpart T, but you must continue to meet the combined filter effluent turbidity limits in §141.73.

§141.551 What strengthened combined filter effluent turbidity limits must my system meet?

Your system must meet two strengthened combined filter effluent turbidity limits.

- (a) The first combined filter effluent turbidity limit is a “95th percentile” turbidity limit that your system must meet in at least 95 percent of the turbidity measurements taken each month. Measurements must continue to be taken as described in §141.74(a) and (c). Monthly reporting must be completed according to §141.570. The following table describes the required limits for specific filtration technologies.

If your system consists of * * *	Your 95th percentile turbidity value is * * *
(1) Conventional Filtration or Direct Filtration	0.3 NTU.
(2) All other “Alternative” Filtration	A value determined by the State (not to exceed 1 NTU) based on the demonstration described in §141.552.

- (b) The second combined filter effluent turbidity limit is a “maximum” turbidity limit which your system may at no time exceed during the month. Measurements must continue to be taken as described in §141.74(a) and (c). Monthly reporting must be completed according to §141.570. The following table describes the required limits for specific filtration technologies.

If your system consists of * * *	Your maximum turbidity value is * * *
(1) Conventional Filtration or Direct Filtration	1 NTU.
(2) All other “Alternative Filtration”	A value determined by the State (not to exceed 5 NTU) based on the demonstration as described in §141.552.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§141.552 My system consists of “alternative filtration” and is required to conduct a demonstration—what is required of my system and how does the State establish my turbidity limits?

- (a) If your system consists of alternative filtration (filtration other than slow sand filtration, diatomaceous earth filtration, conventional filtration, or direct filtration) you are required to conduct a demonstration (see tables in §141.551). Your system must demonstrate to the State, using pilot plant studies or other means, that your system's filtration, in combination with disinfection treatment, consistently achieves:
- (1) 99 percent removal of *Cryptosporidium* oocysts;
 - (2) 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts; and
 - (3) 99.99 percent removal and/or inactivation of viruses.
- (b) [Reserved]

§141.553 My system practices lime softening—is there any special provision regarding my combined filter effluent?

If your system practices lime softening, you may acidify representative combined filter effluent turbidity samples prior to analysis using a protocol approved by the State.

Individual Filter Turbidity Requirements

§141.560 Is my system subject to individual filter turbidity requirements?

If your system is a subpart H system serving fewer than 10,000 people and utilizing conventional filtration or direct filtration, you must conduct continuous monitoring of turbidity for each individual filter at your system. The following requirements apply to continuous turbidity monitoring:

- (a) Monitoring must be conducted using an approved method in §141.74(a);
- (b) Calibration of turbidimeters must be conducted using procedures specified by the manufacturer;
- (c) Results of turbidity monitoring must be recorded at least every 15 minutes;
- (d) Monthly reporting must be completed according to §141.570; and
- (e) Records must be maintained according to §141.571.

§141.561 What happens if my system's turbidity monitoring equipment fails?

If there is a failure in the continuous turbidity monitoring equipment, your system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is back on-line. Your system has 14 days to resume continuous monitoring before a violation is incurred.

§141.562 My system only has two or fewer filters—is there any special provision regarding individual filter turbidity monitoring?

Yes, if your system only consists of two or fewer filters, you may conduct continuous monitoring of combined filter effluent turbidity in lieu of individual filter effluent turbidity monitoring. Continuous monitoring must meet the same requirements set forth in §141.560(a) through (d) and §141.561.

§141.563 What follow-up action is my system required to take based on continuous turbidity monitoring?

Follow-up action is required according to the following tables:

If.....	Your system must.....
<p style="text-align: center;">(a)</p> <p>The turbidity of an individual filter (or the turbidity of combined filter effluent (CFE) for systems with 2 filters that monitor CFE in lieu of individual filters) exceeds 1.0 NTU in two consecutive recordings 15 minutes apart</p>	<p>Report to the State by the 10th of the following month and include the filter number(s), corresponding date(s), turbidity value(s) which exceeded 1.0 NTU, and the cause (if known) for the exceedance(s).</p>
If a system was required to report to the State	Your system must.....
<p style="text-align: center;">(b)</p> <p>For three months in a row and turbidity exceeded 1.0 NTU in two consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters)</p>	<p>Conduct a self-assessment of the filter(s) within 14 days of the day the filter exceeded 1.0 NTU in two consecutive measurements for the third straight month unless a CPE as specified in paragraph (c) of this section was required. Systems with 2 filters that monitor CFE in lieu of individual filters must conduct a self-assessment on both filters. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.</p>

(c) For two months in a row and turbidity exceeded 2.0 NTU in 2 consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters)	Arrange to have a comprehensive performance evaluation (CPE) conducted by the State or a third party approved by the State not later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. If a CPE has been completed by the State or a third party approved by the State within the 12 prior months or the system and State are jointly participating in an ongoing Comprehensive Technical Assistance (CTA) project at the system, a new CPE is not required. If conducted, a CPE must be completed and submitted to the State no later than 120 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month.
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[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§141.564 My system practices lime softening—is there any special provision regarding my individual filter turbidity monitoring?

If your system utilizes lime softening, you may apply to the State for alternative turbidity exceedance levels for the levels specified in the table in §141.563. You must be able to demonstrate to the State that higher turbidity levels are due to lime carryover only, and not due to degraded filter performance.

Reporting and Recordkeeping Requirements

§141.570 What does subpart T require that my system report to the State?

This subpart T requires your system to report several items to the State. The following table describes the items which must be reported and the frequency of reporting. Your system is required to report the information described in the following table, if it is subject to the specific requirement shown in the first column.

Corresponding requirement	Description of information to report	Frequency
(a) Combined Filter Effluent Requirements (§§141.550-141.553)	(1) The total number of filtered water turbidity measurements taken during the month	By the 10th of the following month.
	(2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to your system's required 95th percentile limit	By the 10th of the following month.
	(3) The date and value of any turbidity measurements taken during the month which exceed the maximum turbidity value for your filtration system	By the 10th of the following month.
(b) Individual Turbidity Requirements (§§141.560-141.564)	(1) That your system conducted individual filter turbidity monitoring during the month	By the 10th of the following month.
	(2) The filter number(s), corresponding date(s), and the turbidity value(s) which exceeded 1.0 NTU during the month, and the cause (if known) for the exceedance(s), but only if 2 consecutive measurements exceeded 1.0 NTU	By the 10th of the following month.
	(3)	By the 10th of the following month (or

	If a self-assessment is required, the date that it was triggered and the date that it was completed	14 days after the self-assessment was triggered only if the self-assessment was triggered during the last four days of the month)
	(4) If a CPE is required, that the CPE is required and the date that it was triggered	By the 10th of the following month.
	(5) Copy of completed CPE report	Within 120 days after the CPE was triggered.
(c) Disinfection Profiling (§§141.530-141.536)	(1) Results of optional monitoring which show TTHM levels <0.064 mg/l and HAA5 levels <0.048 mg/l (Only if your system wishes to forgo profiling) or that your system has begun disinfection profiling	(i) For systems serving 500-9,999 by July 1, 2003; (ii) For systems serving fewer than 500 by January 1, 2004.
(d) Disinfection Benchmarking (§§141.540-141.544)	(1) A description of the proposed change in disinfection, your system's disinfection profile for Giardia lamblia (and, if necessary, viruses) and disinfection benchmark, and an analysis of how the proposed change will affect the current levels of disinfection	Anytime your system is considering a significant change to its disinfection practice.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38857, June 29, 2004]

§141.571 What records does subpart T require my system to keep?

Your system must keep several types of records based on the requirements of subpart T, in addition to recordkeeping requirements under §141.75. The following table describes the necessary records, the length of time these records must be kept, and for which requirement the records pertain. Your system is required to maintain records described in this table, if it is subject to the specific requirement shown in the first column.

Corresponding requirement	Description of necessary records	Duration of time records must be kept
(a) Individual Filter Turbidity Requirements (§§141.560-141.564)	Results of individual filter monitoring	At least 3 years.
(b) Disinfection Profiling (§§141.530-141.536)	Results of Profile (including raw data and analysis)	Indefinitely.
(c) Disinfection Benchmarking (§§141.540-141.544)	Benchmark (including raw data and analysis)	Indefinitely.

Subpart U—Initial Distribution System Evaluations

SOURCE: 71 FR 483, Jan. 4, 2006, unless otherwise noted.

§141.600 General requirements.

- (a) The requirements of subpart U of this part constitute national primary drinking water regulations. The regulations in this subpart establish monitoring and other requirements for identifying subpart V compliance monitoring locations for determining compliance with maximum contaminant levels for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5). You must use an Initial Distribution System Evaluation (IDSE) to determine locations with representative high TTHM and HAA5 concentrations throughout your distribution system. IDSEs are used in conjunction with, but separate from, subpart L compliance monitoring, to identify and select subpart V compliance monitoring locations.
- (b) **Applicability.** You are subject to these requirements if your system is a community water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light; or if your system is a nontransient noncommunity water system that serves at least 10,000 people and uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.
- (c) **Schedule.**
- (1) You must comply with the requirements of this subpart on the schedule in the table in this paragraph (c)(1).

If you serve this population	You must submit your standard monitoring plan or system specific study plan ¹ or 40/30 certification ² to the State by or receive very small system waiver from State	You must complete your standard monitoring or system specific study by	You must submit your IDSE report to the State by ³
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system			
(i) ≥100,000	October 1, 2006	September 30, 2008	January 1, 2009.
(ii) 50,000-99,999	April 1, 2007	March 31, 2009	July 1, 2009.
(iii) 10,000-49,999	October 1, 2007	September 30, 2009	January 1, 2010.
(iv) <10,000 (CWS Only)	April 1, 2008	March 31, 2010	July 1, 2010.
Other systems that are part of a combined distribution system			
(v) Wholesale system or consecutive system	— at the same time as the system with the earliest compliance date in the combined distribution system	— at the same time as the system with the earliest compliance date in the combined distribution system	— at the same time as the system with the earliest compliance date in the combined distribution system.

¹If, within 12 months after the date identified in this column, the State does not approve your plan or notify you that it has not yet completed its review, you may consider the plan that you submitted as approved. You must implement that plan and you must complete standard monitoring or a system specific study no later than the date identified in the third column.

²You must submit your 40/30 certification under §141.603 by the date indicated.

³If, within three months after the date identified in this column (nine months after the date identified in this column if you must comply on the schedule in paragraph (c)(1)(iii) of this section), the State does not approve your IDSE report or notify you that it has not yet completed its review, you may consider the report that you submitted as approved and you must implement the recommended subpart V monitoring as required.

- (2) For the purpose of the schedule in paragraph (c)(1) of this section, the State may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The State may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.
- (d) You must conduct standard monitoring that meets the requirements in §141.601, or a system specific study that meets the requirements in §141.602, or certify to the State that you meet 40/30 certification criteria under §141.603, or qualify for a very small system waiver under §141.604.
 - (1) You must have taken the full complement of routine TTHM and HAA5 compliance samples required of a system with your population and source water under subpart L of this part (or you must have taken the full complement of reduced TTHM and HAA5 compliance samples required of a system with your population and source water under subpart L if you meet reduced monitoring criteria under subpart L of this part) during the period specified in §141.603(a) to meet the 40/30 certification criteria in §141.603. You must have taken TTHM and HAA5 samples under §§141.131 and 141.132 to be eligible for the very small system waiver in §141.604.
 - (2) If you have not taken the required samples, you must conduct standard monitoring that meets the requirements in §141.601, or a system specific study that meets the requirements in §141.602.
- (e) You must use only the analytical methods specified in §141.131, or otherwise approved by EPA for monitoring under this subpart, to demonstrate compliance with the requirements of this subpart.
- (f) IDSE results will not be used for the purpose of determining compliance with MCLs in §141.64.

§141.601 Standard monitoring.

- (a) **Standard monitoring plan.** Your standard monitoring plan must comply with paragraphs (a)(1) through (a)(4) of this section. You must prepare and submit your standard monitoring plan to the State according to the schedule in §141.600(c).
 - (1) Your standard monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating locations and dates of all projected standard monitoring, and all projected subpart L compliance monitoring.
 - (2) Your standard monitoring plan must include justification of standard monitoring location selection and a summary of data you relied on to justify standard monitoring location selection.
 - (3) Your standard monitoring plan must specify the population served and system type (subpart H or ground water).
 - (4) You must retain a complete copy of your standard monitoring plan submitted under this paragraph (a), including any State modification of your standard monitoring plan, for as long as you are required to retain your IDSE report under paragraph (c)(4) of this section.
- (b) **Standard monitoring.**
 - (1) You must monitor as indicated in the table in this paragraph (b)(1). You must collect dual sample sets at each monitoring location. One sample in the dual sample set must be analyzed for TTHM. The other sample in the dual sample set must be analyzed for HAA5. You must conduct one monitoring period during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature. You must review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature.

Source water type	Population size category	Monitoring periods and frequency of sampling	Distribution system monitoring locations ¹				
			Total per monitoring period	Near entry points	Average residence time	High TTHM locations	High HAA5 locations
	<500 consecutive	one (during peak	2	1		1	

Subpart H	systems	historical month) ²					
	<500 non-consecutive systems		2			1	1
	500-3,300 consecutive systems	four (every 90 days)	2	1		1	
	500-3,300 non-consecutive systems		2			1	1
	3,301-9,999		4		1	2	1
	10,000-49,999	six (every 60 days)	8	1	2	3	2
	50,000-249,999		16	3	4	5	4
	250,000-999,999		24	4	6	8	6
	1,000,000-4,999,999		32	6	8	10	8
	≥5,000,000		40	8	10	12	10
Ground Water	<500 consecutive systems	one (during peak historical month) ²	2	1		1	
	<500 non-consecutive systems		2			1	1
	500-9,999	four (every 90 days)	2			1	1
	10,000-99,999		6	1	1	2	2
	100,000-499,999		8	1	1	3	3
	≥500,000		12	2	2	4	4

¹A dual sample set (*i.e.*, a TTHM and an HAA5 sample) must be taken at each monitoring location during each monitoring period.

²The peak historical month is the month with the highest TTHM or HAA5 levels or the warmest water temperature.

- (2) You must take samples at locations other than the existing subpart L monitoring locations. Monitoring locations must be distributed throughout the distribution system.
 - (3) If the number of entry points to the distribution system is fewer than the specified number of entry point monitoring locations, excess entry point samples must be replaced equally at high TTHM and HAA5 locations. If there is an odd extra location number, you must take a sample at a high TTHM location. If the number of entry points to the distribution system is more than the specified number of entry point monitoring locations, you must take samples at entry points to the distribution system having the highest annual water flows.
 - (4) Your monitoring under this paragraph (b) may not be reduced under the provisions of §141.29 and the State may not reduce your monitoring using the provisions of §142.16(m).
- (c) **IDSE report.** Your IDSE report must include the elements required in paragraphs (c)(1) through (c)(4) of this section. You must submit your IDSE report to the State according to the schedule in §141.600(c).
- (1) Your IDSE report must include all TTHM and HAA5 analytical results from subpart L compliance monitoring and all standard monitoring conducted during the period of the IDSE as individual analytical results and LRAAs presented in a tabular or spreadsheet format acceptable to the State. If changed from your standard monitoring plan submitted under paragraph (a) of this section, your report must also include a schematic of your distribution system, the population served, and system type (subpart H or ground water).

- (2) Your IDSE report must include an explanation of any deviations from your approved standard monitoring plan.
- (3) You must recommend and justify subpart V compliance monitoring locations and timing based on the protocol in §141.605.
- (4) You must retain a complete copy of your IDSE report submitted under this section for 10 years after the date that you submitted your report. If the State modifies the subpart V monitoring requirements that you recommended in your IDSE report or if the State approves alternative monitoring locations, you must keep a copy of the State's notification on file for 10 years after the date of the State's notification. You must make the IDSE report and any State notification available for review by the State or the public.

§141.602 System specific studies.

(a) **System specific study plan.** Your system specific study plan must be based on either existing monitoring results as required under paragraph (a)(1) of this section or modeling as required under paragraph (a)(2) of this section. You must prepare and submit your system specific study plan to the State according to the schedule in §141.600(c).

(1) **Existing monitoring results.** You may comply by submitting monitoring results collected before you are required to begin monitoring under §141.600(c). The monitoring results and analysis must meet the criteria in paragraphs (a)(1)(i) and (a)(1)(ii) of this section.

i. **Minimum requirements.**

(A) TTHM and HAA5 results must be based on samples collected and analyzed in accordance with §141.131. Samples must be collected no earlier than five years prior to the study plan submission date.

(B) The monitoring locations and frequency must meet the conditions identified in this paragraph (a)(1)(i)(B). Each location must be sampled once during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature for every 12 months of data submitted for that location. Monitoring results must include all subpart L compliance monitoring results plus additional monitoring results as necessary to meet minimum sample requirements.

System Type	Population size category	Number of monitoring locations	Number of samples	
			TTHM	HAA5
Subpart H:	<500	3	3	3
	500-3,300	3	9	9
	3,301-9,999	6	36	36
	10,000-49,999	12	72	72
	50,000-249,999	24	144	144
	250,000-999,999	36	216	216
	1,000,000-4,999,999	48	288	288
	≥5,000,000	60	360	360
Ground Water:	<500	3	3	3
	500-9,999	3	9	9
	10,000-99,999	12	48	48
	100,000-499,999	18	72	72

	≥500,000	24	96	96
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ii. **Reporting monitoring results.** You must report the information in this paragraph (a)(1)(ii).

- (A) You must report previously collected monitoring results and certify that the reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent subpart L results.
- (B) You must certify that the samples were representative of the entire distribution system and that treatment, and distribution system have not changed significantly since the samples were collected.
- (C) Your study monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed or planned system specific study monitoring.
- (D) Your system specific study plan must specify the population served and system type (subpart H or ground water).
- (E) You must retain a complete copy of your system specific study plan submitted under this paragraph (a)(1), including any State modification of your system specific study plan, for as long as you are required to retain your IDSE report under paragraph (b)(5) of this section.
- (F) If you submit previously collected data that fully meet the number of samples required under paragraph (a)(1)(i)(B) of this section and the State rejects some of the data, you must either conduct additional monitoring to replace rejected data on a schedule the State approves or conduct standard monitoring under §141.601.

(2) **Modeling.** You may comply through analysis of an extended period simulation hydraulic model. The extended period simulation hydraulic model and analysis must meet the criteria in this paragraph (a)(2).

(i) **Minimum requirements.**

- (A) The model must simulate 24-hour variation in demand and show a consistently repeating 24-hour pattern of residence time.
- (B) The model must represent the criteria listed in paragraphs (a)(2)(i)(B)(1) through (9) of this section.
 - (1) 75% of pipe volume;
 - (2) 50% of pipe length;
 - (3) All pressure zones;
 - (4) All 12-inch diameter and larger pipes;
 - (5) All 8-inch and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps, and control valves, or are known or expected to be significant conveyors of water;
 - (6) All 6-inch and larger pipes that connect remote areas of a distribution system to the main portion of the system;
 - (7) All storage facilities with standard operations represented in the model; and
 - (8) All active pump stations with controls represented in the model; and
 - (9) All active control valves.
- (C) The model must be calibrated, or have calibration plans, for the current configuration of the distribution system during the period of high TTHM formation potential. All storage facilities must be evaluated as part of the calibration process. All required calibration must be completed no later than 12 months after plan submission.

(ii) **Reporting modeling.** Your system specific study plan must include the information in this paragraph (a)(2)(ii).

- (A) Tabular or spreadsheet data demonstrating that the model meets requirements in paragraph (a)(2)(i)(B) of this section.
 - (B) A description of all calibration activities undertaken, and if calibration is complete, a graph of predicted tank levels versus measured tank levels for the storage facility with the highest residence time in each pressure zone, and a time series graph of the residence time at the longest residence time storage facility in the distribution system showing the predictions for the entire simulation period (*i.e.*, from time zero until the time it takes for the model to reach a consistently repeating pattern of residence time).
 - (C) Model output showing preliminary 24-hour average residence time predictions throughout the distribution system.
 - (D) Timing and number of samples representative of the distribution system planned for at least one monitoring period of TTHM and HAA5 dual sample monitoring at a number of locations no less than would be required for the system under standard monitoring in §141.601 during the historical month of high TTHM. These samples must be taken at locations other than existing subpart L compliance monitoring location.
 - (E) Description of how all requirements will be completed no later than 12 months after you submit your system specific study plan.
 - (F) Schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed system specific study monitoring (if calibration is complete) and all subpart L compliance monitoring.
 - (G) Population served and system type (subpart H or ground water).
 - (H) You must retain a complete copy of your system specific study plan submitted under this paragraph (a)(2), including any State modification of your system specific study plan, for as long as you are required to retain your IDSE report under paragraph (b)(7) of this section.
- (iii) If you submit a model that does not fully meet the requirements under paragraph (a)(2) of this section, you must correct the deficiencies and respond to State inquiries concerning the model. If you fail to correct deficiencies or respond to inquiries to the State's satisfaction, you must conduct standard monitoring under §141.601.
- (b) **IDSE report.** Your IDSE report must include the elements required in paragraphs (b)(1) through (b)(6) of this section. You must submit your IDSE report according to the schedule in §141.600(c).
- (1) Your IDSE report must include all TTHM and HAA5 analytical results from subpart L compliance monitoring and all system specific study monitoring conducted during the period of the system specific study presented in a tabular or spreadsheet format acceptable to the State. If changed from your system specific study plan submitted under paragraph (a) of this section, your IDSE report must also include a schematic of your distribution system, the population served, and system type (subpart H or ground water).
 - (2) If you used the modeling provision under paragraph (a)(2) of this section, you must include final information for the elements described in paragraph (a)(2)(ii) of this section, and a 24-hour time series graph of residence time for each subpart V compliance monitoring location selected.
 - (3) You must recommend and justify subpart V compliance monitoring locations and timing based on the protocol in §141.605.
 - (4) Your IDSE report must include an explanation of any deviations from your approved system specific study plan.
 - (5) Your IDSE report must include the basis (analytical and modeling results) and justification you used to select the recommended subpart V monitoring locations.
 - (6) You may submit your IDSE report in lieu of your system specific study plan on the schedule identified in §141.600(c) for submission of the system specific study plan if you believe that you have the necessary information by the time that the system specific study plan is due. If you elect this approach, your IDSE report must also include all information required under paragraph (a) of this section.

- (7) You must retain a complete copy of your IDSE report submitted under this section for 10 years after the date that you submitted your IDSE report. If the State modifies the subpart V monitoring requirements that you recommended in your IDSE report or if the State approves alternative monitoring locations, you must keep a copy of the State's notification on file for 10 years after the date of the State's notification. You must make the IDSE report and any State notification available for review by the State or the public.

§141.603 40/30 certification.

- (a) **Eligibility.** You are eligible for 40/30 certification if you had no TTHM or HAA5 monitoring violations under subpart L of this part and no individual sample exceeded 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 during an eight consecutive calendar quarter period beginning no earlier than the date specified in this paragraph (a).

If your 40/30 certification is due	Then your eligibility for 40/30 certification is based on eight consecutive calendar quarters of subpart L compliance monitoring results beginning no earlier than ¹
(1) October 1, 2006	January 2004.
(2) April 1, 2007	January 2004.
(3) October 1, 2007	January 2005.
(4) April 1, 2008	January 2005.

¹Unless you are on reduced monitoring under subpart L of this part and were not required to monitor during the specified period. If you did not monitor during the specified period, you must base your eligibility on compliance samples taken during the 12 months preceding the specified period.

(b) **40/30 certification.**

- (1) You must certify to your State that every individual compliance sample taken under subpart L of this part during the periods specified in paragraph (a) of this section were ≤0.040 mg/L for TTHM and ≤0.030 mg/L for HAA5, and that you have not had any TTHM or HAA5 monitoring violations during the period specified in paragraph (a) of this section.
- (2) The State may require you to submit compliance monitoring results, distribution system schematics, and/or recommended subpart V compliance monitoring locations in addition to your certification. If you fail to submit the requested information, the State may require standard monitoring under §141.601 or a system specific study under §141.602.
- (3) The State may still require standard monitoring under §141.601 or a system specific study under §141.602 even if you meet the criteria in paragraph (a) of this section.
- (4) You must retain a complete copy of your certification submitted under this section for 10 years after the date that you submitted your certification. You must make the certification, all data upon which the certification is based, and any State notification available for review by the State or the public.

§141.604 Very small system waivers.

- (a) If you serve fewer than 500 people and you have taken TTHM and HAA5 samples under subpart L of this part, you are not required to comply with this subpart unless the State notifies you that you must conduct standard monitoring under §141.601 or a system specific study under §141.602.
- (b) If you have not taken TTHM and HAA5 samples under subpart L of this part or if the State notifies you that you must comply with this subpart, you must conduct standard monitoring under §141.601 or a system specific study under §141.602.

§141.605 Subpart V compliance monitoring location recommendations.

- (a) Your IDSE report must include your recommendations and justification for where and during what month(s) TTHM and HAA5 monitoring for subpart V of this part should be conducted. You must base your recommendations on the criteria in paragraphs (b) through (e) of this section.
- (b) You must select the number of monitoring locations specified in the table in this paragraph (b). You will use these recommended locations as subpart V routine compliance monitoring locations, unless State requires different or additional locations. You should distribute locations throughout the distribution system to the extent possible.

Source water type	Population size category	Monitoring frequency ¹	Distribution system monitoring location			
			Total per monitoring period ²	Highest TTHM locations	Highest HAA5 locations	Existing subpart L compliance locations
Subpart H:	<500	per year	2	1	1	
	500-3,300	per quarter	2	1	1	
	3,301-9,999	per quarter	2	1	1	
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥5,000,000	per quarter	20	8	7	5
Ground water:	<500	per year	2	1	1	
	500-9,999	per year	2	1	1	
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥500,000	per quarter	8	3	3	2

¹All systems must monitor during month of highest DBP concentrations.

²Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

- (c) You must recommend subpart V compliance monitoring locations based on standard monitoring results, system specific study results, and subpart L compliance monitoring results. You must follow the protocol in paragraphs (c)(1) through (c)(8) of this section. If required to monitor at more than eight locations, you must

repeat the protocol as necessary. If you do not have existing subpart L compliance monitoring results or if you do not have enough existing subpart L compliance monitoring results, you must repeat the protocol, skipping the provisions of paragraphs (c)(3) and (c)(7) of this section as necessary, until you have identified the required total number of monitoring locations.

- (1) Location with the highest TTHM LRAA not previously selected as a subpart V monitoring location.
 - (2) Location with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.
 - (3) Existing subpart L average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.
 - (4) Location with the highest TTHM LRAA not previously selected as a subpart V monitoring location.
 - (5) Location with the highest TTHM LRAA not previously selected as a subpart V monitoring location.
 - (6) Location with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.
 - (7) Existing subpart L average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest TTHM LRAA not previously selected as a subpart V monitoring location.
 - (8) Location with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.
- (d) You may recommend locations other than those specified in paragraph (c) of this section if you include a rationale for selecting other locations. If the State approves the alternate locations, you must monitor at these locations to determine compliance under subpart V of this part.
- (e) Your recommended schedule must include subpart V monitoring during the peak historical month for TTHM and HAA5 concentration, unless the State approves another month. Once you have identified the peak historical month, and if you are required to conduct routine monitoring at least quarterly, you must schedule subpart V compliance monitoring at a regular frequency of every 90 days or fewer.

[71 FR 483, Jan. 4, 2006, as amended at 74 FR 30958, June 29, 2009]

Subpart V—Stage 2 Disinfection Byproducts Requirements

SOURCE: 71 FR 488, Jan. 4, 2006, unless otherwise noted.

§141.620 General requirements.

- (a) **General.** The requirements of subpart V of this part constitute national primary drinking water regulations. The regulations in this subpart establish monitoring and other requirements for achieving compliance with maximum contaminant levels based on locational running annual averages (LRAA) for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5), and for achieving compliance with maximum residual disinfectant residuals for chlorine and chloramine for certain consecutive systems.
- (b) **Applicability.** You are subject to these requirements if your system is a community water system or a nontransient noncommunity water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.
- (c) **Schedule.** You must comply with the requirements in this subpart on the schedule in the following table based on your system type.

If you are this type of system	You must comply with subpart V monitoring by: ¹
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system	
(1) System serving $\geq 100,000$	April 1, 2012.
(2) System serving 50,000-99,999	October 1, 2012.

(3) System serving 10,000-49,999	October 1, 2013.
(4) System serving <10,000	October 1, 2013 if no <i>Cryptosporidium</i> monitoring is required under §141.701(a)(4) or October 1, 2014 if <i>Cryptosporidium</i> monitoring is required under §141.701(a)(4) or (a)(6)
Other systems that are part of a combined distribution system	
(5) Consecutive system or wholesale system	—at the same time as the system with the earliest compliance date in the combined distribution system.

¹The State may grant up to an additional 24 months for compliance with MCLs and operational evaluation levels if you require capital improvements to comply with an MCL.

- (6) Your monitoring frequency is specified in §141.621(a)(2).
 - (i) If you are required to conduct quarterly monitoring, you must begin monitoring in the first full calendar quarter that includes the compliance date in the table in this paragraph (c).
 - (ii) If you are required to conduct monitoring at a frequency that is less than quarterly, you must begin monitoring in the calendar month recommended in the IDSE report prepared under §141.601 or §141.602 or the calendar month identified in the subpart V monitoring plan developed under §141.622 no later than 12 months after the compliance date in this table.
- (7) If you are required to conduct quarterly monitoring, you must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters). If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date.
- (8) For the purpose of the schedule in this paragraph (c), the State may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The State may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.
- (d) **Monitoring and compliance—**
 - (1) **Systems required to monitor quarterly.** To comply with subpart V MCLs in §141.64(b)(2), you must calculate LRAAs for TTHM and HAA5 using monitoring results collected under this subpart and determine that each LRAA does not exceed the MCL. If you fail to complete four consecutive quarters of monitoring, you must calculate compliance with the MCL based on the average of the available data from the most recent four quarters. If you take more than one sample per quarter at a monitoring location, you must average all samples taken in the quarter at that location to determine a quarterly average to be used in the LRAA calculation.
 - (2) **Systems required to monitor yearly or less frequently.** To determine compliance with subpart V MCLs in §141.64(b)(2), you must determine that each sample taken is less than the MCL. If any sample exceeds the MCL, you must comply with the requirements of §141.625. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.
- (e) **Violation.** You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

§141.621 Routine monitoring.

(a) Monitoring.

- (1) If you submitted an IDSE report, you must begin monitoring at the locations and months you have recommended in your IDSE report submitted under §141.605 following the schedule in §141.620(c), unless the State requires other locations or additional locations after its review. If you submitted a 40/30 certification under §141.603 or you qualified for a very small system waiver under §141.604 or you are a nontransient noncommunity water system serving <10,000, you must monitor at the location(s) and dates identified in your monitoring plan in §141.132(f), updated as required by §141.622.
- (2) You must monitor at no fewer than the number of locations identified in this paragraph (a)(2).

Source water type	Population size category	Monitoring Frequency ¹	Distribution system monitoring location total per monitoring period ²
Subpart H:	<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
	250,000-999,999	per quarter	12
	1,000,000-4,999,999	per quarter	16
	≥5,000,000	per quarter	20
Ground Water:	<500	per year	2
	500-9,999	per year	2
	10,000-99,999	per quarter	4
	100,000-499,999	per quarter	6
	≥500,000	per quarter	8

¹All systems must monitor during month of highest DBP concentrations.

²Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

- (3) If you are an un-disinfected system that begins using a disinfectant other than UV light after the dates in subpart U of this part for complying with the Initial Distribution System Evaluation requirements, you must consult with the State to identify compliance monitoring locations for this subpart. You must then develop a monitoring plan under §141.622 that includes those monitoring locations.

- (b) **Analytical methods.** You must use an approved method listed in §141.131 for TTHM and HAA5 analyses in this subpart. Analyses must be conducted by laboratories that have received certification by EPA or the State as specified in §141.131.

[71 FR 488, Jan. 4, 2006, as amended at 74 FR 30958, June 29, 2009]

§141.622 Subpart V monitoring plan.

- (a)
- (1) You must develop and implement a monitoring plan to be kept on file for State and public review. The monitoring plan must contain the elements in paragraphs (a)(1)(i) through (a)(1)(iv) of this section and be complete no later than the date you conduct your initial monitoring under this subpart.
 - (i) Monitoring locations;
 - (ii) Monitoring dates;
 - (iii) Compliance calculation procedures; and
 - (iv) Monitoring plans for any other systems in the combined distribution system if the State has reduced monitoring requirements under the State authority in §142.16(m).
 - (2) If you were not required to submit an IDSE report under either §141.601 or §141.602, and you do not have sufficient subpart L monitoring locations to identify the required number of subpart V compliance monitoring locations indicated in §141.605(b), you 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. You must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If you have more subpart L monitoring locations than required for subpart V compliance monitoring in §141.605(b), you must identify which locations you will use for subpart V compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of subpart V compliance monitoring locations have been identified.
- (b) If you are a subpart H system serving >3,300 people, you must submit a copy of your monitoring plan to the State prior to the date you conduct your initial monitoring under this subpart, unless your IDSE report submitted under subpart U of this part contains all the information required by this section.
- (c) You may revise your monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for State-approved reasons, after consultation with the State regarding the need for changes and the appropriateness of changes. If you change monitoring locations, you must replace existing compliance monitoring locations with the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The State may also require modifications in your monitoring plan. If you are a subpart H system serving >3,300 people, you must submit a copy of your modified monitoring plan to the State prior to the date you are required to comply with the revised monitoring plan.

§141.623 Reduced monitoring.

- (a) You may reduce monitoring to the level specified in the table in this paragraph (a) any time the LRAA is ≤0.040 mg/L for TTHM and ≤0.030 mg/L for HAA5 at all monitoring locations. You may only use data collected under the provisions of this subpart or subpart L of this part to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be ≤4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either §141.132(b)(1)(iii) or §141.132(d).

Source water type	Population size category	Monitoring frequency ¹	Distribution system monitoring location per monitoring period
Subpart H:	<500		monitoring may not be reduced.
	500-3,300	per year	1 TTHM and 1 HAA5 sample: 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; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	3,301-9,999	per year	2 dual sample sets: 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 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs.
	50,000-249,999	per quarter	4 dual sample sets—at the locations with the two highest TTHM and two highest HAA5 LRAAs.
	250,000-999,999	per quarter	6 dual sample sets—at the locations with the three highest TTHM and three highest HAA5 LRAAs.
	1,000,000-4,999,999	per quarter	8 dual sample sets—at the locations with the four highest TTHM and four highest HAA5 LRAAs.
	≥5,000,000	per quarter	10 dual sample sets—at the locations with the five highest TTHM and five highest HAA5 LRAAs.
Ground Water:			
	<500	every third year	1 TTHM and 1 HAA5 sample: 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; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	500-9,999	per year	1 TTHM and 1 HAA5 sample: 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; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	10,000-99,999	per year	2 dual sample sets: 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 dual sample sets; at the locations with the highest TTHM and highest HAA5 LRAAs.
	≥500,000	per quarter	4 dual sample sets at the locations with the two highest TTHM and two highest HAA5 LRAAs.

¹Systems on quarterly monitoring must take dual sample sets every 90 days.

- (b) You may remain on reduced monitoring as long as the TTHM LRAA ≤ 0.040 mg/L and the HAA5 LRAA ≤ 0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample ≤ 0.060 mg/L and each HAA5 sample ≤ 0.045 mg/L (for systems with annual or less frequent monitoring). In addition, the source water annual average TOC level, before any treatment, must be ≤ 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either §141.132(b)(1)(iii) or §141.132(d).
- (c) If the LRAA based on quarterly monitoring at any monitoring location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 or if the annual (or less frequent) sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5, or if the source water annual average TOC level, before any treatment, > 4.0 mg/L at any treatment plant treating surface water or ground water under the direct influence of surface water, you must resume routine monitoring under §141.621 or begin increased monitoring if §141.625 applies.
- (d) The State may return your system to routine monitoring at the State's discretion.

§141.624 Additional requirements for consecutive systems.

If you are a consecutive system that does not add a disinfectant but delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light, you must comply with analytical and monitoring requirements for chlorine and chloramines in §141.131 (c) and §141.132(c)(1) and the compliance requirements in §141.133(c)(1) beginning April 1, 2009, unless required earlier by the State, and report monitoring results under §141.134(c).

§141.625 Conditions requiring increased monitoring.

- (a) If you are required to monitor at a particular location annually or less frequently than annually under §141.621 or §141.623, you must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations if a TTHM sample is >0.080 mg/L or a HAA5 sample is >0.060 mg/L at any location.
- (b) You are in violation of the MCL when the LRAA exceeds the subpart V MCLs in §141.64(b)(2), calculated based on four consecutive quarters of monitoring (or the LRAA calculated based on fewer than four quarters of data if the MCL would be exceeded regardless of the monitoring results of subsequent quarters). You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.
- (c) You may return to routine monitoring once you have conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is ≤ 0.060 mg/L for TTHM and ≤ 0.045 mg/L for HAA5.

§141.626 Operational evaluation levels.

- (a) You have exceeded the operational evaluation level at any monitoring location where the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by 4 to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average, exceeds 0.060 mg/L.
- (b)
 - (1) If you exceed the operational evaluation level, you must conduct an operational evaluation and submit a written report of the evaluation to the State no later than 90 days after being notified of the analytical result that causes you to exceed the operational evaluation level. The written report must be made available to the public upon request.
 - (2) Your operational evaluation must include an examination of system treatment and distribution operational practices, including storage tank operations, excess storage capacity, distribution system flushing, changes in sources or source water quality, and treatment changes or problems that may contribute to TTHM and HAA5 formation and what steps could be considered to minimize future exceedances.
 - (i) You may request and the State may allow you to limit the scope of your evaluation if you are able to identify the cause of the operational evaluation level exceedance.
 - (ii) Your request to limit the scope of the evaluation does not extend the schedule in paragraph (b)(1) of this section for submitting the written report. The State must approve this limited scope of evaluation in writing and you must keep that approval with the completed report.

§141.627 Requirements for remaining on reduced TTHM and HAA5 monitoring based on subpart L results.

You may remain on reduced monitoring after the dates identified in §141.620(c) for compliance with this subpart only if you qualify for a 40/30 certification under §141.603 or have received a very small system waiver under §141.604, plus you meet the reduced monitoring criteria in §141.623(a), and you do not change or add monitoring locations from those used for compliance monitoring under subpart L of this part. If your monitoring locations under this subpart differ from your monitoring locations under subpart L of this part, you may not remain on reduced monitoring after the dates identified in §141.620(c) for compliance with this subpart.

§141.628 Requirements for remaining on increased TTHM and HAA5 monitoring based on subpart L results.

If you were on increased monitoring under §141.132(b)(1), you must remain on increased monitoring until you qualify for a return to routine monitoring under §141.625(c). You must conduct increased monitoring under

§141.625 at the monitoring locations in the monitoring plan developed under §141.622 beginning at the date identified in §141.620(c) for compliance with this subpart and remain on increased monitoring until you qualify for a return to routine monitoring under §141.625(c).

§141.629 Reporting and recordkeeping requirements.

- (a) **Reporting.**
- (1) You must report the following information for each monitoring location to the State within 10 days of the end of any quarter in which monitoring is required:
 - (i) Number of samples taken during the last quarter.
 - (ii) Date and results of each sample taken during the last quarter.
 - (iii) Arithmetic average of quarterly results for the last four quarters for each monitoring location (LRAA), beginning at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter. If the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, you must report this information to the State as part of the first report due following the compliance date or anytime thereafter that this determination is made. If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date, unless you are required to conduct increased monitoring under §141.625.
 - (iv) Whether, based on §141.64(b)(2) and this subpart, the MCL was violated at any monitoring location.
 - (v) Any operational evaluation levels that were exceeded during the quarter and, if so, the location and date, and the calculated TTHM and HAA5 levels.
 - (2) If you are a subpart H system seeking to qualify for or remain on reduced TTHM/HAA5 monitoring, you must report the following source water TOC information for each treatment plant that treats surface water or ground water under the direct influence of surface water to the State within 10 days of the end of any quarter in which monitoring is required:
 - (i) The number of source water TOC samples taken each month during last quarter.
 - (ii) The date and result of each sample taken during last quarter.
 - (iii) The quarterly average of monthly samples taken during last quarter or the result of the quarterly sample.
 - (iv) The running annual average (RAA) of quarterly averages from the past four quarters.
 - (v) Whether the RAA exceeded 4.0 mg/L.
 - (3) The State may choose to perform calculations and determine whether the MCL was exceeded or the system is eligible for reduced monitoring in lieu of having the system report that information
- (b) **Recordkeeping.** You must retain any subpart V monitoring plans and your subpart V monitoring results as required by §141.33.

Subpart W—Enhanced Treatment for *Cryptosporidium*

SOURCE: 71 FR 769, Jan. 5, 2006, unless otherwise noted.

General Requirements

§141.700 General requirements.

- (a) The requirements of this, Subpart W, are national primary drinking water regulations. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium*. These requirements are in addition to requirements for filtration and disinfection in subparts H, P, and T of this part.
- (b) **Applicability.** The requirements of this subpart apply to all subpart H systems, which are public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water.

- (1) Wholesale systems, as defined in §141.2, must comply with the requirements of this subpart based on the population of the largest system in the combined distribution system.
 - (2) The requirements of this subpart for filtered systems apply to systems required by National Primary Drinking Water Regulations to provide filtration treatment, whether or not the system is currently operating a filtration system.
 - (3) The requirements of this subpart for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in subparts H, P, and T of this part, as applicable.
- (c) **Requirements.** Systems subject to this subpart must comply with the following requirements:
- (1) Systems must conduct an initial and a second round of source water monitoring for each plant that treats a surface water or GWUDI source. This monitoring may include sampling for *Cryptosporidium*, *E. coli*, and turbidity as described in §§141.701 through 141.706, to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.
 - (2) Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in §§141.708 through 141.709.
 - (3) Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in §141.710 and provide additional treatment for *Cryptosporidium*, if required, as described in §141.711. All unfiltered systems must provide treatment for *Cryptosporidium* as described in §141.712. Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in §141.713.
 - (4) Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility or treat the discharge from the facility as described in §141.714.
 - (5) Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in §§141.715 through 141.720.
 - (6) Systems must comply with the applicable recordkeeping and reporting requirements described in §§141.721 through 141.722.
 - (7) Systems must address significant deficiencies identified in sanitary surveys performed by EPA as described in §141.723.

Source Water Monitoring Requirements

§141.701 Source water monitoring.

- (a) **Initial round of source water monitoring.** Systems must conduct the following monitoring on the schedule in paragraph (c) of this section unless they meet the monitoring exemption criteria in paragraph (d) of this section.
- (1) Filtered 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) Unfiltered systems serving at least 10,000 people must sample their source water for *Cryptosporidium* at least monthly for 24 months.
 - (3)
 - (i) Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months.
 - (ii) A filtered system serving fewer than 10,000 people may avoid *E. coli* monitoring if the system notifies the State that it will monitor for *Cryptosporidium* as described in paragraph (a)(4) of this section. The system must notify the State no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring under §141.701(c).
 - (4) Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under paragraph (a)(3) of this section:
 - (i) For systems using lake/reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/100 mL.
 - (ii) For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/100 mL.

- (iii) The system does not conduct *E. coli* monitoring as described in paragraph (a)(3) of this section.
- (iv) Systems using ground water under the direct influence of surface water (GWUDI) must comply with the requirements of paragraph (a)(4) of this section based on the *E. coli* level that applies to the nearest surface water body. If no surface water body is nearby, the system must comply based on the requirements that apply to systems using lake/reservoir sources.
- (5) For filtered systems serving fewer than 10,000 people, the State may approve monitoring for an indicator other than *E. coli* under paragraph (a)(3) of this section. The State also may approve an alternative to the *E. coli* concentration in paragraph (a)(4)(i), (ii) or (iv) of this section to trigger *Cryptosporidium* monitoring. This approval by the State must be provided to the system in writing and must include the basis for the State's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in §141.710.
- (6) Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.
- (7) Systems may sample more frequently than required under this section if the sampling frequency is evenly spaced throughout the monitoring period.
- (b) **Second round of source water monitoring.** Systems must conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in paragraph (a) of this section, unless they meet the monitoring exemption criteria in paragraph (d) of this section. Systems must conduct this monitoring on the schedule in paragraph (c) of this section.
- (c) **Monitoring schedule.** Systems must begin the monitoring required in paragraphs (a) and (b) of this section no later than the month beginning with the date listed in this table:

Source Water Monitoring Starting Dates Table

Systems that serve...	Must begin the first round of source water monitoring no later than the month beginning . . .	And must begin the second round of source water monitoring no later than the month beginning...
(1) At least 100,000 people	(i) October 1, 2006	(ii) April 1, 2015.
(2) From 50,000 to 99,999 people	(i) April 1, 2007	(ii) October 1, 2015.
(3) From 10,000 to 49,999 people	(i) April 1, 2008	(ii) October 1, 2016.
(4) Fewer than 10,000 and monitor for <i>E. coli</i> ^a	(i) October 1, 2008	(ii) October 1, 2017.
(5) Fewer than 10,000 and monitor for <i>Cryptosporidium</i> ^b	(i) April 1, 2010	(ii) April 1, 2019.

^aApplies only to filtered systems.

^bApplies to filtered systems that meet the conditions of paragraph (a)(4) of this section and unfiltered systems.

- (d) **Monitoring avoidance.**
 - (1) Filtered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in §141.711.

- (2) Unfiltered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 3-log *Cryptosporidium* inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L in §141.712.
- (3) If a system chooses to provide the level of treatment in paragraph (d)(1) or (2) of this section, as applicable, rather than start source water monitoring, the system must notify the State in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under §141.702. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the State in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in §141.713.
- (e) **Plants operating only part of the year.** Systems with subpart H plants that operate for only part of the year must conduct source water monitoring in accordance with this subpart, but with the following modifications:
 - (1) Systems must sample their source water only during the months that the plant operates unless the State 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 *Cryptosporidium* samples per year during each of two years of monitoring. Samples must be evenly spaced throughout the period the plant operates.
- (f)
 - (1) **New sources.** A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under paragraph (c) of this section must monitor the new source on a schedule the State approves. Source water monitoring must meet the requirements of this subpart. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of §§141.710 and 141.711 or §141.712, as applicable, for the new source on a schedule the State approves.
 - (2) The requirements of §141.701(f) apply to subpart H systems that begin operation after the monitoring start date applicable to the system's size under paragraph (c) of this section.
 - (3) The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under §141.710 or determination of the mean *Cryptosporidium* level under §141.712, as applicable.
- (g) Failure to collect any source water sample required under this section in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of §§141.702 through 141.706 is a monitoring violation.
- (h) **Grandfathering monitoring data.** Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in paragraph (c) of this section to meet the initial source water monitoring requirements in paragraph (a) of this section. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in §141.707.

§141.702 Sampling schedules.

- (a) Systems required to conduct source water monitoring under §141.701 must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.
 - (1) Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in §141.701(c) for each round of required monitoring.
 - (2)
 - (i) Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under §141.701(a) to EPA electronically at <https://intranet.epa.gov/lt2/>.
 - (ii) If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that EPA approves.
 - (3) Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring §141.701(a) to the State.
 - (4) Systems must submit sampling schedules for the second round of source water monitoring §141.701(b) to the State.

- (5) If EPA or the State does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.
- (b) Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (*i.e.*, within a five-day period around the schedule date) unless one of the conditions of paragraph (b)(1) or (2) of this section applies.
 - (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 State approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the State concurrent with the shipment of the sample to the laboratory.
 - (2)
 - (i) 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 requirements, including the quality control requirements in §141.704, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.
 - (ii) The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the State approves an alternative resampling date. The system must submit an explanation for the delayed sampling date to the State concurrent with the shipment of the sample to the laboratory.
- (c) Systems that fail to meet the criteria of paragraph (b) of this section for any source water sample required under §141.701 must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the State for approval prior to when the system begins collecting the missed samples.

§141.703 Sampling locations.

- (a) Systems required to conduct source water monitoring under §141.701 must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the State may approve one set of monitoring results to be used to satisfy the requirements of §141.701 for all plants.
- (b)
 - (1) Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of paragraph (b)(2) of this section.
 - (2) The State may approve a system to collect a source water sample after chemical treatment. To grant this approval, the State must determine that collecting a sample 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.
- (c) Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.
- (d) **Bank filtration.**
 - (1) Systems that receive *Cryptosporidium* treatment credit for bank filtration under §141.173(b) or §141.552(a), as applicable, must collect source water samples in the surface water prior to bank filtration.
 - (2) Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (*i.e.*, after bank filtration). 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 §141.717(c).
- (e) **Multiple sources.** Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in paragraph (e)(1) or (2) of this section. The use of multiple sources during monitoring must be consistent with routine operational practice.

- (1) If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.
- (2) If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either paragraph (e)(2)(i) or (ii) of this section for sample analysis.
 - (i) Systems may composite samples from each source into one sample prior to analysis. The volume of 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.
 - (ii) Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.
- (f) **Additional Requirements.** Systems must submit a description of their sampling location(s) to the State at the same time as the sampling schedule required under §141.702. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the State does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).

§141.704 Analytical methods.

- (a) **Cryptosporidium.** Systems must analyze for *Cryptosporidium* using Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-002 or Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-001, which are incorporated by reference, or alternative methods listed in appendix A to subpart C of this part. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods online from <http://www.epa.gov/safewater/disinfection/lt2> or from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave., NW., Washington, DC 20460 (Telephone: 800-426-4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW., Washington, DC (Telephone: 202-566-2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.
 - (1) Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL as generated by the methods listed in paragraph (a) of this section. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in paragraph (a) of this section, up to a packed pellet volume of at least 2 mL.
 - (2)
 - (i) Matrix spike (MS) samples, as required by the methods in paragraph (a) of this section, must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under §141.705.
 - (ii) 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.
 - (3) Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.
- (b) ***E. coli.*** System must use methods for enumeration of *E. coli* in source water approved in §136.3(a) of this chapter or alternative methods listed in appendix A to subpart C of this part.
 - (1) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of paragraph (b)(2) of this section.
 - (2) The State may approve on a case-by-case basis the holding of an *E. coli* sample for up to 48 hours between sample collection and initiation of analysis if the State determines that analyzing an *E. coli* sample within 30 hours is not feasible. *E. coli* samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in §136.3(a) of this title.
 - (3) Systems must maintain samples between 0 °C and 10 °C during storage and transit to the laboratory.
- (c) **Turbidity.** Systems must use methods for turbidity measurement approved in §141.74(a)(1).

§141.705 Approved laboratories.

- (a) ***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 or a laboratory that has been certified for *Cryptosporidium* analysis by an equivalent State laboratory certification program.
- (b) ***E. coli***. Any laboratory certified by the EPA, the National Environmental Laboratory Accreditation Conference or the State for total coliform or fecal coliform analysis under §141.74 is approved for *E. coli* analysis under this subpart when the laboratory uses the same technique for *E. coli* that the laboratory uses for §141.74.
- (c) **Turbidity**. Measurements of turbidity must be made by a party approved by the State.

§141.706 Reporting source water monitoring results.

- (a) Systems must report results from the source water monitoring required under §141.701 no later than 10 days after the end of the first month following the month when the sample is collected.
- (b)
 - (1) All systems serving at least 10,000 people must report the results from the initial source water monitoring required under §141.701(a) to EPA electronically at <https://intranet.epa.gov/lt2/>.
 - (2) If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that EPA approves.
- (c) Systems serving fewer than 10,000 people must report results from the initial source water monitoring required under §141.701(a) to the State.
- (d) All systems must report results from the second round of source water monitoring required under §141.701(b) to the State.
- (e) Systems must report the applicable information in paragraphs (e)(1) and (2) of this section for the source water monitoring required under §141.701.
 - (1) Systems must report the following data elements for each *Cryptosporidium* analysis:

DATA ELEMENT.
1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Sample type (field or matrix spike).
5. Sample volume filtered (L), to nearest ¼ L.
6. Was 100% of filtered volume examined.
7. Number of oocysts counted.

- (i) For matrix spike samples, systems must also report the sample volume spiked and estimated number of oocysts spiked. These data are not required for field samples.
- (ii) For samples in which less than 10 L is filtered or less than 100% of the sample volume is examined, systems must also report the number of filters used and the packed pellet volume.

- (iii) For samples in which less than 100% of sample volume is examined, systems must also report the volume of re-suspended concentrate and volume of this resuspension processed through immunomagnetic separation.
- (2) Systems must report the following data elements for each *E. coli* analysis:

DATA ELEMENT.
1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Analytical method number.
5. Method type.
6. Source type (flowing stream, lake/reservoir, GWUDI).
7. <i>E. coli</i> /100 mL.
8. Turbidity. ¹

¹Systems serving fewer than 10,000 people that are not required to monitor for turbidity under §141.701 are not required to report turbidity with their *E. coli* results.

§141.707 Grandfathering previously collected data.

- (a)
 - (1) Systems may comply with the initial source water monitoring requirements of §141.701(a) by grandfathering sample results collected before the system is required to begin monitoring (*i.e.*, previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in this section and the State must approve.
 - (2) A filtered system may grandfather *Cryptosporidium* samples to meet the requirements of §141.701(a) when the system does not have corresponding *E. coli* and turbidity samples. A system that grandfathers *Cryptosporidium* samples without *E. coli* and turbidity samples is not required to collect *E. coli* and turbidity samples when the system completes the requirements for *Cryptosporidium* monitoring under §141.701(a).
- (b) ***E. coli* sample analysis.** The analysis of *E. coli* samples must meet the analytical method and approved laboratory requirements of §§141.704 through 141.705.
- (c) ***Cryptosporidium* sample analysis.** The analysis of *Cryptosporidium* samples must meet the criteria in this paragraph.
 - (1) Laboratories analyzed *Cryptosporidium* samples using one of the analytical methods in paragraphs (c)(1)(i) through (vi) of this section, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods on-line from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave, NW, Washington, DC 20460 (Telephone: 800-426-4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202-566-2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at

NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

- (i) **Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA**, 2005, United States Environmental Protection Agency, EPA-815-R-05-002.
 - (ii) **Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA**, 2005, United States Environmental Protection Agency, EPA-815-R-05-001.
 - (iii) **Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA**, 2001, United States Environmental Protection Agency, EPA-821-R-01-025.
 - (iv) **Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA**, 2001, United States Environmental Protection Agency, EPA-821--R-01-026.
 - (v) **Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA**, 1999, United States Environmental Protection Agency, EPA-821-R-99-006.
 - (vi) **Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA**, 1999, United States Environmental Protection Agency, EPA-821-R-99-001.
- (2) For each *Cryptosporidium* sample, the laboratory analyzed at least 10 L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods listed in paragraph (c)(1) of this section.
- (d) **Sampling location.** The sampling location must meet the conditions in §141.703.
- (e) **Sampling frequency. *Cryptosporidium*** samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in §141.702(b)(1) and (2) if the system provides documentation of the condition when reporting monitoring results.
- (1) The State may approve grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the State specifies to ensure that the data used to comply with the initial source water monitoring requirements of §141.701(a) are seasonally representative and unbiased.
 - (2) Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems must follow the monthly averaging procedure in §141.710(b)(5) or §141.712(a)(3), as applicable, when calculating the bin classification for filtered systems or the mean *Cryptosporidium* concentration for unfiltered systems.
- (f) **Reporting monitoring results for grandfathering.** Systems that request to grandfather previously collected monitoring results must report the following information by the applicable dates listed in this paragraph. Systems serving at least 10,000 people must report this information to EPA unless the State approves reporting to the State rather than EPA. Systems serving fewer than 10,000 people must report this information to the State.
- (1) Systems must report that they intend to submit previously collected monitoring results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of §141.701(a). Systems must report this information no later than the date the sampling schedule under §141.702 is required.
 - (2) Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in paragraphs (f)(2)(i) through (iv) of this section, no later than two months after the applicable date listed in §141.701(c).
 - (i) For each sample result, systems must report the applicable data elements in §141.706.
 - (ii) Systems must certify that the reported monitoring results include all results the system generated during the time period beginning with the first reported result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring under this subpart, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in this section.
 - (iii) Systems must certify that the samples were representative of a plant's source water(s) and the source water(s) have not changed. Systems must report a description of the sampling location(s), which must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.

- (iv) For *Cryptosporidium* samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (c)(1) of this section were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.
- (g) If the State determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the State may disapprove the data. Alternatively, the State may approve the previously collected data if the system reports additional source water monitoring data, as determined by the State, to ensure that the data set used under §141.710 or §141.712 represents average source water conditions for the system.
- (h) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring under §141.701(a) and some of the data are rejected due to not meeting the requirements of this section, systems must conduct additional monitoring to replace rejected data on a schedule the State approves. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

Disinfection Profiling and Benchmarking Requirements

§141.708 Requirements when making a significant change in disinfection practice.

- (a) Following the completion of initial source water monitoring under §141.701(a), a system that plans to make a significant change to its disinfection practice, as defined in paragraph (b) of this section, must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in §141.709. Prior to changing the disinfection practice, the system must notify the State and must include in this notice the information in paragraphs (a)(1) through (3) of this section.
 - (1) A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in §141.709.
 - (2) A description of the proposed change in disinfection practice.
 - (3) An analysis of how the proposed change will affect the current level of disinfection.
- (b) Significant changes to disinfection practice are defined as follows:
 - (1) Changes to the point of disinfection;
 - (2) Changes to the disinfectant(s) used in the treatment plant;
 - (3) Changes to the disinfection process; or
 - (4) Any other modification identified by the State as a significant change to disinfection practice.

§141.709 Developing the disinfection profile and benchmark.

- (a) Systems required to develop disinfection profiles under §141.708 must follow the requirements of this section. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire plant, based on CT_{99,9} values in Tables 1.1 through 1.6, 2.1 and 3.1 of §141.74(b) as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the State.
- (b) Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in paragraphs (b)(1) through (4) of this section. Systems with more than one point of disinfectant application must conduct the monitoring in paragraphs (b)(1) through (4) of this section for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in §141.74(a).
 - (1) For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the State.

- (2) For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the State.
 - (3) The disinfectant contact time(s) (t) must be determined during peak hourly flow.
 - (4) The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.
- (c) In lieu of conducting new monitoring under paragraph (b) of this section, systems may elect to meet the requirements of paragraphs (c)(1) or (2) of this section.
- (1) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of paragraph (b) of this section may use these data to develop disinfection profiles as specified in this section if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.
 - (2) Systems may use disinfection profile(s) developed under §141.172 or §§141.530 through 141.536 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under §141.172 or §§141.530 through 141.536 must develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.
- (d) Systems must calculate the total inactivation ratio for *Giardia lamblia* as specified in paragraphs (d)(1) through (3) of this section.
- (1) Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (d)(1)(i) or (ii) of this section.
 - (i) Determine one inactivation ratio ($CT_{calc}/CT_{99.9}$) before or at the first customer during peak hourly flow.
 - (ii) Determine successive $CT_{calc}/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. 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 ($\Sigma (CT_{calc}/CT_{99.9})$).
 - (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. The ($CT_{calc}/CT_{99.9}$) value of each segment and ($\Sigma (CT_{calc}/CT_{99.9})$) must be calculated using the method in paragraph (d)(1)(ii) of this section.
 - (3) The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (d)(1) or (d)(2) of this section by 3.0.
 - (4) Systems must calculate the log of inactivation for viruses using a protocol approved by the State.
- (e) Systems must use the procedures specified in paragraphs (e)(1) and (2) of this section to calculate a disinfection benchmark.
- (1) For each year of profiling data collected and calculated under paragraphs (a) through (d) of this section, 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) The disinfection benchmark is the lowest monthly mean value (for systems with one year of profiling data) or the mean of the lowest monthly mean values (for systems with more than one year of profiling data) of *Giardia lamblia* and virus log inactivation in each year of profiling data.

Treatment Technique Requirements

§141.710 Bin classification for filtered systems.

- (a) Following completion of the initial round of source water monitoring required under §141.701(a), filtered 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 §141.701(a) and must follow the procedures in paragraphs (b)(1) through (5) of this section.

- (b)
- (1) 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) For systems that collect a total of 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) For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (*i.e.*, collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.
 - (4) For systems with plants operating only part of the year that monitor fewer than 12 months per year under §141.701(e), 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 in paragraphs (b)(1) through (4) of this section.
- (c) Filtered systems must determine their initial bin classification from the following table and using the *Cryptosporidium* bin concentration calculated under paragraphs (a)-(b) of this section:

Bin Classification Table for Filtered Systems

For systems that are:	With a <i>Cryptosporidium</i> bin concentration of... ¹	The bin classification is...
. . . required to monitor for <i>Cryptosporidium</i> under §141.701	<i>Cryptosporidium</i> <0.075 oocyst/L	Bin 1.
	$0.075 \text{ oocysts/L} \leq \textit{Cryptosporidium} < 1.0 \text{ oocysts/L}$	Bin 2.
	$1.0 \text{ oocysts/L} \leq \textit{Cryptosporidium} < 3.0 \text{ oocysts/L}$	Bin 3.
	<i>Cryptosporidium</i> ≥ 3.0 oocysts/L	Bin 4.
. . . serving fewer than 10,000 people and NOT required to monitor for <i>Cryptosporidium</i> under §141.701(a)(4)	NA	Bin 1.

¹Based on calculations in paragraph (a) or (d) of this section, as applicable.

- (d) Following completion of the second round of source water monitoring required under §141.701(b), filtered systems must recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported under §141.701(b) and following the procedures in paragraphs (b)(1) through (4) of this section. Systems must then re-determine their bin classification using this bin concentration and the table in paragraph (c) of this section.
- (e)
- (1) Filtered systems must report their initial bin classification under paragraph (c) of this section to the State for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in §141.701(c).
 - (2) Systems must report their bin classification under paragraph (d) of this section to the State for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in §141.701(c).
 - (3) The bin classification report to the State must include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

- (f) Failure to comply with the conditions of paragraph (e) of this section is a violation of the treatment technique requirement.

§141.711 Filtered system additional *Cryptosporidium* treatment requirements.

- (a) Filtered systems must provide the level of additional treatment for *Cryptosporidium* specified in this paragraph based on their bin classification as determined under §141.710 and according to the schedule in §141.713.

If the system bin classification is...	And the system uses the following filtration treatment in full compliance with subparts H, P, and T of this part (as applicable), then the additional <i>Cryptosporidium</i> treatment requirements are...			
	Conventional filtration treatment (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	(¹)
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	(²)
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	(³)

¹As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.

²As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.

³As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

- (b)
- (1) Filtered systems must use one or more of the treatment and management options listed in §141.715, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in paragraph (a) of this section.
 - (2) Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under paragraph (a) of this section using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in §§141.716 through 141.720.
- (c) Failure by a system in any month to achieve treatment credit by meeting criteria in §§141.716 through 141.720 for microbial toolbox options that is at least equal to the level of treatment required in paragraph (a) of this section is a violation of the treatment technique requirement.
- (d) If the State determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under §141.701(a) or §141.701(b), 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 State to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in §141.715.

§141.712 Unfiltered system *Cryptosporidium* treatment requirements.

- (a) **Determination of mean *Cryptosporidium* level.**
- (1) Following completion of the initial source water monitoring required under §141.701(a), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under §141.701(a). Systems must report this value to the State for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in §141.701(c).
 - (2) Following completion of the second round of source water monitoring required under §141.701(b), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under §141.701(b). Systems must report this value to the State for approval no later than 6

months after the month the system is required to complete the second round of source water monitoring based on the schedule in §141.701(c).

- (3) 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 calculation of the mean *Cryptosporidium* level in paragraphs (a)(1) or (2) of this section.
 - (4) The report to the State of the mean *Cryptosporidium* levels calculated under paragraphs (a)(1) and (2) of this section must include a summary of the source water monitoring data used for the calculation.
 - (5) Failure to comply with the conditions of paragraph (a) of this section is a violation of the treatment technique requirement.
- (b) ***Cryptosporidium* inactivation requirements.** Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in this paragraph, based on their mean *Cryptosporidium* levels as determined under paragraph (a) of this section and according to the schedule in §141.713.
- (1) Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.
 - (2) Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3-log *Cryptosporidium* inactivation.
- (c) ***Inactivation treatment technology requirements.*** Unfiltered systems must use chlorine dioxide, ozone, or UV as described in §141.720 to meet the *Cryptosporidium* inactivation requirements of this section.
- (1) Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section on more than one day in the calendar month are in violation of the treatment technique requirement.
 - (2) Systems that use UV light and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section by meeting the criteria in §141.720(d)(3)(ii) are in violation of the treatment technique requirement.
- (d) ***Use of two disinfectants.*** Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of this section and *Giardia lamblia* and virus inactivation requirements of §141.72(a) using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either *Cryptosporidium*, *Giardia lamblia*, or viruses.

§141.713 Schedule for compliance with *Cryptosporidium* treatment requirements.

- (a) Following initial bin classification under §141.710(c), filtered systems must provide the level of treatment for *Cryptosporidium* required under §141.711 according to the schedule in paragraph (c) of this section.
- (b) Following initial determination of the mean *Cryptosporidium* level under §141.712(a)(1), unfiltered systems must provide the level of treatment for *Cryptosporidium* required under §141.712 according to the schedule in paragraph (c) of this section.
- (c) ***Cryptosporidium* treatment compliance dates.**

Cryptosporidium Treatment Compliance Dates Table

Systems that serve...	Must comply with <i>Cryptosporidium</i> treatment requirements no later than... ^a
(1) At least 100,000 people	(i) April 1, 2012.
(2) From 50,000 to 99,999 people	(i) October 1, 2012.
(3) From 10,000 to 49,999 people	(i) October 1, 2013.
(4) Fewer than 10,000 people	(i) October 1, 2014.

^aStates may allow up to an additional two years for complying with the treatment requirement for systems making capital improvements.

- (d) If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under §141.710(d), the system must provide the level of treatment for *Cryptosporidium* required under §141.711 on a schedule the State approves.
- (e) If the mean *Cryptosporidium* level for an unfiltered system changes following the second round of monitoring, as determined under §141.712(a)(2), and if the system must provide a different level of *Cryptosporidium* treatment under §141.712 due to this change, the system must meet this treatment requirement on a schedule the State approves.

§141.714 Requirements for uncovered finished water storage facilities.

- (a) Systems using uncovered finished water storage facilities must comply with the conditions of this section.
- (b) Systems must notify the State of the use of each uncovered finished water storage facility no later than April 1, 2008.
- (c) Systems must meet the conditions of paragraph (c)(1) or (2) of this section for each uncovered finished water storage facility or be in compliance with a State-approved schedule to meet these conditions no later than April 1, 2009.
 - (1) Systems must cover any uncovered finished water storage facility.
 - (2) Systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium* using a protocol approved by the State.
- (d) Failure to comply with the requirements of this section is a violation of the treatment technique requirement.

Requirements for Microbial Toolbox Components

§141.715 Microbial toolbox options for meeting *Cryptosporidium* treatment requirements.

- (a)
 - (1) Systems receive the treatment credits listed in the table in paragraph (b) of this section by meeting the conditions for microbial toolbox options described in §§141.716 through 141.720. Systems apply these treatment credits to meet the treatment requirements in §141.711 or §141.712, as applicable.
 - (2) Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in §141.720 only.
- (b) The following table summarizes options in the microbial toolbox:

Microbial Toolbox Summary Table: Options, Treatment Credits and Criteria

Toolbox Option	<i>Cryptosporidium</i> treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
(1) Watershed control program	0.5-log credit for State-approved program comprising required elements, annual program status report to State, and regular watershed survey. Unfiltered systems are not eligible for credit. Specific criteria are in §141.716(a).
(2) Alternative source/intake management	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in §141.716(b).
Pre Filtration Toolbox Options	
(3) Presedimentation basin with coagulation	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 State-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through basins. Specific criteria are in §141.717(a).

(4) Two-stage lime softening	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. Specific criteria are in §141.717(b).
(5) Bank filtration	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. Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in §141.717(c).
Treatment Performance Toolbox Options	
(6) Combined filter performance	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. Specific criteria are in §141.718(a).
(7) Individual filter performance	0.5-log credit (in addition to 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. Specific criteria are in §141.718(b).
(8) Demonstration of performance	Credit awarded to unit process or treatment train based on a demonstration to the State with a State- approved protocol. Specific criteria are in §141.718(c).
Additional Filtration Toolbox Options	
(9) Bag or cartridge filters (individual filters)	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in §141.719(a).
(10) Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in §141.719(a).
(11) Membrane filtration	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in §141.719(b).
(12) Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in §141.719(c)
(13) Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in §141.719(d).
Inactivation Toolbox Options	
(14) Chlorine dioxide	Log credit based on measured CT in relation to CT table. Specific criteria in §141.720(b)
(15) Ozone	Log credit based on measured CT in relation to CT table. Specific criteria in §141.720(b).
(16) UV	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. Specific criteria in §141.720(d).

§141.716 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 section.

- (1) Systems that intend to apply for the watershed control program credit must notify the State of this intent no later than two years prior to the treatment compliance date applicable to the system in §141.713.
- (2) Systems must submit to the State a proposed watershed control-plan no later than one year before the applicable treatment compliance date in §141.713. The State must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the elements in paragraphs (a)(2)(i) through (iv) of this section.
 - (i) 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 paragraph (a)(5)(ii) of this section.
 - (ii) 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.
 - (iii) 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.
 - (iv) 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) Systems with existing watershed control programs (*i.e.*, programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in paragraph (a)(2) of this section and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.
- (4) If the State does not respond to a system regarding approval of a watershed control plan submitted under this section and the system meets the other requirements of this section, the watershed control program will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded unless and until the State subsequently withdraws such approval.
- (5) Systems must complete the actions in paragraphs (a)(5)(i) through (iii) of this section to maintain the 0.5-log credit.
 - (i) Submit an annual watershed control program status report to the State. 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. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the State or as the result of the watershed survey conducted under paragraph (a)(5)(ii) of this section. 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 State 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.
 - (ii) 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 State. The survey must be conducted according to State guidelines and by persons the State approves.
 - (A) The watershed sanitary survey must meet the following criteria: encompass the region identified in the State-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*.
 - (B) If the State determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the State requires, which may be earlier than the regular date in paragraph (a)(5)(ii) of this section.
 - (iii) 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 State may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.

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

(b) **Alternative source.**

- (1) 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 State approves, a system may determine its bin classification under §141.710 based on the alternative source monitoring results.
- (2) If systems conduct alternative source monitoring under paragraph (b)(1) of this section, systems must also monitor their current plant intake concurrently as described in §141.701.
- (3) Alternative source monitoring under paragraph (b)(1) of this section must meet the requirements for source monitoring to determine bin classification, as described in §§141.701 through 141.706. Systems must report the alternative source monitoring results to the State, along with supporting information documenting the operating conditions under which the samples were collected.
- (4) If a system determines its bin classification under §141.710 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 §141.713.

§141.717 Pre-filtration 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 GWUDI source.
- (2) The system must continuously add a coagulant to the presedimentation basin.
- (3) The presedimentation basin must achieve the performance criteria in paragraph (3)(i) or (ii) of this section.
 - (i) 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: $\log_{10}(\text{monthly mean of daily influent turbidity}) - \log_{10}(\text{monthly mean of daily effluent turbidity})$.
 - (ii) Complies with State-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 GWUDI 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 §141.701(a) must collect samples as described in §141.703(d) and are not eligible for this credit.

- (1) Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in paragraph (c)(4) of this section.
- (2) 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) Only horizontal and vertical wells are eligible for treatment credit.

- (4) For vertical wells, the ground water 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 ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.
- (5) 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 State and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the State determines that microbial removal has been compromised, the State may revoke treatment credit until the system implements corrective actions approved by the State to remediate the problem.
- (6) Springs and infiltration galleries are not eligible for treatment credit under this section, but are eligible for credit under §141.718(c)
- (7) **Bank filtration demonstration of performance.** The State may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in paragraphs (c)(1) - (5) of this section.
 - (i) The study must follow a State-approved protocol and must involve the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.
 - (ii) The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

§141.718 Treatment performance toolbox components.

- (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 §141.74(a) and (c).
- (b) **Individual filter performance.** Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be in addition to the 0.5-log credit under paragraph (a) of this section, during any month the system meets the criteria in this paragraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in §141.174 or §141.560, as applicable.
 - (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 paragraph (b)(1) or (2) of this section during any month does not receive a treatment technique violation under §141.711(c) if the State determines the following:
 - (i) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.
 - (ii) The system has experienced no more than two such failures in any calendar year.
- (c) **Demonstration of performance.** The State 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 §141.711 or §§141.717 through 141.720 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 §§141.717 through 141.720 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 State-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 State 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 State 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.

§141.719 Additional filtration toolbox components.

(a) **Bag and cartridge filters.** Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in paragraphs (a)(1) through (10) of this section. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of paragraphs (a)(2) through (9) of this section to the State. The filters must treat the entire plant flow taken from a subpart H source.

- (1) The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in paragraphs (a)(2) through (a)(9) of this section. A factor of safety 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 paragraphs (a)(2) through (9) of this section.
- (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 discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may 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 the following equation:

$$\text{Maximum Feed Concentration} = 1 \times 10^4 \times (\text{Filtrate Detection Limit})$$

- (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 establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this subpart.
- (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:

$$\text{LRV} = \text{LOG}_{10}(\text{C}_f) - \text{LOG}_{10}(\text{C}_p)$$

Where:

LRV = log removal value demonstrated during challenge testing; **C_f** = the feed concentration measured during the challenge test; and **C_p** = the filtrate concentration measured during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then 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 (LRV_{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 LRV_{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 10th percentile of the set of LRV_{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 10th 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 State.

(b) **Membrane filtration.**

(1) Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in §141.2 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under paragraph (b)(1)(i) and (ii) of this section.

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (b)(2) of this section.

(ii) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in paragraph (b)(3) of this section.

(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 State. Challenge testing must be conducted according to the criteria in paragraphs (b)(2)(i) through (vii) of this section. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in paragraphs (b)(2)(i) through (vii) of this section.

(i) 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.

(ii) Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism 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 may not be used.

(iii) 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:

$$\text{Maximum Feed Concentration} = 3.16 \times 10^6 \times (\text{Filtrate Detection Limit})$$

(iv) 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).

(v) 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:

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

Where:

LRV = log removal value demonstrated during the 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 is 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.

- (vi) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value (LRV_{C-Test}). If fewer than 20 modules are tested, then LRV_{C-Test} is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then LRV_{C-Test} is equal to the 10th 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 10th percentile may be calculated using linear interpolation.
 - (vii) The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.
 - (viii) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the State.
- (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 to the membrane filtration process and meets the requirements described in paragraphs (b)(3)(i) through (vi) of this section. 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).
- (i) 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.
 - (ii) 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.
 - (iii) The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the State, 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 paragraph (b)(3)(iii)(A) or (B) of this section as applicable to the type of direct integrity test the system uses.
 - (A) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

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

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. The volumetric concentration factor is the ratio of the suspended solids

concentration on the high pressure side of the membrane relative to that in the feed water.

- (B) For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

$$\text{LRV}_{\text{DIT}} = \text{LOG}_{10}(\text{C}_f) - \text{LOG}_{10}(\text{C}_p)$$

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.

- (iv) 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 State.
- (v) If the result of a direct integrity test exceeds the control limit established under paragraph (b)(3)(iv) of this section, 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.
- (vi) 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 State 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 criteria in paragraphs (b)(4)(i) through (v) of this section. 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 paragraphs (b)(3)(i) through (v) of this section is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the State summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.
- (i) Unless the State approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.
- (ii) Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.
- (iii) Continuous monitoring must be separately conducted on each membrane unit.
- (iv) 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 paragraphs (b)(3)(i) through (v) of this section.
- (v) If indirect integrity monitoring includes a State-approved alternative parameter and if the alternative parameter exceeds a State-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 paragraphs (b)(3)(i) through (v) of this section.
- (c) **Second stage filtration.** Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the State 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 GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The State 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 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 GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The State must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

§141.720 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 paragraph (b) or (c) of this section must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in §§141.74(a) through (b).
- (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 measurable 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)** Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in paragraph (a) of this section.

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
(i) 0.25	159	153	140	128	107	90	69	45	29	19	12
(ii) 0.5	319	305	279	256	214	180	138	89	58	38	24
(iii) 1.0	637	610	558	511	429	360	277	179	116	75	49
(iv) 1.5	956	915	838	767	643	539	415	268	174	113	73
(v) 2.0	1275	1220	1117	1023	858	719	553	357	232	150	98
(vi) 2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122
(vii) 3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

¹Systems may use this equation to determine log credit between the indicated values: $\text{Log credit} = (0.001506 \times (1.09116)^{\text{Temp}}) \times \text{CT}$.

(3) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in paragraph (a) of this section.

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
(i) 0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
(ii) 0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
(iii) 1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
(iv) 1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4

(v) 2.0	48	46	42	38	32	26	20	12	7.8	4.9	3.1
(vi) 2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
(vii) 3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

¹Systems may use this equation to determine log credit between the indicated values: $\text{Log credit} = (0.0397 \times (1.09757)^{\text{Temp}}) \times \text{CT}$.

- (c) **Site-specific study.** The State may approve alternative chlorine dioxide or ozone CT values to those listed in paragraph (b) of this section on a site-specific basis. The State must base this approval on a site-specific study a system conducts that follows a State-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 paragraph (d)(1) of this section. Systems must validate and monitor UV reactors as described in paragraphs (d)(2) and (3) of this section to demonstrate that they are achieving a particular UV dose value for treatment credit.
- (4) **UV dose table.** The treatment credits listed in this table 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, as described in paragraph (d)(2) of this section. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.

UV Dose Table for *Cryptosporidium*, *Giardia lamblia*, and Virus Inactivation Credit

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)
(i) 0.5	1.6	1.5	39
(ii) 1.0	2.5	2.1	58
(iii) 1.5	3.9	3.0	79
(iv) 2.0	5.8	5.2	100
(v) 2.5	8.5	7.7	121
(vi) 3.0	12	11	143
(vii) 3.5	15	15	163
(viii) 4.0	22	22	186

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

- (i) 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.
 - (ii) 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.
 - (iii) The State may approve an alternative approach to validation testing.
- (3) Reactor monitoring.**
- (i) Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under paragraph (d)(2) of this section. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the State designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the State approves.
 - (ii) 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, as described in paragraphs (d)(1) and (2) of this section. Systems must demonstrate compliance with this condition by the monitoring required under paragraph (d)(3)(i) of this section.

Reporting and Recordkeeping Requirements

§141.721 Reporting requirements.

- (a) Systems must report sampling schedules under §141.702 and source water monitoring results under §141.706 unless they notify the State that they will not conduct source water monitoring due to meeting the criteria of §141.701(d).
- (b) Systems must report the use of uncovered finished water storage facilities to the State as described in §141.714.
- (c) Filtered systems must report their *Cryptosporidium* bin classification as described in §141.710.
- (d) Unfiltered systems must report their mean source water *Cryptosporidium* level as described in §141.712.
- (e) Systems must report disinfection profiles and benchmarks to the State as described in §§141.708 through 141.709 prior to making a significant change in disinfection practice.
- (f) Systems must report to the State in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under §141.711 or §141.712. Alternatively, the State may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

Microbial Toolbox Reporting Requirements

Toolbox option	Systems must submit the following information	On the following schedule
(1) Watershed control program (WCP)	(i) 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 §141.713
	(ii) Watershed control plan	No later than one year before the applicable treatment compliance date in §141.713.
	(iii) Annual watershed control program status report	Every 12 months, beginning one year after the applicable treatment compliance date in §141.713.

	(iv) Watershed sanitary survey report	For community water systems, every three years beginning three years after the applicable treatment compliance date in §141.713. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in §141.713.
(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 §141.713.
(3) Presedimentation	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100% of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative State-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 §141.713.
(4) Two-stage lime softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration (ii) Both stages treated 100% of the plant flow	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(5) Bank filtration	(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit)	No later than the applicable treatment compliance date in §141.713.
	(ii) If monthly average of daily max 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 §141.713.
(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 §141.713.
(7) Individual filter performance	Monthly verification of the following: (i) 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 (ii) No individual filter 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 §141.713.]
(8) Demonstration of performance	(i) Results from testing following a State approved protocol (ii) As required by the State, monthly verification of operation within conditions of State approval for demonstration of performance credit	No later than the applicable treatment compliance date in §141.713. Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.

(9) Bag filters and cartridge filters	(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge filtration; (B) Removal efficiency established through challenge testing that meets criteria in this subpart	No later than the applicable treatment compliance date in §141.713.
	(ii) Monthly verification that 100% of plant flow was filtered	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(10) Membrane filtration	(i) Results of verification testing demonstrating the following: (A) Removal efficiency established through challenge testing that meets criteria in this subpart; (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline	No later than the applicable treatment compliance date in §141.713.
	(ii) Monthly report summarizing the following: (A) All direct integrity tests above the control limit; (B) If applicable, any turbidity or alternative state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(11) Second stage filtration	Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(12) Slow sand filtration (as secondary filter)	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from subpart H sources.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(13) Chlorine dioxide	Summary of CT values for each day as described in §141.720.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(14) Ozone	Summary of CT values for each day as described in §141.720.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.
(15) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose	No later than the applicable treatment compliance date in §141.713.
	(ii) 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 141.720(d).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §141.713.

§141.722 Recordkeeping requirements.

- (a) Systems must keep results from the initial round of source water monitoring under §141.701(a) and the second round of source water monitoring under §141.701(b) until 3 years after bin classification under §141.710 for filtered systems or determination of the mean *Cryptosporidium* level under §141.710 for unfiltered systems for the particular round of monitoring.
- (b) Systems must keep any notification to the State that they will not conduct source water monitoring due to meeting the criteria of §141.701(d) for 3 years.
- (c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under §§141.716 through 141.720 and with uncovered finished water reservoirs under §141.714, as applicable, for 3 years.

Requirements for Sanitary Surveys Performed by EPA

§141.723 Requirements to respond to significant deficiencies identified in sanitary surveys performed by EPA.

- (a) A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.
- (b) For the purposes of this section, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that EPA determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.
- (c) For sanitary surveys performed by EPA, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.
- (d) Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by EPA, or if there is no approved schedule, according to the schedule reported under paragraph (c) of this section if such deficiencies are within the control of the system.

Subpart Y—Revised Total Coliform Rule

SOURCE: 78 FR 10354, Feb. 13, 2013, unless otherwise noted.

§141.851 General.

- (a) **General.** The provisions of this subpart include both maximum contaminant level and treatment technique requirements.
- (b) **Applicability.** The provisions of this subpart apply to all public water systems.
- (c) **Compliance date.** Systems must comply with the provisions of this subpart beginning April 1, 2016, unless otherwise specified in this subpart.
- (d) **Implementation with EPA as State.** Systems falling under direct oversight of EPA, where EPA acts as the State, must comply with decisions made by EPA for implementation of subpart Y. EPA has authority to establish such procedures and criteria as are necessary to implement subpart Y.
- (e) **Violations of national primary drinking water regulations.** Failure to comply with the applicable requirements of §§141.851 through 141.861, including requirements established by the State pursuant to these provisions, is a violation of the national primary drinking water regulations under subpart Y.

§141.852 Analytical methods and laboratory certification.

- (a) **Analytical methodology.**
 - (1) The standard sample volume required for analysis, regardless of analytical method used, is 100 ml.
 - (2) Systems need only determine the presence or absence of total coliforms and *E. coli*; a determination of density is not required.
 - (3) The time from sample collection to initiation of test medium incubation may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 deg. C during transit.
 - (4) If water having residual chlorine (measured as free, combined, or total chlorine) is to be analyzed, sufficient sodium thiosulfate (Na₂S₂O₃) must be added to the sample bottle before sterilization to

neutralize any residual chlorine in the water sample. Dechlorination procedures are addressed in Section 9060A.2 of *Standard Methods for the Examination of Water and Wastewater* (20th and 21st editions).

- (5) Systems must conduct total coliform and *E. coli* analyses in accordance with one of the analytical methods in the following table or one of the alternative methods listed in Appendix A to subpart C of part 141.

Organism	Methodology category	Method ¹	Citation ¹	
TOTAL COLIFORMS	Lactose Fermentation Methods	Standard Total Coliform Fermentation Technique	Standard Methods 9221 B.1, B.2 (20th ed.; 21st ed.). ^{2,3}	
			Standard Methods Online 9221 B.1, B.2-99. ^{2,3}	
		Presence-Absence (P-A) Coliform Test	Standard Methods 9221 D.1, D.2 (20th ed.; 21st ed.). ^{2,7}	
			Standard Methods Online 9221 D.1, D.2-99. ^{2,7}	
	Membrane Filtration Methods	Standard Total Coliform Membrane Filter Procedure	Standard Methods 9222 B, C (20th ed.; 21st ed.). ^{2,4}	
			Standard Methods Online 9222 B-97 ^{2,4} , 9222 C-97. ^{2,4}	
		Membrane Filtration using MI medium	EPA Method 1604. ²	
		m-ColiBlue24 [®] Test ^{2,4}		
		Chromocult ^{2,4}		
	Enzyme Substrate Methods	Colilert [®]	Standard Methods 9223 B (20th ed.; 21st ed.). ^{2,5}	
			Standard Methods Online 9223 B-97. ^{2,5}	
		Colisure [®]	Standard Methods 9223 B (20th ed.; 21st ed.). ^{2,5,6}	
			Standard Methods Online 9223 B-97. ^{2,5,6}	
				E*Colite [®] Test ²
				Readycult [®] Test ²
modified Colitag [®] Test ²				
ESCHERICHIA COLI	<i>Escherichia coli</i> Procedure (following Lactose Fermentation Methods)	EC-MUG medium	Standard Methods 9221 F.1 (20th ed.; 21st ed.). ²	

	<i>Escherichia coli</i> Partition Method	EC broth with MUG (EC-MUG)	Standard Methods 9222 G.1c(2) (20th ed.; 21st ed.) ^{2 8}	
		NA-MUG medium	Standard Methods 9222 G.1c(1) (20th ed.; 21st ed.) ²	
	Membrane Filtration Methods	Membrane Filtration using MI medium m-ColiBlue24 [®] Test ^{2 4}	EPA Method 1604 ²	
		Chromocult ^{2 4}		
	Enzyme Substrate Methods	Colilert [®]	Standard Methods 9223 B (20th ed.; 21st ed.) ^{2 5}	
			Standard Methods Online 9223 B-97 ^{2 5 6}	
		Colisure [®]	Standard Methods 9223 B (20th ed.; 21st ed.) ^{2 5 6}	
			Standard Methods Online 9223 B-97 ^{2 5 6}	
				E*Colite [®] Test ²
				Readycult [®] Test ²
modified Colitag [®] Test ²				

¹The procedures must be done in accordance with the documents listed in paragraph (c) of this section. For Standard Methods, either editions, 20th (1998) or 21st (2005), may be used. For the Standard Methods Online, the year in which each method was approved by the Standard Methods Committee is designated by the last two digits following the hyphen in the method number. The methods listed are the only online versions that may be used. For vendor methods, the date of the method listed in paragraph (c) of this section is the date/version of the approved method. The methods listed are the only versions that may be used for compliance with this rule. Laboratories should be careful to use only the approved versions of the methods, as product package inserts may not be the same as the approved versions of the methods.

²Incorporated by reference. See paragraph (c) of this section.

³Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and false-negative rate for total coliforms, using lactose broth, is less than 10 percent.

⁴All filtration series must begin with membrane filtration equipment that has been sterilized by autoclaving. Exposure of filtration equipment to UV light is not adequate to ensure sterilization. Subsequent to the initial autoclaving, exposure of the filtration equipment to UV light may be used to sanitize the funnels between filtrations within a filtration series. Alternatively, membrane filtration equipment that is pre-sterilized by the manufacturer (*i.e.*, disposable funnel units) may be used.

⁵Multiple-tube and multi-well enumerative formats for this method are approved for use in presence-absence determination under this regulation.

⁶Colisure[®] results may be read after an incubation time of 24 hours.

⁷A multiple tube enumerative format, as described in *Standard Methods for the Examination of Water and Wastewater* 9221, is approved for this method for use in presence-absence determination under this regulation.

⁸The following changes must be made to the EC broth with MUG (EC-MUG) formulation: Potassium dihydrogen phosphate, KH₂PO₄, must be 1.5g, and 4-methylumbelliferyl-Beta-D-glucuronide must be 0.05 g.

(b) **Laboratory certification.** Systems must have all compliance samples required under this subpart analyzed by a laboratory certified by the EPA or a primacy State to analyze drinking water samples. The laboratory used by the system must be certified for each method (and associated contaminant(s)) used for compliance monitoring analyses under this rule.

(c) **Incorporation by reference.** The standards required in this section are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, EPA must publish notice of change in the FEDERAL REGISTER and the material must be available to the public. All approved material is available for inspection either electronically at www.regulations.gov, in hard copy at the Water Docket, or from the sources indicated below. The Docket ID is EPA-HQ-OW-2008-0878. Hard copies of these documents may be viewed at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is 1-202-566-1744, and the telephone number for the Water Docket is 1-202-566-2426. Copyrighted materials are only available for viewing in hard copy. These documents are also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 1-202-741-6030 or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

- (1) American Public Health Association, 800 I Street, NW., Washington, DC 20001.
- (i) “Standard Methods for the Examination of Water and Wastewater,” 20th edition (1998):
- (A) **Standard Methods 9221**, “Multiple-Tube Fermentation Technique for Members of the Coliform Group,” B.1, B.2, “Standard Total Coliform Fermentation Technique.”
 - (B) **Standard Methods 9221**, “Multiple-Tube Fermentation Technique for Members of the Coliform Group,” D.1, D.2, “Presence-Absence (P-A) Coliform Test.”
 - (C) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” B, “Standard Total Coliform Membrane Filter Procedure.”
 - (D) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” C, “Delayed-Incubation Total Coliform Procedure.”
 - (E) **Standard Methods 9223**, “Enzyme Substrate Coliform Test,” B, “Enzyme Substrate Test,” Colilert[®] and Colisure[®].
 - (F) **Standard Methods 9221**, “Multiple Tube Fermentation Technique for Members of the Coliform Group,” F.1, “*Escherichia coli* Procedure: EC-MUG medium.”
 - (G) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” G.1.c(2), “*Escherichia coli* Partition Method: EC broth with MUG (EC-MUG).”
 - (H) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” G.1.c(1), “*Escherichia coli* Partition Method: NA-MUG medium.”
- (ii) “Standard Methods for the Examination of Water and Wastewater,” 21st edition (2005):
- (A) **Standard Methods 9221**, “Multiple-Tube Fermentation Technique for Members of the Coliform Group,” B.1, B.2, “Standard Total Coliform Fermentation Technique.”
 - (B) **Standard Methods 9221**, “Multiple-Tube Fermentation Technique for Members of the Coliform Group,” D.1, D.2, “Presence-Absence (P-A) Coliform Test.”
 - (C) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” B, “Standard Total Coliform Membrane Filter Procedure.”
 - (D) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” C, “Delayed-Incubation Total Coliform Procedure.”
 - (E) **Standard Methods 9223**, “Enzyme Substrate Coliform Test,” B, “Enzyme Substrate Test,” Colilert[®] and Colisure[®].
 - (F) **Standard Methods 9221**, “Multiple Tube Fermentation Technique for Members of the Coliform Group,” F.1, “*Escherichia coli* Procedure: EC-MUG medium.”

- (G) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” G.1.c(2), “*Escherichia coli* Partition Method: EC broth with MUG (EC-MUG).”
- (H) **Standard Methods 9222**, “Membrane Filter Technique for Members of the Coliform Group,” G.1.c(1), “*Escherichia coli* Partition Method: NA-MUG medium.”
- (iii) “Standard Methods Online” available at <http://www.standardmethods.org>:
 - (A) **Standard Methods Online 9221**, “Multiple-Tube Fermentation Technique for Members of the Coliform Group” (1999), B.1, B.2-99, “Standard Total Coliform Fermentation Technique.”
 - (B) **Standard Methods Online 9221**, “Multiple-Tube Fermentation Technique for Members of the Coliform Group” (1999), D.1, D.2-99, “Presence-Absence (P-A) Coliform Test.”
 - (C) **Standard Methods Online 9222**, “Membrane Filter Technique for Members of the Coliform Group” (1997), B-97, “Standard Total Coliform Membrane Filter Procedure.”
 - (D) **Standard Methods Online 9222**, “Membrane Filter Technique for Members of the Coliform Group” (1997), C-97, “Delayed-Incubation Total Coliform Procedure.”
 - (E) **Standard Methods Online 9223**, “Enzyme Substrate Coliform Test” (1997), B-97, “Enzyme Substrate Test”, Colilert[®] and Colisure[®].
- (2) Charm Sciences, Inc., 659 Andover Street, Lawrence, MA 01843-1032, telephone 1-800-343-2170:
 - (i) E*Colite[®]— “Charm E*Colite[™] Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Drinking Water,” January 9, 1998.
 - (ii) [Reserved]
- (3) CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA, 95403, telephone 1-800-878-7654:
 - (i) modified Colitag[®], ATP D05-0035— “Modified Colitag[™] Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water,” August 28, 2009.
 - (ii) [Reserved]
- (4) EMD Millipore (a division of Merck KGaA, Darmstadt Germany), 290 Concord Road, Billerica, MA 01821, telephone 1-800-645-5476:
 - (i) Chromocult— “Chromocult[®] Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* for Finished Waters,” November 2000, Version 1.0.
 - (ii) Readycult[®]— “Readycult[®] Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters,” January 2007, Version 1.1.
- (5) EPA's Water Resource Center (MC-4100T), 1200 Pennsylvania Avenue NW., Washington, DC 20460, telephone 1-202-566-1729:
 - (i) EPA Method 1604, EPA 821-R-02-024— “EPA Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium),” September 2002, <http://www.epa.gov/nerlcwww/1604sp02.pdf>.
 - (ii) [Reserved]
- (6) Hach Company, P.O. Box 389, Loveland, CO 80539, telephone 1-800-604-3493:
 - (i) m-ColiBlue24[®]— “Membrane Filtration Method m-ColiBlue24[®] Broth,” Revision 2, August 17, 1999.
 - (ii) [Reserved]

[78 FR 10354, Feb. 13, 2013, as amended at 79 FR 10669, Feb. 26, 2014]

§141.853 General monitoring requirements for all public water systems.

(a) *Sample siting plans.*

- (1) Systems must develop a written sample siting plan that identifies sampling sites and a sample collection schedule that are representative of water throughout the distribution system not later than March 31, 2016. These plans are subject to State review and revision. Systems must collect total coliform samples according to the written sample siting plan. Monitoring required by §§141.854

through 141.858 may take place at a customer's premise, dedicated sampling station, or other designated compliance sampling location. Routine and repeat sample sites and any sampling points necessary to meet the requirements of subpart S must be reflected in the sampling plan.

- (2) Systems must collect samples at regular time intervals throughout the month, except that systems that use only ground water and serve 4,900 or fewer people may collect all required samples on a single day if they are taken from different sites.
- (3) Systems must take at least the minimum number of required samples even if the system has had an *E. coli* MCL violation or has exceeded the coliform treatment technique triggers in §141.859(a).
- (4) A system may conduct more compliance monitoring than is required by this subpart to investigate potential problems in the distribution system and use monitoring as a tool to assist in uncovering problems. A system may take more than the minimum number of required routine samples and must include the results in calculating whether the coliform treatment technique trigger in §141.859(a)(1)(i) and (ii) has been exceeded only if the samples are taken in accordance with the existing sample siting plan and are representative of water throughout the distribution system.
- (5) Systems must identify repeat monitoring locations in the sample siting plan. Unless the provisions of paragraphs (a)(5)(i) or (a)(5)(ii) of this section are met, the system must collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one service connection away from the end of the distribution system, the system must still take all required repeat samples. However, the State may allow an alternative sampling location in lieu of the requirement to collect at least one repeat sample upstream or downstream of the original sampling site. Except as provided for in paragraph (a)(5)(ii) of this section, systems required to conduct triggered source water monitoring under §141.402(a) must take ground water source sample(s) in addition to repeat samples required under this subpart.
 - (i) Systems may propose repeat monitoring locations to the State that the system believes to be representative of a pathway for contamination of the distribution system. A system may elect to specify either alternative fixed locations or criteria for selecting repeat sampling sites on a situational basis in a standard operating procedure (SOP) in its sample siting plan. The system must design its SOP to focus the repeat samples at locations that best verify and determine the extent of potential contamination of the distribution system area based on specific situations. The State may modify the SOP or require alternative monitoring locations as needed.
 - (ii) Ground water systems serving 1,000 or fewer people may propose repeat sampling locations to the State that differentiate potential source water and distribution system contamination (e.g., by sampling at entry points to the distribution system). A ground water system with a single well required to conduct triggered source water monitoring may, with written State approval, take one of its repeat samples at the monitoring location required for triggered source water monitoring under §141.402(a) if the system demonstrates to the State's satisfaction that the sample siting plan remains representative of water quality in the distribution system. If approved by the State, the system may use that sample result to meet the monitoring requirements in both §141.402(a) and this section.
 - (A) If a repeat sample taken at the monitoring location required for triggered source water monitoring is *E. coli*-positive, the system has violated the *E. coli* MCL and must also comply with §141.402(a)(3). If a system takes more than one repeat sample at the monitoring location required for triggered source water monitoring, the system may reduce the number of additional source water samples required under §141.402(a)(3) by the number of repeat samples taken at that location that were not *E. coli*-positive.
 - (B) If a system takes more than one repeat sample at the monitoring location required for triggered source water monitoring under §141.402(a), and more than one repeat sample is *E. coli*-positive, the system has violated the *E. coli* MCL and must also comply with §141.403(a)(1).
 - (C) If all repeat samples taken at the monitoring location required for triggered source water monitoring are *E. coli*-negative and a repeat sample taken at a monitoring location other than the one required for triggered source water monitoring is *E. coli*-

positive, the system has violated the *E. coli* MCL, but is not required to comply with §141.402(a)(3).

- (6) States may review, revise, and approve, as appropriate, repeat sampling proposed by systems under paragraphs (a)(5)(i) and (ii) of this section. The system must demonstrate that the sample siting plan remains representative of the water quality in the distribution system. The State may determine that monitoring at the entry point to the distribution system (especially for undisinfected ground water systems) is effective to differentiate between potential source water and distribution system problems.
- (b) **Special purpose samples.** Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, must not be used to determine whether the coliform treatment technique trigger has been exceeded. Repeat samples taken pursuant to §141.858 are not considered special purpose samples, and must be used to determine whether the coliform treatment technique trigger has been exceeded.
- (c) **Invalidation of total coliform samples.** A total coliform-positive sample invalidated under this paragraph (c) of this section does not count toward meeting the minimum monitoring requirements of this subpart.
- (1) The State may invalidate a total coliform-positive sample only if the conditions of paragraph (c)(1)(i), (ii), or (iii) of this section are met.
- (i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.
- (ii) The State, on the basis of the results of repeat samples collected as required under §141.858(a), determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The State cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected at a location other than the original tap are total coliform-negative (e.g., a State cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the system has only one service connection).
- (iii) The State has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition that does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under §141.858(a), and use them to determine whether a coliform treatment technique trigger in §141.859 has been exceeded. To invalidate a total coliform-positive sample under this paragraph, the decision and supporting rationale must be documented in writing, and approved and signed by the supervisor of the State official who recommended the decision. The State must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.
- (2) A laboratory must invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the Multiple-Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence (P-A) Coliform Test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system must continue to re-sample within 24 hours and have the samples analyzed until it obtains a valid result. The State may waive the 24-hour time limit on a case-by-case basis. Alternatively, the State may implement criteria for waiving the 24-hour sampling time limit to use in lieu of case-by-case extensions.

§141.854 Routine monitoring requirements for non-community water systems serving 1,000 or fewer people using only ground water.

- (a) **General.**

- (1) The provisions of this section apply to non-community water systems using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 or fewer people.
 - (2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.
 - (3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.
 - (4) For the purpose of determining eligibility for remaining on or qualifying for quarterly monitoring under the provisions of paragraphs (f)(4) and (g)(2), respectively, of this section for transient non-community water systems, the State may elect to not count monitoring violations under §141.860(c)(1) of this part if the missed sample is collected no later than the end of the monitoring period following the monitoring period in which the sample was missed. The system must collect the make-up sample in a different week than the routine sample for that monitoring period and should collect the sample as soon as possible during the monitoring period. The State may not use this provision under paragraph (h) of this section. This authority does not affect the provisions of §§141.860(c)(1) and 141.861(a)(4) of this part.
- (b) **Monitoring frequency for total coliforms.** Systems must monitor each calendar quarter that the system provides water to the public, except for seasonal systems or as provided under paragraphs (c) through (h) and (j) of this section. Seasonal systems must meet the monitoring requirements of paragraph (i) of this section.
- (c) **Transition to subpart Y.**
- (1) Systems, including seasonal systems, must continue to monitor according to the total coliform monitoring schedules under §141.21 that were in effect on March 31, 2016, unless any of the conditions for increased monitoring in paragraph (f) of this section are triggered on or after April 1, 2016, or unless otherwise directed by the State.
 - (2) Beginning April 1, 2016, the State must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the State has performed the special monitoring evaluation during each sanitary survey, the State may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of this section. The State may not allow systems to begin less frequent monitoring under the special monitoring evaluation unless the system has already met the applicable criteria for less frequent monitoring in this section. For seasonal systems on quarterly or annual monitoring, this evaluation must include review of the approved sample siting plan, which must designate the time period(s) for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). The seasonal system must collect compliance samples during these time periods.
- (d) **Annual site visits.** Beginning no later than calendar year 2017, systems on annual monitoring, including seasonal systems, must have an initial and recurring annual site visit by the State that is equivalent to a Level 2 assessment or an annual voluntary Level 2 assessment that meets the criteria in §141.859(b) to remain on annual monitoring. The periodic required sanitary survey may be used to meet the requirement for an annual site visit for the year in which the sanitary survey was completed.
- (e) **Criteria for annual monitoring.** Beginning April 1, 2016, the State may reduce the monitoring frequency for a well-operated ground water system from quarterly routine monitoring to no less than annual monitoring, if the system demonstrates that it meets the criteria for reduced monitoring in paragraphs (e)(1) through (e)(3) of this section, except for a system that has been on increased monitoring under the provisions of paragraph (f) of this section. A system on increased monitoring under paragraph (f) of this section must meet the provisions of paragraph (g) of this section to go to quarterly monitoring and must meet the provisions of paragraph (h) of this section to go to annual monitoring.
- (1) The system has a clean compliance history for a minimum of 12 months;
 - (2) The most recent sanitary survey shows that the system is free of sanitary defects or has corrected all identified sanitary defects, has a protected water source, and meets approved construction standards; and

- (3) The State has conducted an annual site visit within the last 12 months and the system has corrected all identified sanitary defects. The system may substitute a Level 2 assessment that meets the criteria in §141.859(b) for the State annual site visit.
- (f) **Increased monitoring requirements for systems on quarterly or annual monitoring.** A system on quarterly or annual monitoring that experiences any of the events identified in paragraphs (f)(1) through (f)(4) of this section must begin monthly monitoring the month following the event. A system on annual monitoring that experiences the event identified in paragraphs (f)(5) of this section must begin quarterly monitoring the quarter following the event. The system must continue monthly or quarterly monitoring until the requirements in paragraph (g) of this section for quarterly monitoring or paragraph (h) of this section for annual monitoring are met. A system on monthly monitoring for reasons other than those identified in paragraphs (f)(1) through (f)(4) of this section is not considered to be on increased monitoring for the purposes of paragraphs (g) and (h) of this section.
- (1) The system triggers a Level 2 assessment or two Level 1 assessments under the provisions of §141.859 in a rolling 12-month period.
- (2) The system has an *E. coli* MCL violation.
- (3) The system has a coliform treatment technique violation.
- (4) The system has two subpart Y monitoring violations or one subpart Y monitoring violation and one Level 1 assessment under the provisions of §141.859 in a rolling 12-month period for a system on quarterly monitoring.
- (5) The system has one subpart Y monitoring violation for a system on annual monitoring.
- (g) **Requirements for returning to quarterly monitoring.** The State may reduce the monitoring frequency for a system on monthly monitoring triggered under paragraph (f) of this section to quarterly monitoring if the system meets the criteria in paragraphs (g)(1) and (g)(2) of this section.
- (1) Within the last 12 months, the system must have a completed sanitary survey or a site visit by the State or a voluntary Level 2 assessment by a party approved by the State, be free of sanitary defects, and have a protected water source; and
- (2) The system must have a clean compliance history for a minimum of 12 months.
- (h) **Requirements for systems on increased monitoring to qualify for annual monitoring.** The State may reduce the monitoring frequency for a system on increased monitoring under paragraph (f) of this section if the system meets the criteria in paragraph (g) of this section plus the criteria in paragraphs (h)(1) and (h)(2) of this section.
- (1) An annual site-visit by the State and correction of all identified sanitary defects. The system may substitute a voluntary Level 2 assessment by a party approved by the State for the State annual site visit in any given year.
- (2) The system must have in place or adopt one or more additional enhancements to the water system barriers to contamination in paragraphs (h)(2)(i) through (h)(2)(v) of this section.
- (i) Cross connection control, as approved by the State.
- (ii) An operator certified by an appropriate State certification program or regular visits by a circuit rider certified by an appropriate State certification program.
- (iii) Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the State.
- (iv) Demonstration of maintenance of at least a 4-log removal or inactivation of viruses as provided for under §141.403(b)(3).
- (v) Other equivalent enhancements to water system barriers as approved by the State.
- (i) **Seasonal systems.**
- (1) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a State-approved start-up procedure, which may include a requirement for startup sampling prior to serving water to the public.
- (2) A seasonal system must monitor every month that it is in operation unless it meets the criteria in paragraphs (i)(2)(i) through (iii) of this section to be eligible for monitoring less frequently than monthly beginning April 1, 2016, except as provided under paragraph (c) of this section.
- (i) Seasonal systems monitoring less frequently than monthly must have an approved sample siting plan that designates the time period for monitoring based on site-specific considerations

(e.g., during periods of highest demand or highest vulnerability to contamination). Seasonal systems must collect compliance samples during this time period.

- (ii) To be eligible for quarterly monitoring, the system must meet the criteria in paragraph (g) of this section.
 - (iii) To be eligible for annual monitoring, the system must meet the criteria under paragraph (h) of this section.
- (3) The State may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating, except that systems that monitor less frequently than monthly must still monitor during the vulnerable period designated by the State.
- (j) **Additional routine monitoring the month following a total coliform-positive sample.** Systems collecting samples on a quarterly or annual frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month, except that the State may waive this requirement if the conditions of paragraph (j)(1), (2), or (3) of this section are met. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations under §141.859(a).
- (1) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month in which the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.
 - (2) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State has determined why the sample was total coliform-positive and has established that the system has corrected the problem or will correct the problem before the end of the next month in which the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem.
 - (3) The State may not waive the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the State determines that the system has corrected the contamination problem before the system takes the set of repeat samples required in §141.858, and all repeat samples were total coliform-negative, the State may waive the requirement for additional routine monitoring the next month.

§141.855 Routine monitoring requirements for community water systems serving 1,000 or fewer people using only ground water.

(a) **General.**

- (1) The provisions of this section apply to community water systems using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 or fewer people.
- (2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.
- (3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.

- (b) **Monitoring frequency for total coliforms.** The monitoring frequency for total coliforms is one sample/month, except as provided for under paragraphs (c) through (f) of this section.
- (c) **Transition to subpart Y.**
- (1) All systems must continue to monitor according to the total coliform monitoring schedules under §141.21 that were in effect on March 31, 2016, unless any of the conditions in paragraph (e) of this section are triggered on or after April 1, 2016, or unless otherwise directed by the State.
 - (2) Beginning April 1, 2016, the State must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the State has performed the special monitoring evaluation during each sanitary survey, the State may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of this section. The State may not allow systems to begin less frequent monitoring under the special monitoring evaluation unless the system has already met the applicable criteria for less frequent monitoring in this section.
- (d) **Criteria for reduced monitoring.**
- (1) The State may reduce the monitoring frequency from monthly monitoring to no less than quarterly monitoring if the system is in compliance with State-certified operator provisions and demonstrates that it meets the criteria in paragraphs (d)(1)(i) through (d)(1)(iii) of this section. A system that loses its certified operator must return to monthly monitoring the month following that loss.
 - (i) The system has a clean compliance history for a minimum of 12 months.
 - (ii) The most recent sanitary survey shows the system is free of sanitary defects (or has an approved plan and schedule to correct them and is in compliance with the plan and the schedule), has a protected water source and meets approved construction standards.
 - (iii) The system meets at least one of the following criteria:
 - (A) An annual site-visit by the State that is equivalent to a Level 2 assessment or an annual Level 2 assessment by a party approved by the State and correction of all identified sanitary defects (or an approved plan and schedule to correct them and is in compliance with the plan and schedule).
 - (B) Cross connection control, as approved by the State.
 - (C) Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the State.
 - (D) Demonstration of maintenance of at least a 4-log removal or inactivation of viruses as provided for under §141.403(b)(3).
 - (E) Other equivalent enhancements to water system barriers as approved by the State.
 - (2) [Reserved]
- (e) **Return to routine monthly monitoring requirements.** Systems on quarterly monitoring that experience any of the events in paragraphs (e)(1) through (e)(4) of this section must begin monthly monitoring the month following the event. The system must continue monthly monitoring until it meets the reduced monitoring requirements in paragraph (d) of this section.
- (1) The system triggers a Level 2 assessment or two Level 1 assessments in a rolling 12-month period.
 - (2) The system has an *E. coli* MCL violation.
 - (3) The system has a coliform treatment technique violation.
 - (4) The system has two subpart Y monitoring violations in a rolling 12-month period.
- (f) **Additional routine monitoring the month following a total coliform-positive sample.** Systems collecting samples on a quarterly frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month, except that the State may waive this requirement if the conditions of paragraph (f)(1), (2), or (3) of this section are met. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations.
- (1) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month in which the system provides water to the public. Although a sanitary

survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

- (2) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State has determined why the sample was total coliform-positive and has established that the system has corrected the problem or will correct the problem before the end of the next month in which the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and the public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem.
- (3) The State may not waive the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the State determines that the system has corrected the contamination problem before the system takes the set of repeat samples required in §141.858, and all repeat samples were total coliform-negative, the State may waive the requirement for additional routine monitoring the next month.

§141.856 Routine monitoring requirements for subpart H public water systems serving 1,000 or fewer people.

(a) General.

- (1) The provisions of this section apply to subpart H public water systems of this part serving 1,000 or fewer people. Following any total coliform-positive sample taken under the provisions of this section, systems must
- (2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.
- (3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.
- (4) **Seasonal systems.**
 - (i) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a State-approved start-up procedure, which may include a requirement for start-up sampling prior to serving water to the public.
 - (ii) The State may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating.

(b) Routine monitoring frequency for total coliforms. Subpart H systems of this part (including consecutive systems) must monitor monthly. Systems may not reduce monitoring.

(c) Unfiltered subpart H systems. A subpart H system of this part that does not practice filtration in compliance with subparts H, P, T, and W must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in §141.74(b)(2), exceeds 1 NTU. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in §141.859 has been exceeded.

§141.857 Routine monitoring requirements for public water systems serving more than 1,000 people.

(a) General.

- (1) The provisions of this section apply to public water systems serving more than 1,000 persons.
- (2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.

- (3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.
- (4) **Seasonal systems.**
 - (i) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a State-approved start-up procedure, which may include a requirement for start-up sampling prior to serving water to the public.
 - (ii) The State may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating.
- (b) **Monitoring frequency for total coliforms.** The monitoring frequency for total coliforms is based on the population served by the system, as follows:

Total Coliform Monitoring Frequency for Public Water Systems Serving More Than 1,000 People

Population served	Minimum number of samples per month
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150

320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

- (c) **Unfiltered subpart H systems.** A subpart H system of this part that does not practice filtration in compliance with subparts H, P, T, and W must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in §141.74(b)(2), exceeds 1 NTU. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in §141.859 has been exceeded.
- (d) **Reduced monitoring.** Systems may not reduce monitoring, except for non-community water systems using only ground water (and not ground water under the direct influence of surface water) serving 1,000 or fewer people in some months and more than 1,000 persons in other months. In months when more than 1,000 persons are served, the systems must monitor at the frequency specified in paragraph (a) of this section. In months when 1,000 or fewer people are served, the State may reduce the monitoring frequency, in writing, to a frequency allowed under §141.854 for a similarly situated system that always serves 1,000 or fewer people, taking into account the provisions in §141.854(e) through (g).

§141.858 Repeat monitoring and *E. coli* requirements.

(a) **Repeat monitoring.**

- (1) If a sample taken under §§141.854 through 141.857 is total coliform-positive, the system must collect a set of repeat samples within 24 hours of being notified of the positive result. The system must collect no fewer than three repeat samples for each total coliform-positive sample found. The State may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. Alternatively, the State may implement criteria for the system to use in lieu of case-by-case extensions. In the case of an extension, the State must specify how much time the system has to collect the repeat samples. The State cannot waive the requirement for a system to collect repeat samples in paragraphs (a)(1) through (a)(3) of this section.
- (2) The system must collect all repeat samples on the same day, except that the State may allow a system with a single service connection to collect the required set of repeat samples over a three-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 300 ml.
- (3) The system must collect an additional set of repeat samples in the manner specified in paragraphs (a)(1) through (a)(3) of this section if one or more repeat samples in the current set of repeat samples is total coliform-positive. The system must collect the additional set of repeat samples within 24 hours of being notified of the positive result, unless the State extends the limit as provided in paragraph (a)(1) of this section. The system must continue to collect additional sets of repeat samples until either total coliforms are not detected in one complete set of repeat samples or the system determines that a

coliform treatment technique trigger specified in §141.859(a) has been exceeded as a result of a repeat sample being total coliform-positive and notifies the State. If a trigger identified in §141.859 is exceeded as a result of a routine sample being total coliform-positive, systems are required to conduct only one round of repeat monitoring for each total coliform-positive routine sample.

- (4) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.
 - (5) Results of all routine and repeat samples taken under §§141.854 through 141.858 not invalidated by the State must be used to determine whether a coliform treatment technique trigger specified in §141.859 has been exceeded.
- (b) ***Escherichia coli (E. coli) testing.***
- (1) If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if *E. coli* are present. If *E. coli* are present, the system must notify the State by the end of the day when the system is notified of the test result, unless the system is notified of the result after the State office is closed and the State does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the State before the end of the next business day.
 - (2) The State has the discretion to allow a system, on a case-by-case basis, to forgo *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is *E. coli*-positive. Accordingly, the system must notify the State as specified in paragraph (b)(1) of this section and the provisions of §141.63(c) apply.

§141.859 Coliform treatment technique triggers and assessment requirements for protection against potential fecal contamination.

- (a) ***Treatment technique triggers.*** Systems must conduct assessments in accordance with paragraph (b) of this section after exceeding treatment technique triggers in paragraphs (a)(1) and (a)(2) of this section.
- (1) Level 1 treatment technique triggers.
 - (i) For systems taking 40 or more samples per month, the system exceeds 5.0% total coliform-positive samples for the month.
 - (ii) For systems taking fewer than 40 samples per month, the system has two or more total coliform-positive samples in the same month.
 - (iii) The system fails to take every required repeat sample after any single total coliform-positive sample.
 - (2) Level 2 treatment technique triggers.
 - (i) An *E. coli* MCL violation, as specified in §141.860(a).
 - (ii) A second Level 1 trigger as defined in paragraph (a)(1) of this section, within a rolling 12-month period, unless the State has determined a likely reason that the samples that caused the first Level 1 treatment technique trigger were total coliform-positive and has established that the system has corrected the problem.
 - (iii) For systems with approved annual monitoring, a Level 1 trigger in two consecutive years.
- (b) ***Requirements for assessments.***
- (1) Systems must ensure that Level 1 and 2 assessments are conducted in order to identify the possible presence of sanitary defects and defects in distribution system coliform monitoring practices. Level 2 assessments must be conducted by parties approved by the State.
 - (2) When conducting assessments, systems must ensure that the assessor evaluates minimum elements that include review and identification of inadequacies in sample sites; sampling protocol; sample processing; atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., small ground water systems); and existing water quality monitoring data. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

- (3) **Level 1 assessments.** A system must conduct a Level 1 assessment consistent with State requirements if the system exceeds one of the treatment technique triggers in paragraph (a)(1) of this section.
- (i) The system must complete a Level 1 assessment as soon as practical after any trigger in paragraph (a)(1) of this section. In the completed assessment form, the system must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified. The system must submit the completed Level 1 assessment form to the State within 30 days after the system learns that it has exceeded a trigger.
 - (ii) If the State reviews the completed Level 1 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the State must consult with the system. If the State requires revisions after consultation, the system must submit a revised assessment form to the State on an agreed-upon schedule not to exceed 30 days from the date of the consultation.
 - (iii) Upon completion and submission of the assessment form by the system, the State must determine if the system has identified a likely cause for the Level 1 trigger and, if so, establish that the system has corrected the problem, or has included a schedule acceptable to the State for correcting the problem.
- (4) **Level 2 assessments.** A system must ensure that a Level 2 assessment consistent with State requirements is conducted if the system exceeds one of the treatment technique triggers in paragraph (a)(2) of this section. The system must comply with any expedited actions or additional actions required by the State in the case of an *E. coli* MCL violation.
- (i) The system must ensure that a Level 2 assessment is completed by the State or by a party approved by the State as soon as practical after any trigger in paragraph (a)(2) of this section. The system must submit a completed Level 2 assessment form to the State within 30 days after the system learns that it has exceeded a trigger. The assessment form must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified.
 - (ii) The system may conduct Level 2 assessments if the system has staff or management with the certification or qualifications specified by the State unless otherwise directed by the State.
 - (iii) If the State reviews the completed Level 2 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the State must consult with the system. If the State requires revisions after consultation, the system must submit a revised assessment form to the State on an agreed-upon schedule not to exceed 30 days.
 - (iv) Upon completion and submission of the assessment form by the system, the State must determine if the system has identified a likely cause for the Level 2 trigger and determine whether the system has corrected the problem, or has included a schedule acceptable to the State for correcting the problem.
- (c) **Corrective action.** Systems must correct sanitary defects found through either Level 1 or 2 assessments conducted under paragraph (b) of this section. For corrections not completed by the time of submission of the assessment form, the system must complete the corrective action(s) in compliance with a timetable approved by the State in consultation with the system. The system must notify the State when each scheduled corrective action is completed.
- (d) **Consultation.** At any time during the assessment or corrective action phase, either the water system or the State may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the State on all relevant information that may impact on its ability to comply with a requirement of this subpart, including the method of accomplishment, an appropriate timeframe, and other relevant information.

§141.860 Violations.

- (a) ***E. coli* MCL Violation.** A system is in violation of the MCL for *E. coli* when any of the conditions identified in paragraphs (a)(1) through (a)(4) of this section occur.
- (1) The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample.

- (2) The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample.
 - (3) The system fails to take all required repeat samples following an *E. coli*-positive routine sample.
 - (4) The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.
- (b) **Treatment technique violation.**
- (1) A treatment technique violation occurs when a system exceeds a treatment technique trigger specified in §141.859(a) and then fails to conduct the required assessment or corrective actions within the timeframe specified in §141.859(b) and (c).
 - (2) A treatment technique violation occurs when a seasonal system fails to complete a State-approved start-up procedure prior to serving water to the public.
- (c) **Monitoring violations.**
- (1) Failure to take every required routine or additional routine sample in a compliance period is a monitoring violation.
 - (2) Failure to analyze for *E. coli* following a total coliform-positive routine sample is a monitoring violation.
- (d) **Reporting violations.**
- (1) Failure to submit a monitoring report or completed assessment form after a system properly conducts monitoring or assessment in a timely manner is a reporting violation.
 - (2) Failure to notify the State following an *E. coli*-positive sample as required by §141.858(b)(1) in a timely manner is a reporting violation.
 - (3) Failure to submit certification of completion of State-approved start-up procedure by a seasonal system is a reporting violation.

§141.861 Reporting and recordkeeping.

- (a) **Reporting—**
- (1) ***E. coli.***
 - (i) A system must notify the State by the end of the day when the system learns of an *E. coli* MCL violation, unless the system learns of the violation after the State office is closed and the State does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the State before the end of the next business day, and notify the public in accordance with subpart Q of this part.
 - (ii) A system must notify the State by the end of the day when the system is notified of an *E. coli*-positive routine sample, unless the system is notified of the result after the State office is closed and the State does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the State before the end of the next business day.
 - (2) A system that has violated the treatment technique for coliforms in §141.859 must report the violation to the State no later than the end of the next business day after it learns of the violation, and notify the public in accordance with subpart Q of this part.
 - (3) A system required to conduct an assessment under the provisions of §141.859 of this part must submit the assessment report within 30 days. The system must notify the State in accordance with §141.859(c) when each scheduled corrective action is completed for corrections not completed by the time of submission of the assessment form.
 - (4) A system that has failed to comply with a coliform monitoring requirement must report the monitoring violation to the State within 10 days after the system discovers the violation, and notify the public in accordance with subpart Q of this part.
 - (5) A seasonal system must certify, prior to serving water to the public, that it has complied with the State-approved start-up procedure.
- (b) **Recordkeeping.**
- (1) The system must maintain any assessment form, regardless of who conducts the assessment, and documentation of corrective actions completed as a result of those assessments, or other available summary documentation of the sanitary defects and corrective actions taken under §141.859 for State review. This record must be maintained by the system for a period not less than five years after completion of the assessment or corrective action.

- (2) The system must maintain a record of any repeat sample taken that meets State criteria for an extension of the 24-hour period for collecting repeat samples as provided for under §141.858(a)(1) of this part.

[78 FR 10354, Feb. 13, 2013, as amended at 79 FR 10670, Feb. 26, 2014]

NC General Statutes – Chapter 130A Article 10

§130A-311. Short title.

This Article shall be cited as the “North Carolina Drinking Water Act.” (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-312. Purpose.

The purpose of this Article is to regulate water systems within the State which supply drinking water that may affect the public health. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-313. Definitions.

The following definitions shall apply throughout this Article:

- (1) “Administrator” means the Administrator of the United State Environmental Protection Agency.
- (2) “Certified laboratory” means a facility for performing bacteriological, chemical or other analyses on water which has received interim or final certification by either the Environmental Protection Agency or the Department.
- (3) “Contaminant” means any physical, chemical, biological or radiological substance or matter in water.
- (3a) “Department” means the Department of Environmental Quality.
- (4) “Drinking water rules” means rules adopted pursuant to this Article.
- (5) “Federal act” means the Safe Drinking Water Act of 1974, P.L. 93-523, as amended.
- (6) “Federal agency” means any department, agency or instrumentality of the United States.
- (7) “Maximum contaminant level” means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.
- (8) “National primary drinking water regulations” means primary drinking water regulations promulgated by the Administrator pursuant to the federal act.
- (9) “Person” means an individual, corporation, company, association, partnership, unit of local government, State agency, federal agency or other legal entity.
- (10) “Public water systems” means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances if the system serves 15 or more service connections or which regularly serves 25 or more individuals. The term includes:
 - a. Any collection, treatment, storage or distribution facility under control of the operator of the system and used primarily in connection with the system; and
 - b. Any collection or pretreatment storage facility not under the control of the operator of the system that is used primarily in connection with the system. A public water system is either a “community water system” or a “noncommunity water system” as follows:
 - c. “Community water system” means a public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.
 - d. “Noncommunity water system” means a public water system that is not a community water system.

A connection to a system that delivers water by a constructed conveyance other than a pipe is not a connection within the meaning of this subdivision under any one of the following circumstances.

 - a. The water is used exclusively for purposes other than residential uses. As used in this subdivision, “residential uses” means drinking, bathing, cooking, or other similar uses.
 - b. The Department determines that alternative water to achieve the equivalent level of public health protection pursuant to applicable drinking water rules is provided for residential uses.
 - c. The Department determines that the water provided for residential uses is centrally treated or treated at the point of entry by the provider, a pass-through entity, or the user to achieve the equivalent level or protection provided by the applicable drinking water rules.
- (10a) “Secretary” means the Secretary of Environmental Quality.
- (11) “Supplier of water” means a person who owns, operates or controls a public water system.
- (12) “Treatment technique requirement” means a requirement of the drinking water rules which specifies a specific treatment technique for a contaminant which leads to reduction in the level of the contaminant sufficient to comply with drinking water rules. (1979, c. 788, s. 1; 1983, c. 891, s. 2; 1987, c. 704, s. 2; 1993 (Reg. Sess., 1994), c. 776, s. 14; 1997-30, s. 1; 1997-443, s. 11A.81A; 2012-200, s. 10; 2015-241, ss. 14.30(u), (v).)

§130A-314. Scope of the Article.

- (a) The provisions of this Article shall apply to each public water system in the State unless the public water system meets all of the following conditions:
- (1) Consists only of distribution and storage facilities and does not have any collection and treatment facilities;
 - (2) Obtains all of its water from, but is not owned or operated by, a public water system to which the drinking water rules apply;
 - (3) Does not sell water to any person; and
 - (4) Is not a carrier which conveys passengers in interstate commerce.
- (b) A provision of any charter granted to a public water system in conflict with the provisions of this Article is repealed. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-315. Drinking water rules; exceptions; limitation on implied warranties.

- (a) The Commission shall adopt and the Secretary shall enforce drinking water rules to regulate public water systems. The rules may distinguish between community water systems and noncommunity water systems.
- (b) The rules shall:
- (1) Specify contaminants which may have an adverse effect on the public health;
 - (2) Specify for each contaminant either:
 - a. A maximum contaminant level which is acceptable in water for human consumption, if it is feasible to establish the level of the contaminant in water in public water systems; or
 - b. One or more treatment techniques which lead to a reduction in the level of contaminants sufficient to protect the public health, if it is not feasible to establish the level of the contaminants in water in a public water system; and
 - (3) Establish criteria and procedures to assure a supply of drinking water which dependably complies with maximum contaminant levels and treatment techniques as determined in paragraph (2) of this subsection. These rules may provide for:
 - a. The minimum quality of raw water which may be taken into a public water system;
 - b. A program of laboratory certification;
 - c. Monitoring and analysis;
 - d. Record-keeping and reporting;
 - e. Notice of noncompliance, failure to perform monitoring, variances and exemptions;
 - f. Inspection of public water systems; inspection of records required to be kept; and the taking of samples;
 - g. Criteria for design and construction of new or modified public water systems;
 - h. Review and approval of design and construction of new or modified public water systems;
 - i. Siting of new public water system facilities;
 - j. Variances and exemptions from the drinking water rules; and
 - k. Additional criteria and procedures as may be required to carry out the purpose of this Article.
- (b1) The rules may also establish criteria and procedures to insure an adequate supply of drinking water. The rules may:
- (1) Provide for record keeping and reporting.
 - (2) Provide for inspection of public water systems and required records.
 - (3) Establish criteria for the design and construction of new public water systems and for the modification of existing public water systems.
 - (4) Establish procedures for review and approval of the design and construction of new public water systems and for the modification of existing public water systems.
 - (4a) Limit the number of service connections to a public water system based on the quantity of water available to the public water system, provided that the number of service connections shall not be limited for a public water system operating in accordance with a local water supply plan that meets the requirements of G.S. 143-355(1).
 - (5) Establish a criteria and procedures for siting new public water systems.
 - (6) Provide for variances and exemptions from the rules.
 - (7) Provide for notice of noncompliance in accordance with G.S. 130A-324.

- (b2) Two or more water systems that are adjacent, that are owned by the same supplier of water, that individually serve less than 15 service connections or less than 25 persons but that in combination serve 15 or more service connections or 25 or more persons, and that individually are not public water systems shall meet the standards applicable to public water systems for the following contaminants: coliform bacteria, nitrates, nitrites, lead, copper, and other inorganic chemicals for which testing and monitoring is required for public water systems on 1 July 1994. The standards applicable to these contaminants shall be enforced by the Commission as though the water systems to which this subsection applies were public water systems.
- (b3) The Department shall not certify or renew a certification of a laboratory under rules adopted pursuant to subdivision (3)b. of subsection (b) of this section unless the laboratory offer to perform composite testing of samples taken from a single public water supply system for those contaminants that the laboratory is seeking certification or renewable of certification to the extent allowed by regulations adopted by the United State Environmental Protection Agency.
- (c) The drinking water rules may be amended as necessary in accordance with required federal regulations.
- (d) When a person that receives water from a public water system is authorized by the Utilities Commission, pursuant to G.S. 62-110(g), to charge for the costs of providing water or sewer service, that person shall not be subject to regulation under this Article solely as a result of submetering and billing for water service. The supplying water system shall perform the same level of monitoring, analysis, and record keeping that the supplying system would perform if the providing water system had not been authorized to charge for the costs of providing water or sewer service pursuant to G.S. 62-110(g).
- (e) When a public water system supplies water through a master meter to a water system not regulated by this Article, the supplying water system is not responsible for operation, maintenance, or repair of the providing water system. The supplying water system shall not be responsible for contamination that is confined to the providing water system if the supplying water system meets applicable requirements for water quality, treatment, and system operation for the contaminant. The supplying water system may monitor the water within the providing water system for contamination pursuant to rules adopted under this Article. The supplying water system and the Department shall have access to the providing water system to investigate water quality problems and to determine whether any contamination is confined to the providing water system and whether the quality of the water supplied by the supplying water system is contributing contamination to the providing water system.
- (f) If water in the providing water system exceeds the maximum contaminant levels established pursuant to this Article and the Department determines that the supplying water system is not responsible, the supplying water system must notify the providing water system owner in writing within one day of determining that the contamination is confined solely to the providing water system for bacteria, nitrate, and nitrite, and within 30 days for all other contaminants.
- (g) A supplier of water regulated under this Article shall not be deemed to provide any warranty under Article 2 of Chapter 25 of the General Statues, including an implied warranty of merchantability or an implied warranty of fitness for a particular purpose. (1979, c. 788, s. 1; 1983, c. 891, s. 2; 1985, c. 417, ss. 1, 2; 1991 (Reg. Sess., 1992), c. 826, s. 1; 1993 (Reg. Sess., 1994) c. 776, s. 15; 1995, c. 25, s. 1; 2001-172, s. 1.1; 2001-502, s. 6; 2004-143, s. 8; 2008-140, s. 1.)

§130A-316. Department to examine waters.

The Department shall examine all waters and their sources and surroundings which are used as, or proposed to be used as, sources of public water supply to determine whether the waters and their sources are suitable for use as public water supply sources. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-317 Department to provide advice; submission and approval of public water system plans.

- (a) The Department shall advise all persons and units of local government locating, constructing, altering or operating or intending to locate, construct, alter or operate a public water system of the most appropriate source of water supply and the best practical method of purifying water from that source having regard to the present and prospective needs and interests of other persons and units of local government which may be affected. The Department shall also advise concerning accepted engineering practices in the location, construction, alteration and operation of public water systems.
- (b) All persons and units of local government constructing or altering a public water system shall give prior notice and submit plans, specifications and other information to the Department. The Commission shall adopt rules

providing for the amount of prior notice required to be given and the nature and detail of the plans, specifications and other information required to be submitted. The Commission shall take into consideration the complexity of the construction or alteration which may be involved and the resources of the Department to review the plans, specifications and other information. The Department shall review the plans, specifications and other information, and notify the person, Utilities Commission and unit of local government of compliance or lack of compliance with applicable statutes and rules of the Commission.

- (c) No person or unit of local government shall begin construction or alteration of a public water system or award a contract for construction or alteration unless all of the following conditions are met:
- (1) The plans for construction or alteration have been prepared by an engineer licensed by this State.
 - (2) The Department has determined that the system, as constructed or altered, will be capable of compliance with the drinking water rules.
 - (3) The Department has determined that the system is capable of interconnection at an appropriate time with an expanding municipal, county or regional system.
 - (4) The Department has determined that adequate arrangements have been made for the continued operation, service and maintenance of the public water system.
 - (5) The Department has approved the plans and specifications.
- (d) Municipalities, counties, local boards or commissions, water and sewer authorities, or groups of municipalities and counties may establish and administer within their utility service areas their own approval program in lieu of State approval of water system plans required in subsection (c) of this section for construction or alteration of the distribution system of a proposed or existing public water system, subject to the prior certification of the Department. For purposes of this subsection, the service area of a municipality shall include only that area within the corporate limits of the municipality and that area outside a municipality in its extraterritorial jurisdiction where water service is already being provided to the applicant by the permitting authority or connection to the permitting authority's system is immediately available. No later than the 180th date after the receipt of an approval program and statement submitted by any local government, commission, authority, or board, the Department shall certify any local program that meets all of the following conditions:
- (1) Provides by ordinance or local law for requirements compatible with those imposed by the Article, and the standards and rules adopted pursuant to this Article.
 - (2) Provides that the Department receives notice and a copy of each application for approval and that the Department received copies of approval plans.
 - (3) Provides that plans and specifications for all construction and alterations by prepared by or under the direct supervision of an engineer licensed to practice in this State.
 - (4) Provides for the adequate enforcement of the program requirements by appropriate administrative and judicial process.
 - (5) Provides for the adequate administrative organization, engineering staff, financial and other resources necessary to effectively carry out its plan review program. A local government commission, authority, or board may either employ an engineer licensed under Chapter 89C of the General Statutes to practice as a professional engineer in the State or contract with an engineer licensed under Chapter 89C of the General Statutes to practice as a professional engineer in the State in order to provide for adequate engineering staff under the subdivision.
 - (6) Provides that the system is capable of interconnection at an appropriate time with an expanding municipal, county, or regional system.
 - (7) Provides or the adequate arrangement for the continued operation, service, and maintenance of the public water system.
 - (8) Provides that an approved system, as constructed or altered, will be capable of compliance with the drinking water rules.
 - (9) Is approved by the Department as adequate to meet the requirements of this Article and any applicable rules adopted pursuant to this Article.
- (e) The Department may deny, suspend, or revoke the certification of a local program upon a finding that a violation of the provisions in subsection (d) of this section has occurred. A local government administering an approval program shall be given notice that there has been a tentative decision to deny, suspend, or revoke certification and that an administrative hearing will be held in accordance with Chapter 150B of the General Statutes where the decision may be challenged. If a violation of the provisions in subsection (d) of this section present an imminent hazard, certification may be suspended or revoked immediately. The Department shall

give notice of the immediate suspension or revocation and notice that an administrative hearing will be held in accordance with Chapter 150B of the General Statutes where the decision may be challenged.

- (f) Notwithstanding any other provisions of subsection (d) of this section, if the Department determines that a public water system is violating plan approval requirements of a local program and that the local government has not acted to enforce those approval requirements, the Department may, after written notice to the local government, take enforcement action in accordance with the provisions of this Article.
- (g) The Department shall identify systems meeting all of the following criteria:
 - (1) As constructed or altered, the system appears capable of interconnectivity with another system or systems located within the same river basin, as set out in G.S. 143 215.22.
 - (2) The system appears to have adequate unallocated capacity to expand.
 - (3) Interconnectivity would promote public health, protect the environment, or ensure compliance with established drinking water rules.

The Department shall notify the identified systems of the potential for interconnectivity in the future. The systems so notified may discuss options for potential interconnectivity, including joint operations, regionalization, or merger. The Local Government Commission shall be copied on the notice from the Department and shall assist the systems with any questions regarding liabilities of the systems and alterations to the operations structure of the systems. (1979, c. 788, s. 1; 1983, c. 891, s. 2; 1985, c. 697, s. 1; 1987, c. 827, s. 1; 2006-238, s. 1; 2015-241, s. 14.14A(a).)

§130A-318. Disinfection of public water systems.

- (a) The Department is authorized to require disinfection of:
 - (1) Public water systems introduced on or after January 1, 1972; and
 - (2) All public water systems, regardless of the date introduced, whenever:
 - a. The maximum microbiological contaminant level is exceeded; or
 - b. Conditions exist which make continued use of the water potential hazardous to public health.
- (b) Public water systems shall employ disinfection methods and procedures approved by the Department. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-319. Condemnation of lands for public water systems.

All units of local government operating public water systems and all water companies operating under franchise from the State or unites of local government, may acquire by condemnation lands and rights in lands and water necessary for the successful operation and protection of their systems. Condemnation proceedings under this section shall be the same as prescribed by law under Chapter 40A of the General Statutes. (1979, c. 788, s. 1; 1981, c. 919, s. 14; 1983, c. 891, s. 2.)

§130A-320. Sanitation of watersheds; rules; inspections; local source protection planning.

- (a) The Commission shall adopt rules governing the sanitation of watersheds from which public drinking water supplies are obtained. In adopting these rules the Commission is authorized to consider the different classes of watersheds, taking into account general topography, nature of watershed development, density of population and need for frequency of sampling of raw water. The rules shall govern the keeping of livestock, operation of recreational areas, maintenance of residences and places of business, disposal of sewage, establishment of cemeteries or burying grounds, and any other factors which would endanger the public water supply.
- (b) Any supplier of water operating a public water system and furnishing water from unfiltered surface supplies shall inspect the watershed area at least quarterly, and more often when the Department determines that more frequent inspections are necessary.
- (c) Every supplier of water operating a public water system treating and furnishing water from surface supplies shall create and implement a source water protection plan (SWPP). The Commission shall adopt rules that provide all of the following:
 - (1) A standardized format for use by suppliers of water in creating their SWPP. The Commission may create different formats and required plan elements for public water systems based on the system type, source type, watershed classification, population served, source susceptibility to contamination, proximity of potential contamination sources to the intake, lack of water supply alternatives, or other characteristics the Commission finds to be relevant.

- (2) Schedules for creating a SWPP, implementing mandatory provisions of the SWPP, and for review and update of the SWPP by suppliers of water.
- (3) Reporting requirements sufficient for the Department to monitor the creation, implementation, and revision by suppliers of water. The Commission may provide different reporting requirements based on the public water system characteristics set forth in subdivision (1) of this subsection. (1979, c. 788, s. 1; 1983, c. 891, s. 2; 2014-41, s. 1; 2014-115, s. 55.5)

§130A-321. Variances and exemptions; considerations; duration; condition; notice and hearing.

- (a) The Secretary may authorize variances from the drinking water rules.
 - (1) The Secretary may grant one or more variances to a public water system from any requirement respecting a maximum contaminant level of an applicable drinking water rule upon a finding that:
 - a. Because of characteristics of the raw water sources reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of the drinking water rules after application of the best technology, treatment techniques, or other means which the Secretary finds are available (taking costs into consideration); and
 - b. The granting of a variance will not result in an unreasonable risk to public health when considering the population exposed, the projected duration of the requested variance and the degree to which the maximum contaminant level is being or will be exceeded.
 - (2) The Secretary may grant one or more variances to a public water system from any requirement of a specified treatment technique of an applicable drinking water rule upon a finding that the public water system applying for the variance has demonstrated that the treatment technique is not necessary to protect the public health because of the nature of the raw water source of the system.
 - (3) In consideration of whether the public water system is unable to comply with a contaminant level required by the drinking water rules because of the nature of the raw water sources, the Secretary shall consider factors such as:
 - a. The availability and effectiveness of treatment methods for the contaminant for which the variance is requested; and
 - b. Costs of implementing the best treatment(s), improving the quality of the raw water by the best means or using an alternate source.
 - (4) In consideration of whether a public water system should be granted a variance from a required treatment technique because the treatment is unnecessary to protect the public health, the Secretary shall consider factors such as:
 - a. Quality of the water source including water quality data and pertinent sources of pollution; and
 - b. Source protection measures employed by the public water system.
 - (5) In order to implement sub-subdivision a. of subdivision (1) of this subsection, the Commission shall adopt by rule a list of the best available technologies, treatment techniques, or other means available, to deal with each contaminant for which a maximum contaminant level is established.
- (b) The Secretary may authorize exemptions from the drinking water rules.
 - (1) The Secretary may exempt a public water system from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable drinking water rule upon a finding that:
 - a. Due to compelling factors, including economic factors, the public water system is unable to comply with the contaminant level or treatment technique requirement;
 - b. The public water system was in operation on the effective date of the contaminant level or treatment technique requirement or, for a system that was not in operation on that date, only if no reasonable alternative source of drinking water is available to the new system; and
 - c. The granting of the exemption will not result in an unreasonable risk to public health which considering the population exposed, the projected duration of the requested exemption and the degree to which the maximum contaminant level is being or will be exceeded.
 - (2) In consideration of whether the public water system is unable to comply due to compelling factors, the Secretary shall consider factors such as:
 - a. Construction, installation or modification of treatment equipment or systems;
 - b. The time needed to put into operation a new treatment facility to replace an existing system which is not in compliance; and

c. Economic feasibility of immediate compliance.

- (c) As a condition of issuance of either a variance or an exemption, the Secretary shall issue a schedule of compliance for the public water system, including increments of progress for each drinking water rule for which the variance or exemption was issued. As a further condition of a variance or exemption, the Secretary shall require the public water system to implement any necessary control measures prescribed by the Secretary during the period of the variance or exemption. The compliance schedule for an exemption shall require compliance as expeditiously as practical but no later than June 19, 1987, for existing maximum contaminant levels and treatment techniques, or no later than one year from the issuance of the exemption for any newly adopted maximum contaminant level or treatment technique. The final date for compliance provided in any exemption schedule may be extended up to three years after the date of the issuance of the exemption if the water system establishes:
- (1) The water system cannot meet the standard without capital improvements which cannot be completed within the period of exemption, or
 - (2) The system needs financial assistance for necessary improvements and has entered into an agreement to obtain such assistance, or
 - (3) The system has entered into an enforceable agreement to become part of a regional public water system and the system is taking all practical steps to meet the standards.
- If a public water system serves 500 or fewer service connections and needs financial assistance for necessary improvements, an exemption may be renewed for one or more additional two-year periods if the system establishes it meets the requirements set forth in subdivisions (1) and (2) of this section.
- (d) The Secretary shall provide notice and opportunity for public hearing on proposed variances and proposed variance and exemption schedules. (1979, c. 788, s. 1; 1981, c. 353, ss. 1, 2; 1983, c. 891, s. 2; 1987, c. 704, ss. 3-5.)

§130A-322. Imminent hazard; power of the Secretary.

- (a) The Secretary shall judge whether an imminent hazard exists concerning a present or potential condition in a public water system.
- (b) In order to eliminate an imminent hazard, the Secretary may, without notice or hearing, issue an order requiring the person or persons involved to immediately take action necessary to protect the public health. A copy of the order shall be delivered by certified mail or personal service. The order shall become effective immediately and shall remain in effect until modified or rescinded by the Secretary or by a court of competent jurisdiction. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-323. Emergency plan for drinking water; emergency circumstances defined.

- (a) The Secretary shall develop and implement an adequate plan for the provision of drinking water under emergency circumstances. When the Secretary determines that emergency circumstances exist with respect to a need for drinking water, the Secretary may take action in accordance with the plan as necessary in order to provide drinking water.
- (b) Emergency circumstances shall exist whenever the available supply of drinking water is inadequate. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-324. Notice of noncompliance; failure to perform monitoring; variances and exemptions.

Whenever a public water system:

- (1) Is not in compliance with the drinking water rules;
- (2) Fails to perform an applicable testing procedure or monitoring required by the drinking water rules;
- (3) Is subject to a variance granted for inability to meet a maximum contaminant level requirement;
- (4) Is subject to an exemption; or
- (5) Fails to comply with the requirements prescribed by a variance or exemption, the supplier shall as soon as possible, but not later than 48 hours after discovery, notify the Department and give public notification as prescribed by the drinking water rules. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-325. Prohibited acts.

The following acts are prohibited:

- (1) Failure by a supplier of water to comply with this Article, an order issued under this Article, or the drinking water rules;
- (2) Failure by a supplier of water to comply with the requirements of G.S. 130A-324 or the dissemination by a supplier of any false or misleading information with respect to remedial actions being undertaken to achieve compliance with the drinking water rules;
- (3) Refusal by a supplier of water to allow the Department or local health department to inspect a public water system as provided for in G.S. 130A-17;
- (4) The willful defiling by any person of any water supply of a public water system or the willful damaging of any pipe or other part of a public water system;
- (5) The discharge by any person of sewage or other waste above the intake of a public water system, unless the sewage or waste has been passed through a system of purification approved by the Department; and
- (6) The failure by a person to maintain a system approved by the Department for collecting and disposing of all accumulations of human excrement located on the watershed of a public water system. (1979, c. 788, s. 1; 1983, c. 891, s. 2; 1985, c. 462, s. 2; 1989, c. 727, s. 146.)

§130A-326. Powers of the Secretary

To carry out the provisions of this Article, the Secretary is authorized to:

- (1) Administer and enforce the provisions of this Article, the drinking water rules and orders issued under this Article;
- (2) Enter into agreements or cooperative arrangements with, or participate in related programs of other states, other state agencies, federal or interstate agencies, units of local government, educational institutions, local health departments or other organizations or individuals;
- (3) Receive financial and technical assistance from the federal government and other public or private agencies;
- (4) Require public water systems to take actions or make modifications as necessary to comply with the requirements of this Article or the drinking water rules;
- (5) Prescribe policies and procedures necessary or appropriate to carry out the Secretary's function under this Article;
- (6) Establish and collect fees to recover the costs of laboratory analyses performed for compliance with this Article. The fees shall not exceed two hundred dollars (\$200.00) for each analysis; and
- (7) Establish and collect fees for certification and certification renewal of laboratories to perform analyses for compliance under this Article. The fees shall not exceed twenty dollars (\$20.00) per analyte certified. The minimum fee for certification renewal shall be two hundred fifty dollars (\$250.00) per analyte category. The maximum fee for certification or certification renewal shall be six hundred dollars (\$600.00) per analyte category. The fees collected under this subdivision shall be used to administer blind performance evaluation samples to certified laboratories to determine compliance with certification requirements. (1979, c. 788, s. 1; 1981, c. 562, s. 9; 1983, c. 891, s. 2; 1987, c. 471; 1991 (Reg. Sess., 1992), c. 1039, s. 10.)

§130A-327. Construction.

This Article shall be interpreted as giving the State the authority needed to assume primary enforcement responsibility under the federal act. (1979, c. 788, s. 1; 1983, c. 891, s. 2.)

§130A-328. Public water system operating permit and permit fee.

- (a) No person shall operate a community or non transient non-community water system who has not been issued an operating permit by the Department. A community or non transient non-community water system operating permit shall be valid from January 1 through December 31 of each year unless suspended or revoked by the Department for cause. The Commission shall adopt rules concerning permit issuance and renewal and permit suspension and revocation. The annual fees in subsection (b) shall be prorated on a monthly basis for permits obtained after January 1 of each year.
- (b) The following fees are imposed for the issuance or renewal of a permit to operate a community or non transient non-community water system; the fees are based on the number of persons served by the system:

Non Community Water Systems:	Fee
Base Fee:	
Non transient non-community	\$150

Community Water Systems:

Number of Persons Served	
50 or fewer	\$255
More than 50 but no more than 100	\$270
More than 100 but no more than 200	\$330
More than 200 but no more than 300	\$350
More than 300 but no more than 400	\$385
More than 400 but no more than 500	\$420
More than 500 but no more than 750	\$780
More than 750 but no more than 1000	\$810
More than 1000 but no more than 2000	\$840
More than 2000 but no more than 3000	\$870
More than 3000 but no more than 4000	\$1350
More than 4000 but no more than 5000	\$1460
More than 5000 but no more than 7500	\$1925
More than 7500 but no more than 10,000	\$2065
More than 10,000 but no more than 25,000	\$2600
More than 25,000 but no more than 50,000	\$2925
More than 50,000 but no more than 75,000	\$4250
More than 75,000 but no more than 100,000	\$4675
More than 100,000 but no more than 250,000	\$5100
More than 250,000 but no more than 500,000	\$5525
More than 500,000	\$5950

- (c) The following fees are imposed for the review of plans, specifications, and other information submitted to the Department for approval of construction or alteration of a public water system. The fees are based on the type of constructions or alteration proposed:

Distribution system:	Fee
Construction of water lines, less than 5000 linear feet	\$150
Construction of water lines, 5000 linear feet or more	\$200
Other construction or alteration to a distribution system	\$75
Ground water system:	
Construction of a new ground water system or adding a new well	\$200
Alteration to an existing ground water system	\$100
Surface water system:	
Construction of a new surface water treatment facility	\$250
Alteration to an existing surface water treatment facility	\$150
Water System Management Plan review	\$75
Miscellaneous change or maintenance not covered above	\$50

- (d) The Department may charge an administrative fee of up to one hundred fifty dollars (\$150.00) for failure to pay the permit fee by January 31 of each year.
- (e) All fees collected under this section shall be applied to the costs of administering and enforcing this Article. (1991, c. 576, s. 1; 1991 (Reg. Sess., 1992), c. 811, s. 6; c. 1039, s. 11; 2006-66, s. 11.7(a).)

§130A-329. Reporting.

Reports required to be submitted under this Article or under rules adopted by the Commission shall be submitted electronically on a form specified by the Department. The Department may waive the requirement for electronic submission of a report if the water system demonstrates that it lacks the technical capability to report electronically. (2008-143, s. 12.)

§130A-330. Reserved for future codification purposes.

§130A-331. Reserved for future codification purposes.

§130A-332. Reserved for future codification purposes.

FIGURE 1(A) ALKALINITY VS pH

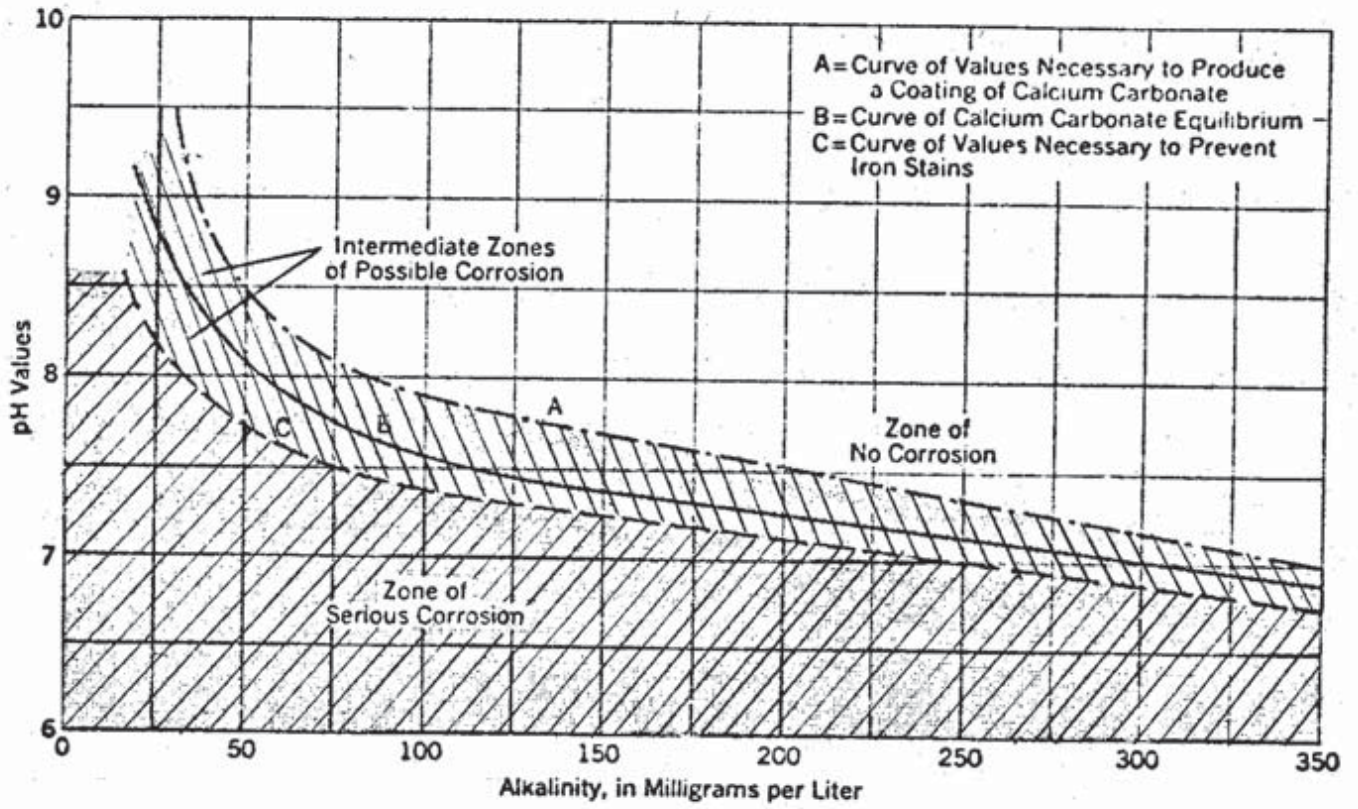
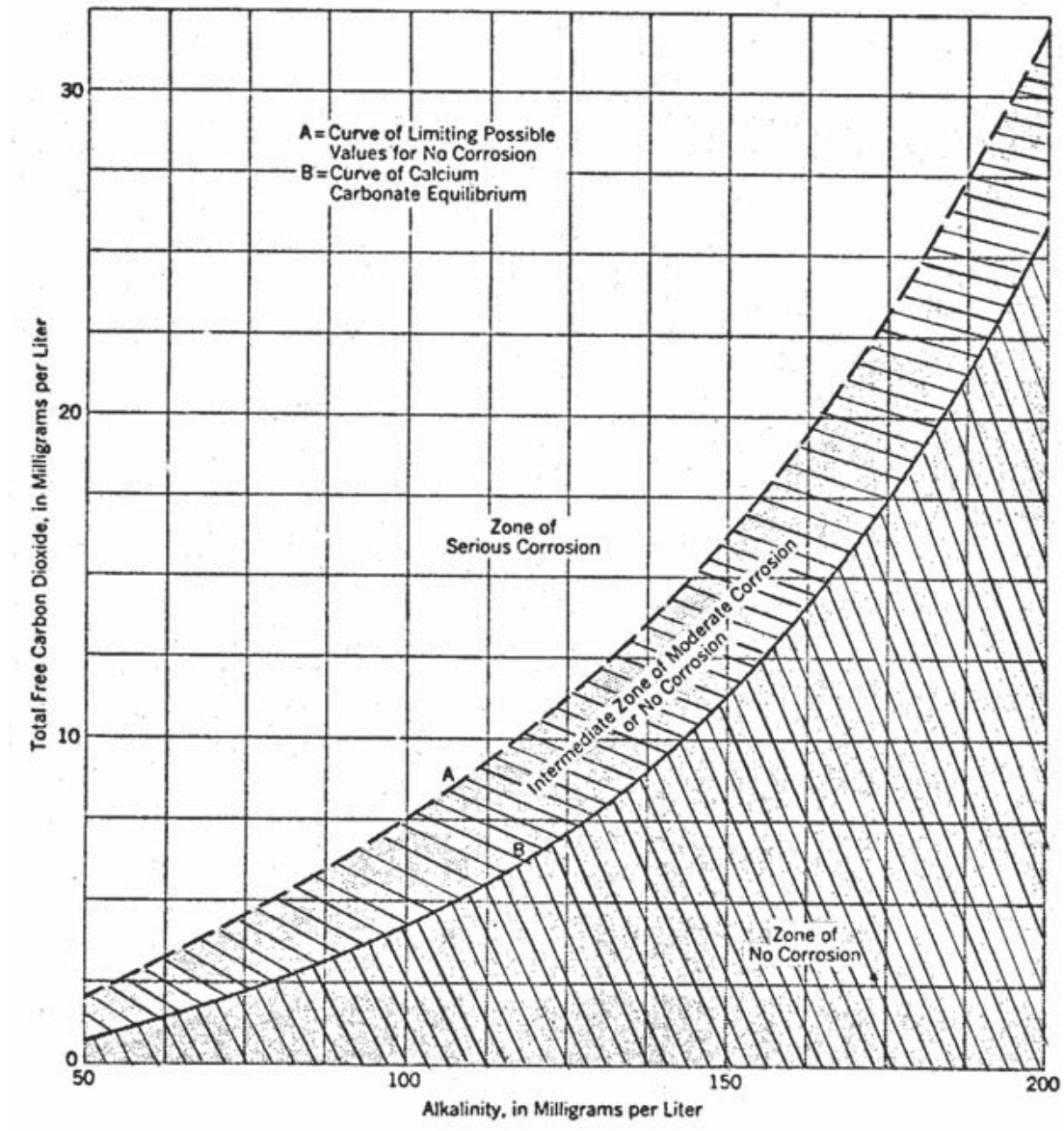


FIGURE 1(B) ALKALINITY VS TOTAL FREE CARBON DIOXIDE



Source of Figures 1(a) and 1(b):

Water Supply and Waste Disposal. Hardenberg, W.A., and Rodie, E.S., Internaitonal Textbook Co., Scranton PA 1961.

FIGURE 2:

- DELETED -

FIGURE 2:

- DELETED -

FIGURE 3(A): DEMAND WEIGHT OF FIXTURES IN FIXTURE UNIT

Fixture type	Weight in fixture units
Bathtub	4
Bedpan washer	10
Bedit	4
Dental unit or cuspidor	1
Dental laboratory	2
Drinking fountain	2
Kitchen sink	4
Laboratory	2
Laundry tray (1 or 2 compartments)	4
Shower, each head	4
Sink: service	4
Urinal, pedestal	10
Urinal (wall lip)	5

Urinal stall	5
Urinal with flush tank	3
Urinal trough (for every 2 foot section)	2
Wash sink, circular or multiple (each set of faucets)	2
Water closet: F.V.	10
Water closet: tank	5

FIGURE 3(B): EXAMPLE – FIXTURE UNITS AND ESTIMATED DEMANDS

Kind of Fixtures	Building Supply		
	No. of Fixtures	Fixture Units	Demand (gallons per minute)
Water closets	130	1,300	
Urinals	30	150	
Shower heads	12	48	
Laboratories	130	260	
Service sinks	27	81	
TOTAL		1,839	310

FIGURE 3(C): ESTIMATE CURVES FOR DEMAND LOAD

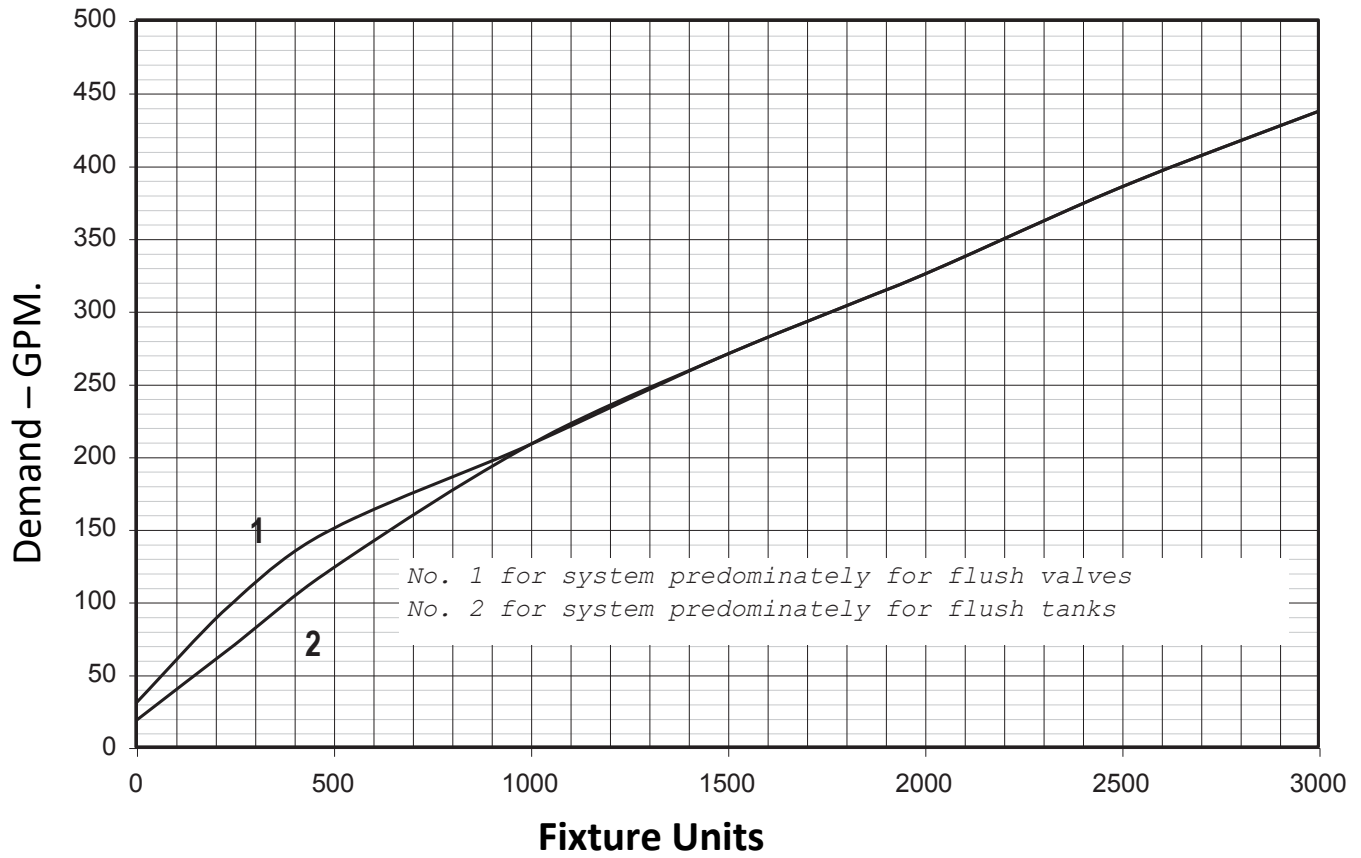


FIGURE 3(D): ENLARGED SCALE DEMAND LOAD

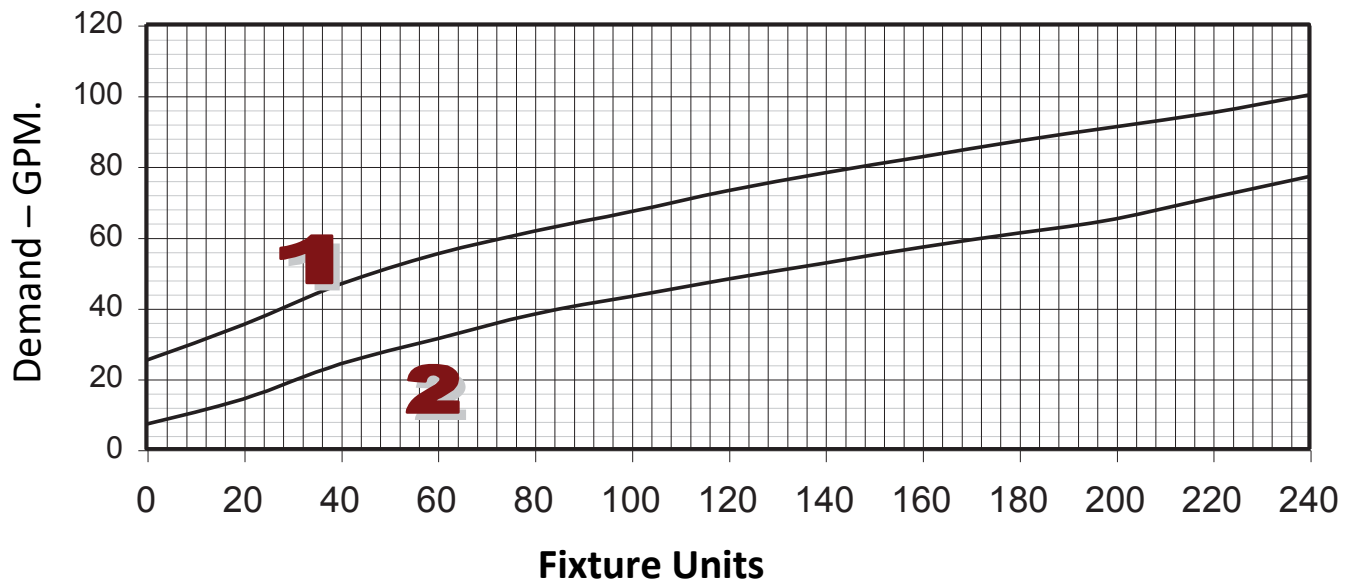
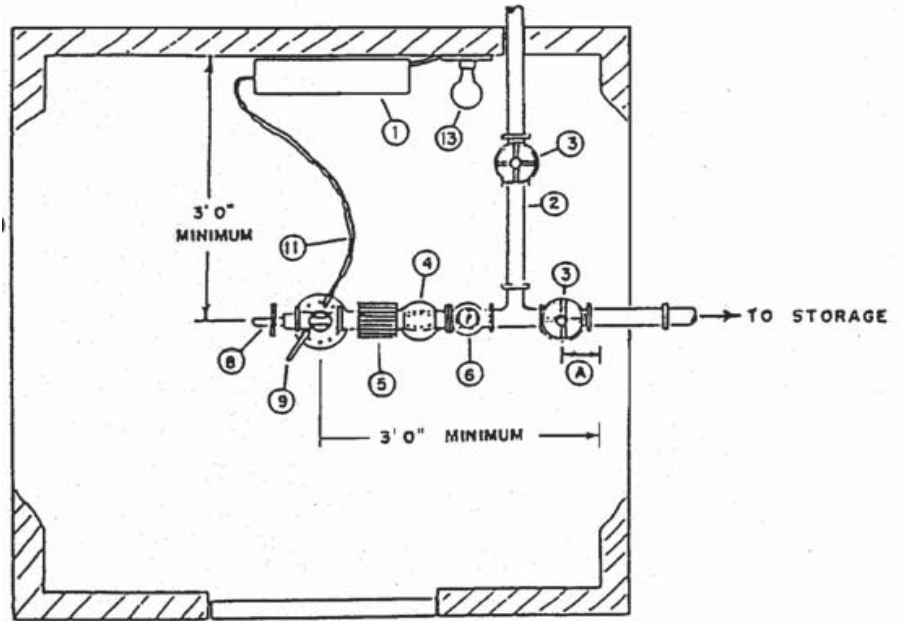


FIGURE 4: TYPICAL WELL HEAD DETAILS

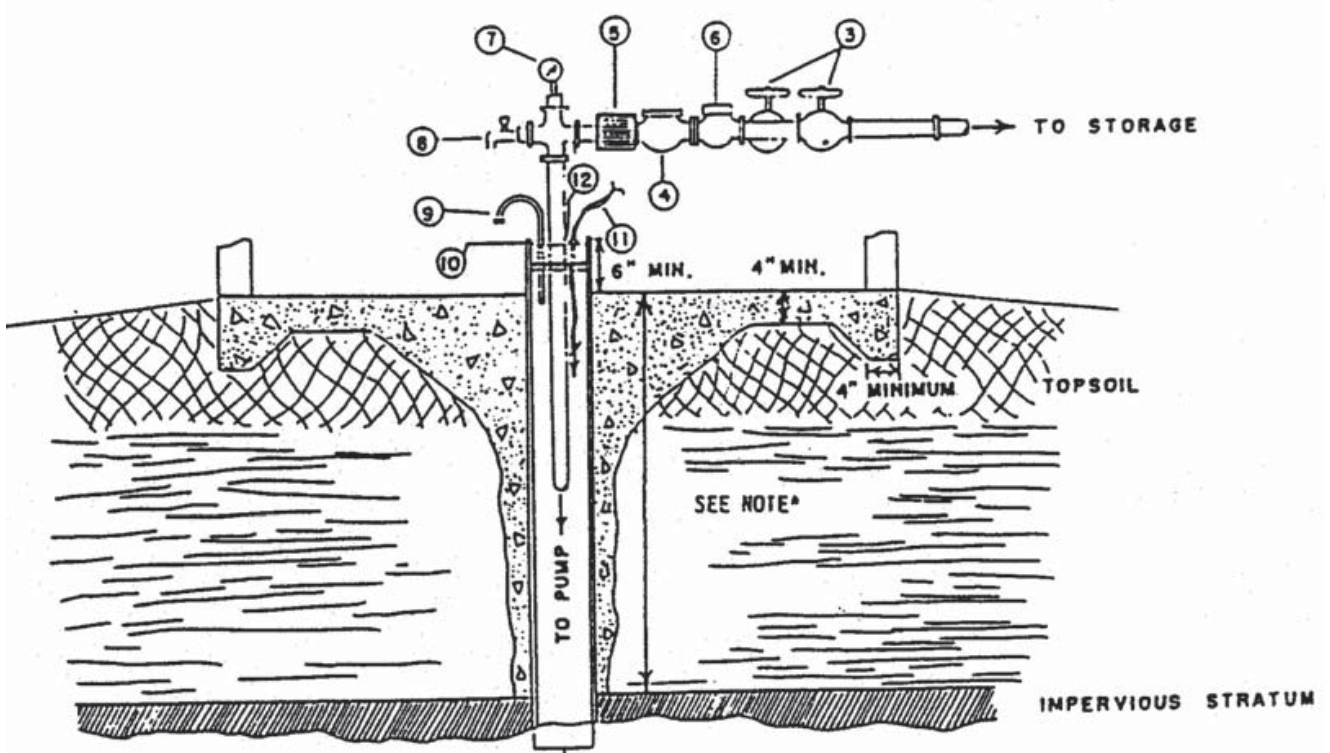
LEGEND

- 1. Control box
- 2. Blow off line
- 3. Gate valve
- 4. Check valve
- 5. Dresser coupling (or union)
- 6. Meter
- 7. Pressure gauge (w/needle valve)
- 8. Sample faucet (non-threaded)
- 9. Screened vent
- 10. Sanitary well seal
- 11. Electrical conduit
- 12. Electrical cable seal
- 13. Electrical lighting



NOTES

- A. Leave clearance between wall and valve for turning valve
- B. Slope ground surface away from slab
- C. Grout around casing to impervious stratum (20' min. depth)
- D. Slope floor to drain
- E. Provide hatch in roof above well casing.



NOTE*

Grout the annular space between the casing and the surrounding soil to a distance of at least twenty (2) feet below ground surface, provided that this distance may be reduced when available water is found at a lesser depth, but in no case shall the grouting depth be less than ten (10) feet.

**FIGURE 5:
PRESSURE & VOLUME DIFFERENTIALS FOR HYDROPNEUMATIC TANKS**

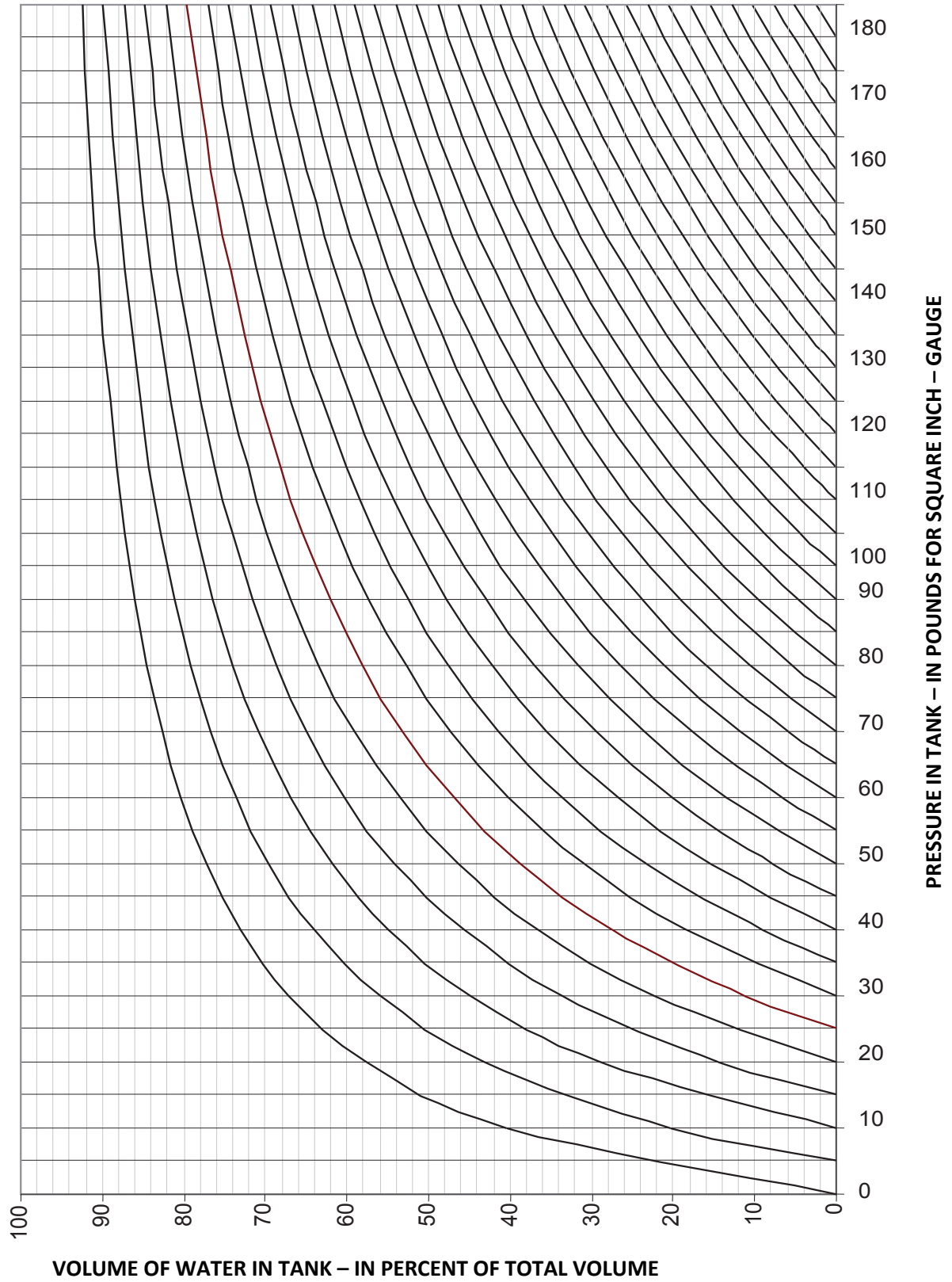


FIGURE 6: VOLUME OF HYDROPNEUMATIC TANKS

The following examples are offered in further explanation of the requirements for proper sizing of hydropneumatic tanks. As previously indicated, it is required to supply the indicated peak demand for a period of twenty minutes, and it is assumed that a combination of hydropneumatic storage and pumping will be utilized. The Effective Volume of the tank is considered to be the volume of water discharged between the high and low pressure setting.

$$\text{Required Effective Volume} = (\text{Peak Demand} - \text{Pumping Capacity}) \times 20 \text{ minutes}$$

For example, a mobile home system to serve 50 spaces and having a pumping capacity of 30 gpm would require an effective volume of:

$$\text{Req'd Effective Volume} = (\text{Peak Demand} - \text{Pumping Capacity}) \times 20 \text{ minutes} = (60-30) \times 20 = 600 \text{ gallons}$$

(For peak demands, see Rule .0802)

The actual tank size required to furnish the 600 gallons effective volume depends upon the pressure settings, air-water volume controls, etc. A system without controls would require the largest tank, whereas a system with air charging device and automatic air-water volume controls would require a much smaller tank.

The curves indicating air-water volume relationships shown in Figure 5 may be utilized to determine required tank sizes.

Continuing the above example, assume further that it is necessary to operate the tank on a 60-40 psi pressure cycle, and assume that the tank has no air-water volume controls and was not precharged. These conditions are indicated by the top curve in Figure 5 since this curve passes through the 0% water – 100% air point.

At 60 psi, water volume: 80%

At 40 psi, water volume: 73%

Therefore, the percent water volume discharges during the 60-40 psi cycle is $80-73\%=7\%$ of the total tank volume. The total volume of a tank necessary to produce the required effective volume of 600 gallons:

$$\text{Total Volume} = 600 \div 0.07 = 8570 \text{ gallons}$$

The tank size can also be determined by direct calculation rather than by using Figure 5. By using the principle of Boyle's Law and assuming the effects of temperature to be negligible, the tank is sized accordingly.

Continuing the above example and converting the pressure to Absolute (gauge + 14.7 psi), the volume is calculated as follows:

If there is no water (100% air) in the tank originally and it is filled with water until a pressure of 60 psi gauge is reached, the volume of air at that point is:

$$P_1V_1=P_2V_2$$

$$\text{Vol.}_2 \frac{P_1V_1}{P_2} = \frac{(0+14.7 \text{ psi}) \times (100)}{(60+14.7 \text{ psi})} = 19.7\% \text{ (air)}$$

On a 60-40 psi cycle, the tank would discharge to a pressure of 40 psi, and the air volume would be:

$$\text{Vol.}_3 \frac{P_2 V_2}{P_3} = \frac{(60+14.7 \text{ psi}) \times (19.7\%)}{(40+14.7 \text{ psi})} = 26.9\% \text{ (air)}$$

The percent volume of water discharge during the 60-40 cycle is:

$$\text{Percent volume: } 26.9 - 19.7 = 7.2\%$$

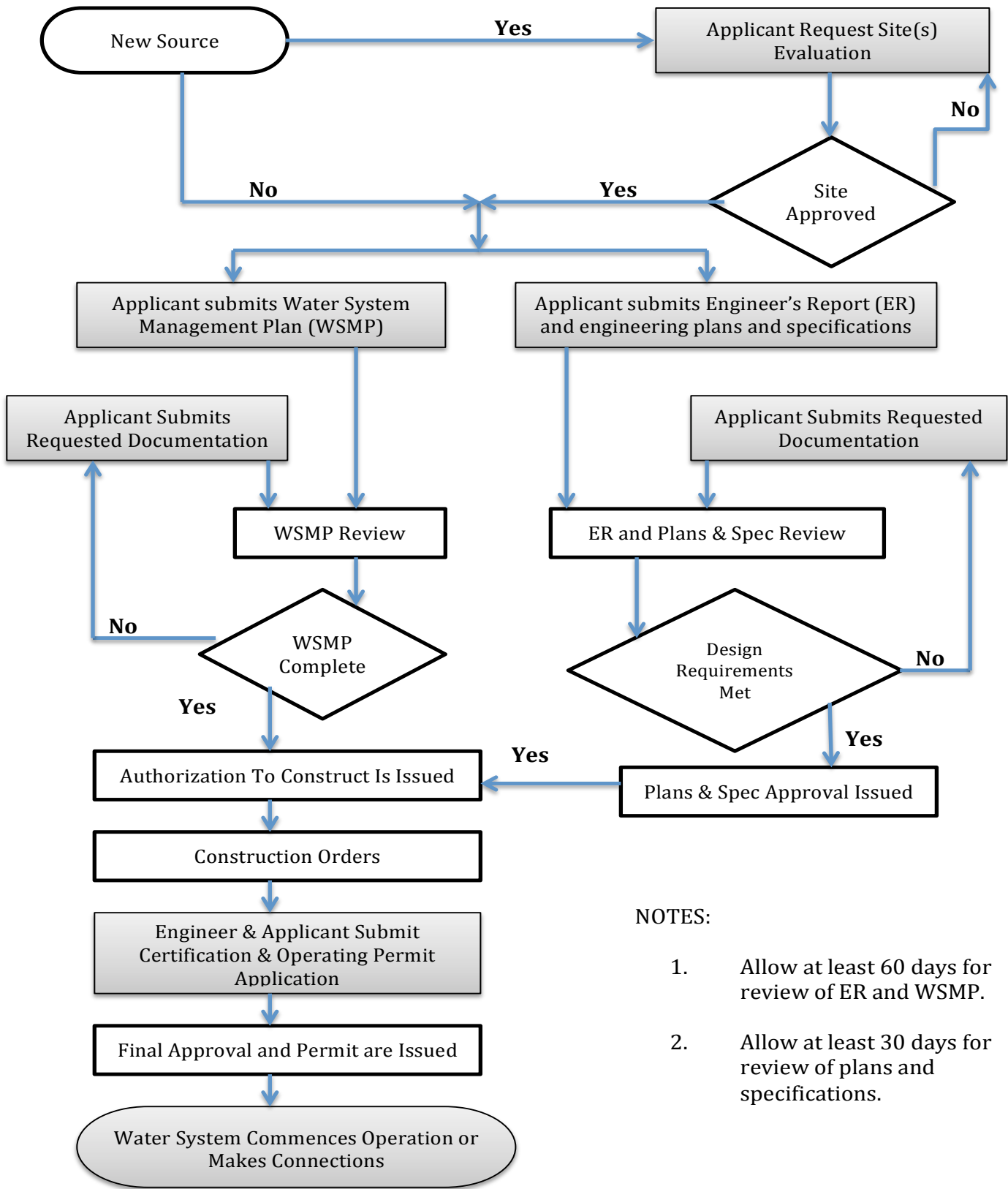
The total tank volume necessary to produce the required effective volume of 600 gallons is:

$$\text{Total volume} = \frac{600 \text{ gal.}}{0.072} = 8330 \text{ gallons}$$

By utilizing an air charging system with automatic air-water volume controls, it is possible to discharge up to 25% of the tank volume during a 60-40 psi pressure cycle. The total tank volume necessary to furnish the required effective volume in this case would be:

$$\text{Total Tank Volume} = \frac{\text{Required Effective Volume (gallons)}}{0.25}$$

APPROVAL PROCESS FLOW CHART



NOTES:

1. Allow at least 60 days for review of ER and WSMP.
2. Allow at least 30 days for review of plans and specifications.



**State of North Carolina
Department of Environmental Quality
APPLICANT CERTIFICATION FORM**

In accordance with 15A NCAC 18C .0303 (c), a signed applicant certification must be submitted to the Department, stating that the Operation and Maintenance (O&M) Plan and the Emergency Management Plan requirements have been satisfied and that the system will have a certified operator as required by Section .1300. No construction, alteration, or expansion of a community or non-transient, non-community public water system shall be placed into final service or made available for human consumption until the applicant has submitted the certification and has received Final Approval from the Department.

Certification must be provided by the following individual or their duly authorized representative:

1. For a corporation, limited liability company, home owner association or non-profit organization: *a president, vice president, secretary, or treasurer.*
2. For a partnership or sole proprietorship: *by a general partner or the proprietor.*
3. For a municipality, State, Federal or other agency: *by either a principal executive officer or ranking elected official.*

By the signature below I certify, under penalty of law:

1. The following actions have been completed for the construction, alteration, or expansion of the water system, as defined in the project documents;
 - I, or personnel under my direct supervision, have completed an O&M Plan, and
 - an Emergency Management Plan in accordance with 15A NCAC 18C .0307(d) and (e). Based on my evaluation of the plans, or my inquiry of the person or persons directly responsible for preparing the O&M Plan and Emergency Management Plan, the information contained in the plans is, to the best of my knowledge and belief, true, accurate, and complete.

2. The following actions will be completed before the construction, alteration, or expansion of the water system, as defined in the project documents is placed into final service or made available for human consumption.
 - In accordance with 15A NCA 18C .0307(d), the O&M Plan will be made accessible to the system operator on duty at all times and available to the Department upon request.
 - In accordance with 15A NCAC 18C .0307(e) the Emergency Management Plan will be made accessible to the system operator on duty at all times and available to the Department upon request.
 - In accordance with 15A NCAC 18C .0303(c), the system will have a certified operator as required by 15A NCAC 18C .1300.

Signature: _____

Name(Print): _____

Title: _____

Date: _____

Project Name: _____

System Name: _____

Serial #: _____

PWS I.D. #: _____

**MAIL TO: Capacity Development Engineer, Public Water Supply Section
1634 Mail Service Center, Raleigh, North Carolina 27699-1634**



STATE OF NORTH CAROLINA
 Department of Environmental Quality

APPLICANT CERTIFICATION FORM
 For Water Main Extensions Not Owned by the Supplier of Water

No construction, alteration, expansion, or interconnection of a community or non-transient, non-community public water system shall be placed into final service or made available for human consumption until the applicant has submitted this certification and have received Final Approval from the Department.

Certification must be provided by the following individual or their duly authorized representative:

1. For a corporation, limited liability company, home owner association or non-profit organization: *a president, vice president, secretary, or treasurer.*
2. For a partnership or sole proprietorship: *by a general partner or the proprietor.*
3. For a municipality, State, Federal or other agency: *by either a principal executive officer or ranking elected official.*

By the signature below I certify that:

- The reference project is a water main extension connected to a Public Water System, however the line extension is not owned by the Supplier of Water (i.e., the owner or operator of a Public Water System) and will not be operated as a Public Water System. If this project becomes a Public Water System as defined by the N.C. General Statutes 130A-313, I will notify the appropriate Regional Engineer of the Public Water Supply Section immediately.
- I acknowledge that the Supplier of Water is not responsible for operation, maintenance, and repair of the below referenced project.

Signature: _____

Name(Print): _____

Title: _____

Date: _____

Project Name: _____

Serial #: _____



STATE OF NORTH CAROLINA
 Department of Environmental Quality

WATER SYSTEM MANAGEMENT PLAN CERTIFICATION

All persons, including units of local government, intending to construct, alter, or expand a community water systems or new non-transient, non-community water systems must develop and submit a Water System Management Plan (WSMP) completed in accordance with North Carolina Rules 15A NCAC 18C .0307(c). The WSMP must include certification that the information in the WSMP is true, accurate, and complete. No construction may be undertaken and no contract for construction, alteration or installation may be entered into until the Department issues an Authorization to Construct letter. This authorization requires the completion and submittal of the Engineer’s Report and Water System Management Plan and approval of the engineering plans and specification by the Department.

The signature below will certify that a WSMP has been completed in accordance with 15A NCAC 18C .0307(c), and that the information in the WSMP is true, accurate, and complete.

Certification must be provided by the following individual or their duly authorized representative:

1. For a corporation, limited liability company, home owner association or non-profit organization: *a president, vice president, secretary, or treasurer.*
2. For a partnership or sole proprietorship: *by a general partner or the proprietor.*
3. For a municipality, State, Federal or other agency: *by either a principal executive officer or ranking elected official.*

I certify, under penalty of law, that I, or personnel under my direction or supervision, have completed a WSMP in accordance with 15A NCAC 18C .1307(c). Based on my evaluation of the plan, or my inquiry of the person or persons directly responsible for preparing the WSMP, the information contained in the WSMP is, to the best of my knowledge and belief, true, accurate, and complete.

Signature: _____

Name(Print): _____

Title: _____

Date: _____

Project Name: _____

System Name: _____

Serial #: _____

PWS I.D. # _____



STATE OF NORTH CAROLINA

Roy Cooper, Governor

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY

Michael S. Regan, Secretary

DIVISION OF WATER RESOURCES

S. Daniel Smith, Director

PUBLIC WATER SUPPLY SECTION

Robert W. Midgette, Section Chief