

Notice of Rulemaking Hearing
Department of Environment and Conservation
Division of Water Supply

There will be a public rulemaking hearing before the Tennessee Department of Environment and Conservation, Division of Water Supply, acting on behalf of the Tennessee Water Quality Control Board to receive comments concerning amendments to Rule Chapter 1200-5-1 Public Water Systems pursuant to Tennessee Code Annotated (TCA) 68-221-701 et seq. Tennessee Safe Drinking Water Act. A hearing will be held at the TDEC Fleming Training Center in Murfreesboro, Tennessee at 2022 Blanton Drive at 10 am CST on January 3, 2008 as well as at the large conference room of the TDEC Offices, 1525 Hollywood Drive in Jackson, Tennessee on January 3, 2008 at 10 am CST and at the Knoxville Utilities Board Operation Center, 4505 Middlebrook Pike in Knoxville, Tennessee at 10 am EST on January 3, 2008. Additional written comments must be received by the Division of Water Supply at the accompanying address by 4:30pm CST on January 10, 2008 in order to assure consideration:

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For a copy of the entire text of this notice of rulemaking hearing contact Tom Moss, at Division of Water Supply, 401 Church Street, Nashville TN 37243-1549; (615) 532-0191 or call the nearest field office of the Department of Environment and Conservation, Division of Water Supply at 1-888-891-8332. The text of the rules may also be downloaded from the Department's website at <http://www.state.tn.us/environment/dws>.

Individuals with disabilities who wish to participate in these proceedings or to review these filings should contact the Tennessee Department of Environment and Conservation to discuss any auxiliary aids or services needed to facilitate such participation. Such contact may be made in person, by writing, telephone, or other means and should be made no less than ten days prior to the (scheduled meeting date) (or the date such party intends to review such filings), to allow time to provide such aid or service. Contact the Tennessee Department of Environment and Conservation, American Disabilities Act (ADA) Coordinator at 1-866-253-5827 (toll free) or 1-615-532-0200 (Nashville) for further information. Hearing impaired callers may use the Tennessee Relay Service (1-800-848-0298).

The proposed amendments were drafted for the addition of the Ground Water Rule based on the new federal rule requirements contained in 40 CFR 141.400 as well as other Ground Water Rule associated changes within Rule Chapter 1200-5-1, the increasing of fees for public water systems and updating laboratory analytical methods and fees and consolidating them under Rule 1200-5-1-14. In addition, the required minimum chlorine disinfectant within water system distribution systems is proposed to be amended to be raised to 0.5 mg/l from 0.2 mg/l and disinfectant leaving the water plant from 0.2 to 2.0 mg/l due to problems with slime-forming bacterial growth within the distribution systems, with an effective date of July 1, 2009.

Substance of the Proposed Rules
Amendments
Chapter 1200-5-1
Public Water Systems

Paragraph (75) of Rule 1200-5-1-.04 Definitions is amended by adding the sentence “Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.” at the end of the paragraph so that, as amended the it shall read as follows:

- (75) “Public Water System” means a system for the provision of piped water for human consumption if such serves 15 or more connections or which regularly serves 25 or more individuals daily at least 60 days out of the year and includes:
- (a) any collection, treatment, storage or distribution facility under control of the operator of such system and used primarily in connection with such system; and
 - (b) any collection or pre-treatment storage facility not under such control which is used primarily in connection with such system,

The population of a water system shall be determined by actual count or by multiplying the household factor by the number of connections in the system. The household factor shall be taken from the latest federal census for that county or city. Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.

Authority: T.C.A. §§68—221—704 and 4—5—202. Administrative History: Original rule certified June 7, 1974. Repealed and refiled June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed November 26, 1990; effective January 10, 1991. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993; effective January 5, 1994. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed October 31, 2000; effective January 14, 2001. Amendment filed July 15, 2002; effective September 28, 2002. Amendment filed December 30, 2002; effective March 14, 2003. Amendment filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective .

Amendment

Paragraph (1) of Rule 1200-5-1-.07 Monitoring and Analytical Requirements is amended by deleting the title “Microbiological Contaminant Sampling and Analytical Requirements” and substituting the title “Microbiological Contaminant Sampling” so that, as amended it shall read as follows:

- (1) Microbiological Contaminant Sampling

Amendment

Subparagraph (a) of paragraph (1) of Rule 1200-5-1-.07 Monitoring and Analytical Requirements is amended by deleting the subparagraph in its entirety and marking it as “reserved” such that, as amended the subparagraph shall read:

- (a) Reserved

Amendment

Subparagraph (b) of paragraph (1) of Rule 1200-5-1-.07 Monitoring and Analytical Requirements is amended by deleting it in its entirety and reserving it so that, as amended the subparagraph shall read as follows:

- (b) Reserved

Amendment

Subparagraph (g) of paragraph (1) of Rule 1200-5-1-.07 Monitoring and Analytical Requirements shall be amended by deleting it in its entirety and substituting the following language so that, as amended the subparagraph shall read as follows:

- (g) 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 Rule 1200-5-1-.06(4) provided the water is not served to customers before negative analytical results are obtained. Samples representing water served to customers prior to obtaining analytical results shall not be special purpose samples and shall count toward compliance with the MCL for total coliforms in Rule 1200-5-1-.06(4). Repeat samples taken pursuant to paragraph (2) of this section are not considered special purpose samples, and must be used to determine compliance with the MCL for total coliforms in Rule 1200-5-1-.06(4).

Amendment

Paragraph (4) of Rule 1200-5-1-.07 Monitoring and Analytical Requirements is amended by adding new subparagraph (d) so that, as amended the new subparagraph shall read as follows:

- (d) Sanitary surveys conducted by the Department pursuant to Rule 1200-5-1-.07(4) may be used to meet the sanitary survey requirements of Rule 1200-5-1-.40.

Authority: T.C.A. §§68—221—704 et seq. and 4—5—202. Administrative History: Original rule certified June 7, 1974. Repealed and refiled June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed November 26, 1990; effective January 10, 1991. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993, effective January 5, 1994. Amendment filed April 12, 1996, effective June 26, 1996. Amendment filed, October 31, 2002 effective January 14, 2001. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed ; effective .

Amendment

Paragraph (5) of Rule 1200-5-1-.08 Turbidity Sampling and Analytical Requirements is amended by deleting it in its entirety.

Authority: T.C.A. §§68—221—704 and 4—5—202. Administrative History: Original rule certified June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed November 26, 1990; effective January 10, 1991. Amendment filed April 12, 1996, effective June 26, 1996. Amendment filed August 15, 2005; effective October 29, 2005. Amendment filed ; effective .

Amendment

Part 1 of subparagraph (d) of paragraph (1) of Rule 1200-5-1-.09 Inorganic Chemical Sampling and Analytical Requirements is amended by deleting the last sentence “Detection limits for each analytical methods are the following:” so that, as amended the part shall read as follows:

1. If the concentration in the composite sample is greater than or equal to one-fifth of the MCL of an 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 were detected in the composite sample.

Amendment

Subparagraph (d) of paragraph (1) of Rule 1200-5-1-.09 Inorganic Chemical Sampling and Analytical Requirements is amended by deleting Table 1200-5-1-.09(1)(d), Detection Limits for Inorganic Contaminants.

Amendment

Paragraph (12) of Rule 1200-5-1-.09 Inorganic Chemical Sampling and Analytical Requirements is amended by deleting it in its entirety.

Authority: T.C.A. §§68—221—701 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993; effective January 5, 1994. Amendment filed April 12, 1996, effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed July 15, 2002, effective September 28, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed ; effective .

Amendment

Subparagraphs (l) and (m) of paragraph (1) of Rule 1200-5-1-.10 Organic Chemical Sampling and Analytical Requirements and the accompanying tables are amended by deleting the subparagraphs and the accompanying tables in their entirety and reserving them so that the subparagraphs as amended, shall read as follows:

- (l) Reserved
- (m) Reserved

Amendment

Subparagraph (s) of paragraph (1) of Rule 1200-5-1-.10 Organic Chemical Sampling and Analytical Requirements and the accompanying table is amended by deleting it in its entirety.

Authority: T.C.A. §§68—221—704 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993; effective January 5, 1994. Amendment filed April 12, 1996, effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed November 21, 2001; effective February 4, 2002. Amendment filed July 15, 2002, effective September 28, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed ; effective .

Amendment

The title for Rule 1200-5-1-.11 Radionuclide Sampling and Analytical Methods is amended by replacing the title “Radionuclide Sampling and Analytical Methods” with “Radionuclide Sampling” so that, as amended, the title of the rule shall read as follows:

Rule 1200-5-1-.11 Radionuclide Sampling

Amendment

Paragraphs (1) and (2) of Rule 1200-5-1-.11 Radionuclide Sampling and Analytical Methods are deleted in their entirety and paragraphs (3), (4), (5) and (6) re-enumerated as paragraphs (1), (2), (3) and (4) so that, as amended, the paragraphs shall read as follows:

- (1) 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 (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample.)
- (a) To determine compliance with gross alpha particle activity, radium-226, radium-228 and uranium the detection limit shall not exceed the concentration in the Table to this subparagraph.

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

Contaminant	Detection Limit
Gross alpha particle activity	3pCi/L
Radium-226	1pCi/L
Radium-228	1pCi/L
Uranium	1/10 the MCL

- (b) To determine compliance with beta particle and photon activity the detection limit shall not exceed the concentrations listed in the following table.

Detection Limits for Man-made Beta Particle and Photon Emitters

Radionuclide	Detection Limit
Tritium	1000pCi/L
Strontium-89	10pCi/L
Strontium-90	2pCi/L
Iodine-131	1pCi/L
Cesium-134	10pCi/L
Gross beta	4pCi/L
Other radionuclides	1/10 of the applicable limit

- (2) To judge compliance with the maximum contaminant levels listed in Rule 1200-5-1-.06(5) 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.
- (3) 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.

- (4) Monitoring and compliance requirements for gross alpha particle activity, radium -226, radium 228, and uranium.
- (a) Community water systems (CWSs) must conduct initial monitoring to determine compliance with radium-226 and 228, gross alpha particle activity and uranium activity by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, and uranium and beta particle activity and photon activity in drinking water "detection limit" is defined as in Rule 1200-5-1-.11(3).
1. 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 (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 Rule 1200-5-1-.11(4)(a)2(ii)(III).
 - (i) 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.
 - (I) 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.
 - (II) 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.

- (III) 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 demonstrates 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 Rule 1200-5-1-.11, 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 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 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 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 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 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 composite 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 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% (1.65 sigma, where sigma 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, 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

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 Rule 1200-5-1-.11(4)(b)1 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 Rule 1200-5-1-.11(4)(b)1.
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 beta 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, the State may reduce the frequency of monitoring at that sampling point to every 3 years. Systems must collect all samples required in Rule 1200-5-1-.11(4)(b)2 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 subparagraph(b)2.
 - 3. Community water systems designated by the State to monitor for beta particle and photon radioactivity can not apply to the State for a waiver from the monitoring frequencies specified in Rule 1200-5-1-.11(4)(b)1 or (b)2.
 - 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. For community water systems, if the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the 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 Rule 1200-5-1-.06(5)(b)1, using the formula in Rule 1200-5-1-.06(5)(b)2. Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.
 - 6. Community water systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in Rule 1200-5-1-.06(5)(c) 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. Community water systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in Rule 1200-5-1-.11(4)(b)1(ii) or(b)2(i).
- (c) General monitoring and compliance requirements for radionuclides.
- 1. The State may require more frequent monitoring than specified in subparagraphs (a) and (b) of this paragraph, 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 the radionuclide MCLs 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, 1/2 the detection limit will be used to calculate the annual average.
4. The Department has the discretion to delete results of obvious sampling or analytic errors.
5. If the MCL for radioactivity set forth in Rule 1200-5-1-.06(5) is exceeded, the operator of a community water system must give notice to the State pursuant to Rule 1200-5-1-.20 and to the public as required by Rule 1200-5-1-.19.

Authority: T.C.A. §§53—2002 and 53—2003; Public Acts of 1983, Chapter 324. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed November 21, 2001, effective February 4, 2002. Amendment filed April 12, 2002; effective June 26, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed ; effective .

Amendment

Paragraphs (2), (3) and (4) of Rule 1200-5-1-.12 Secondary Drinking Water Regulations are amended by deleting them in their entirety and re-enumerating paragraph (5) to become paragraph (2) so that, as amended, paragraph (2) shall read:

- (2) The system may apply for monitoring waivers from the monitoring frequency specified in paragraph (1) of this Rule. The state may issue monitoring waivers after considering: historical data, whether or not there have been customer complaints concerning the contaminant to be waived, any corrective action taken by the water supplier to correct the secondary contaminant problem, and whether or not the system routinely monitors for the contaminant as part of its treatment process monitoring program. The state shall determine the frequency, if any, a system must monitor after considering the historical data available, the number and nature of customer complaints and other factors that may affect the contaminant concentration, and specify the decision in writing to the system.

Authority: T.C.A. §§68—221—704 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed _____; effective _____.

Amendment

Rule 1200-5-1-.14 Laboratory Certification is amended by deleting it in its entirety and substituting the following so that, as amended, the Rule shall read as follows:

1200-5-1-.14 Laboratory Certification.

- (1) General
 - (a) For the purpose of determining compliance with maximum contaminant levels set forth in this chapter, analyses of samples may be considered only if they have been analyzed by a laboratory certified by the Department. Laboratories which are certified by the Department are designated "state-certified laboratories." Analysis for turbidity, free chlorine residual, temperature, pH, alkalinity, calcium, conductivity, orthophosphate, daily chlorite, and silica may be performed by persons approved by the Department. Approved methodology must be used.
 - (b) The Tennessee Laboratory Certification Program is established for the purpose of evaluating laboratories to determine technical capability to analyze for one or more groups of the contaminants, disinfectant residuals, disinfection byproducts and disinfectant precursors listed in Rules 1200-5-1-.06 through 1200-5-1-.10, 1200-5-1-.12, 1200-5-1-.21, 1200-5-1-.24 through 1200-5-1-.26, and 1200-5-1-.36 through .40 of this Rule chapter. Designation of Department laboratory certification officer(s) shall be from those experienced professional staff members assigned to the Department of Environment and Conservation Division of Water Supply, and certified by the U.S. Environmental Protection Agency. Certification Officer(s) shall supervise the certification program.
 - (c) A laboratory desiring certification in microbiological and/or chemical analysis shall make written application to the Department of Environment and Conservation, Division of Water Supply. The applicant shall indicate those group(s) of contaminants for which it seeks certification:

Chemistry

1. General (wet)
 2. Inorganic
 3. Organic Chemicals
 4. Disinfection Byproducts
 5. Polychlorinated Biphenyls (PCBs)
 6. Radiochemistry
 7. Microbiology
 - (i) Enzyme Substrate Coliforms
 - (ii) Membrane Filter Coliforms
 - (iii) Heterotrophic Plate Count
 - (iv) Coliphage
 - (v) Enterococci
- (d) The laboratory shall upon request supply to the Department all information requested concerning its equipment, facilities, data, and the qualifications of its laboratory staff. Certified laboratories must have an on-site audit conducted every three years by the certification officer or his/her designee.
- (e) A laboratory desiring certification will arrange for an American Association for Laboratory Accreditation (A2LA) approved vendor to send performance evaluation samples to the laboratory for testing pursuant to its proficiency testing program. A2LA approved Performance Evaluation vendors can be viewed at: <http://www.a2la.org/dirsearchnew/nelacptproviders.cfm>. The laboratory's performance in correctly evaluating such sample(s) will be sent to both the laboratory and to the certification officer. All direct costs for the performance evaluation samples will be borne by the laboratory requesting certification.
- (f) The certification officer shall review the written report of the laboratory performance evaluation and together with his review of requirements set forth in this Rule shall determine the certification ranking.
- (g) Certified laboratories must maintain all records and correspondence used to determine compliance with the requirements of these Rules for a period of not less than six (6) years. Adequate information must be available to reconstruct results for compliance and performance evaluation (PE) samples. This includes all raw data, calculations, and quality control data. Electronic data must be backed up by protected tape, hard disk, or other method approved by the Department. Water system clients should be notified before disposing of any records so that they may request copies if needed. Performance evaluation samples shall be analyzed annually.
- (h) Certified Laboratories shall comply with all requirements set forth in the latest edition of EPA Manual for the Certification of Laboratories Analyzing Drinking Water except where those requirements differ from the requirements set forth in this chapter.
- (2) In order for a laboratory to be certified by the Department:
- (a) It must have a written quality assurance (QA) plan which addresses the following items:

1. Laboratory organization and responsibility.
2. Process used to identify clients' Data Quality Objectives.
3. Standard Operating Procedures with dates of last revision.
4. Field sampling procedures.
5. Laboratory sample receipt and handling procedures.
6. Instrument calibration procedures
7. Analytical procedures.
8. Data reduction, validation, reporting and verification.
9. Type of quality control (QC) checks and the frequency of their use.
10. List schedules of internal and external system and data quality audits and inter - laboratory comparisons.
11. Preventive maintenance procedures and schedules.
12. Corrective action contingencies.
13. Record keeping procedures.

(i) If a particular item is not relevant, the QA plan should state this and provide a brief explanation.

(ii) All laboratories analyzing drinking water compliance samples must adhere to any required QC procedures specified in the approved method. Documentation for many of the listed QA plan items may be made by reference to appropriate sections of the latest edition of EPA Manual for the Certification of Laboratories Analyzing Drinking Water, the laboratory's standard operating procedures (SOPs), or other literature (e.g., promulgated methods, Standard Methods for the Examination of Water and Wastewater, etc.). The QA Plan should be updated at least annually.

(b) It must complete the performance evaluation samples as described in Rule 1200-5-1-.14(9).

(c) On an annual basis and with each application for certification or recertification, all laboratories except Tennessee Public Water Systems shall convey to the Department, Division of Water Supply, payment for the activities necessary for each group of contaminants it desires certification or recertification. All laboratories except Tennessee Public Water Systems shall pay annually an administrative certification fee as listed in the fee schedule. The fee schedule is as follows:

	Fee Type	Fee in Dollars
1.	Administrative In-State	\$1000.00
2.	Administrative Out of State	\$750.00
3.	General Chemistry-Turbidity, Corrosivity, pH	\$500.00
4.	Inorganics- Trace Metals, Sodium, Nitrite, Nitrate, Fluoride, Sulfate, Cyanide, Asbestos, Chlorite, and Bromate	\$500.00
5.	Organics	\$500.00
6.	Disinfection Byproducts-Trihalomethanes and Haloacetic acids	\$500.00
7.	Polychlorinated Biphenyls (PCB)	\$500.00
8.	Radiochemistry	\$500.00
9.	Enzyme Substrate-Total Coliform and E.-Coli	\$500.00
10.	Membrane Filter- Total Coliform, Fecal Coliform, E.-Coli	\$500.00
11.	Heterotrophic Plate Count	\$500.00

12.	Coliphage	\$500.00
13.	Enterococci	\$500.00

- (i) Certification fees shall be retained by the state even if the laboratory applying for certification does not qualify for certification.
 - (ii) If the certification fee is not paid within 30 days after the receipt of the invoice, certification of the laboratory is automatically revoked.
 - (iii) The reinstatement fee for a laboratory that fails to pay its certification fee by the invoice due date shall be \$500.00 in addition to the fees specified in this subparagraph.
- (3) Ranking Scheme of Laboratories - Based upon a review of the written application, the facts determined from any inspection, and the results of a laboratory performance evaluation, a certification officer may classify a laboratory as follows for the particular group(s) of contaminants for which it seeks certification:
- (a) Certified - A laboratory that meets the minimum requirements as set forth in these Rules.
 - (b) Provisionally Certified - A laboratory which has deficiencies but can still produce valid analytical data.
 - (c) Not Certified - A laboratory which possesses major deficiencies such that it cannot consistently produce valid analytical data in order to determine compliance with the maximum contaminant level. Analytical data will not be accepted from a laboratory with this ranking.
 - (d) Interim Certification - Interim certification may be granted in certain circumstances when it is impossible or unnecessary to perform an on-site audit. Interim certification status may be granted if, for example, the Certification Officer determines that the laboratory has the appropriate instrumentation, is using the approved methods, has adequately trained personnel to perform the analyses, and has satisfactorily analyzed PE samples, if available, for the contaminants in question. The Certification Officer should perform an on-site audit as soon as possible but no later than three years. An example of a situation where this type of certification is warranted would be a laboratory that has requested certification for the analysis of additional analytes that involve a method for which it already has certification.
- (4) Downgrading Certification Status - A laboratory certified to perform analyses may be downgraded to a Provisionally Certified status for a particular parameter, or for one or more groups of contaminants for which it has been certified for any one of the following reasons:
- (a) Failure to analyze a set of performance evaluation samples within established acceptance limits described in paragraph (9) of this rule. If more than one concentration of a particular contaminant was provided for analysis, the laboratory must analyze all concentrations provided except where otherwise stated.

- (b) Failure to notify the Department within 30 days of any changes either in personnel, equipment, or laboratory location which may impair analytical capability.
 - (c) Failure to maintain the minimum required standard of quality as contained in the most recent version of the EPA Manual for the Certification of Laboratory Analyzing Drinking Water as determined by an on-site evaluation by a Department representative.
 - (d) During a provisional status period, which may last for up to one year plus any extension period pending proceedings for revocation of its certification, the laboratory may continue to analyze samples for compliance purposes, but it must notify its clients of its downgraded status in writing on all reports.
 - (e) Failure to report compliance data to the public water system or the state in a timely manner. Data that may cause the system to exceed a MCL shall be reported as soon as possible to the system and to the state.
- (5) Revoking Certification Status - A laboratory certified to perform analyses may be downgraded from a Certified or a Provisionally Certified status to a Not Certified status for a particular parameter, or for one or more groups of contaminants for which it has been certified, including but not limited to any of the reasons listed in subparagraphs below. Commercial laboratories must notify their public water system customers of the change in certification status by mail within 45 days of a downgrade in status by the Department and retain copies of such notice for six years.
- (a) Failure to analyze an initial and a follow-up or cross check performance evaluation sample within established acceptance limits.
 - (b) Failure to correct identified deviations (including continued use of unapproved methods and equipment) within the time specified by the Department.
 - (c) Reporting as data derived from its own laboratory analysis, that data obtained from analyses of the sample(s) performed by another laboratory.
 - (d) Falsification or inaccurate reporting of analytical data.
 - (e) Failure to report to the Department on Departmental forms analytical results as specified by Rule 1200-5-1-.18. Forms may be obtained from the Division of Water Supply. A certified laboratory shall submit results of its analyses to both the appropriate Department's field office and the Department's central office on forms furnished by the Department.
 - (f) Failure to perform the analysis within the time period prescribed by the analytical procedure. However, the time period shall not be more than thirty (30) days from the sample collection date, except for lead and copper tap samples collected pursuant to Rule 1200-5-1-.33.
 - (g) Failure to notify its drinking water customers of any downgrade or revocation of its certification status and to keep records of the notice to customers.
 - (h) Failure of the laboratory to reject any sample taken for compliance purposes that does not meet acceptable criteria for the type container and preservative, maximum holding time, chain of custody, proper sample collection and transport, and sample report form that contains the location, date, time of collection, collector's name, preservative added, and other special remarks

concerning the sample. Indelible ink shall be used for completing the sample report form.

- (i) Failure of the Laboratory Director to give timely notice to the party responsible for collecting the sample that improper sampling technique, container, transport, holding time, method preservative or documentation was used.
 - (j) Failure to provide written sampling procedures with sample containers sent to customers for collecting drinking water samples.
 - (k) Failure to meet the method detection limits.
 - (l) Failure to maintain all data necessary to reconstruct analytical results reported for compliance samples.
 - (m) Failure to pay certification fees as listed in Rule 1200-5-1-.14(2)(c).
- (6) Procedure for Revocation
- (a) The State, Department, Division of Water Supply or the certification officer shall notify the laboratory by certified mail of its intent to revoke certification.
 - (b) If the local laboratory objects to the determination to revoke certification, the laboratory shall submit a written notice of appeal to the Department within thirty (30) days after issuance of the notice of intent to revoke certification. The notice of appeal will be referred to the Tennessee Water Quality Control Board. The Board will set a hearing date and conduct proceedings in accordance with the Uniform Administrative Procedures Act, Chapter 5 of Title 4. If no notice of appeal is so filed, certification will be revoked.
 - (c) The notice of appeal shall set forth the grounds and reasons for objection and shall ask for a hearing before the Tennessee Water Quality Control Board. It shall be signed by a duly authorized representative of the laboratory such as the president/owner of a commercial laboratory, or the mayor, utility manager, president, or laboratory supervisor in the case of a municipal or utility district laboratory.
 - (d) If the Water Quality Control Board modifies or sets aside the determination of the Department, the Department will reevaluate the local laboratory within sixty (60) days of issuance of the decision by the Board.
- (7) Reinstatement of Certification - Certification of a laboratory will be reinstated when it demonstrates to the Department that the deficiencies which resulted in provisional certification or revocation have been corrected. Such demonstration may result from an on-site evaluation and/or a successful analysis of samples on the next regularly scheduled performance evaluation.
- (8) Reciprocity of Certified Laboratories - The Department may authorize acceptance of analyses from laboratories certified by other states or by the U. S. Environmental Protection Agency. Authorization will be granted on a reciprocal basis for laboratories from those states which accept Tennessee laboratory certification. Laboratories desiring Department approval of their certification from the U.S. E.P.A. or from another state must submit to the Department copies of all correspondence pertaining to the grant of certification, including the results of any performance evaluation sample analyses.
- (9) Proficiency Evaluation (PE) Samples or Performance Test (PT) Samples

- (a) In order to receive and maintain full certification for an analyte, the following are required for each analyte for which a laboratory is certified:
 - (i) The laboratory must analyze PE samples (if available) acceptable to the Department at least once a year for each analyte and by each method used to analyze compliance samples. PE samples are also referred to as Performance Test (PT) samples.
 - (ii) Results from analysis of the PE samples must be within the acceptable limits set forth in this chapter.
 - (iii) The laboratory must document the corrective actions taken when a PE sample is analyzed unsuccessfully. A copy of this documentation must be available for review by the certification officer.
 - (iv) A make up PE sample must be successfully analyzed within three months of being notified that a PE sample was not acceptable.
- (b) Excluding vinyl chloride, the laboratory may be certified for all VOCs if they successfully analyze at least 80% of the regulated VOCs. The 80% Rule does not apply to the regulated trihalomethanes (THM) or haloacetic acids (HAAs). Laboratories are certified for total THMs and HAA5 but each regulated THM and HAA concentration must be reported, evaluated and passed individually to pass the PE sample. If a laboratory fails one of the regulated THMs or HAAs, it cannot be certified for total THMs or HAA5, but must analyze another PE sample and pass all of the regulated THMs or HAAs in a PE sample to be certified to analyze compliance monitoring samples for total trihalomethanes or total haloacetic acids.

The following table summarizes the 80% Rule.

Analyte(s)	PE Success Requirement
Vinyl Chloride	100%
20 VOCs	80% *
4 Regulated THMs	100%
5 Regulated HAA5s	100%

*A lab will not maintain certification for analyte(s) which it repeatedly fails.

- (c) Acceptable PE studies for the determination of total coliforms and E. coli shall be part of a drinking water study. Each study shall contain a set of ten samples in various combinations of total coliforms, E. coli, non-coliforms, and at least one blank. To be certified, laboratories must successfully analyze nine of the ten samples with no false negatives.
- (10) Analytical Requirements

- (a) Microbiology
 - 1. Suppliers of water for community water systems and non-community water systems shall analyze for coliform bacteria for the purpose of determining compliance with Rule 1200-5-1-.06(4). The standard sample volume required for total coliform analysis, regardless of the analytical method used is 100 milliliters. Analyses shall be conducted in accordance with one of the analytical methods in following table:

Table 1200-5-1-.14(10)(a)1.

Organism	Methodology	Citation ¹
Total Coliforms ²	Total Coliform Fermentation Technique ^{3,4,5}	9221 A, B
	Total Coliform Membrane Filter Technique ⁶	9222 A, B, C
	Presence-Absence (P-A) Coliform Test ^{5,7}	9221
	ONPG-MUG Test ⁸	9223
	Colisure Test ⁹	
	E*Colite [®] Test ¹⁰	
	m-ColiBlue24 [®] Test ¹¹	
Readycult [®] Coliforms 100 Presence/Absence Test ¹²		
Membrane Filter Technique using Chromocult [®] Coliform Agar ¹³		
	Colitag [®] Test ¹⁴	

Footnotes

- 1 Methods 9221 A, B; 9222 A, B, C; 9221 D and 9223 are contained in Standard Methods for the Examination of Water and Wastewater, 18th edition (1992) and 19th edition (1995) American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 20005; either edition 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.
- 2 The time from sample collection to initiation of analysis may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 °C during transit.
- 3 Lactose 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.
- 4 If 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.
- 5 No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
- 6 MI 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-4100), 401 M. Street SW, Washington, DC 20460, EPA/600/J-99/225.
- 7 Six-times formulation strength may be used if the medium is filter-sterilized rather than autoclaved.
- 8 The ONPG-MUG Test is also known as the Autoanalysis Colilert System.
- 9 A 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.
- 10 A 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.
- 11 A description of the m-ColiBlue24[®] Test, Aug 17, 1999, is available from the Hach Company, 100 Dayton Avenue, Ames, IA 50010.
- 12 The Readycult[®] Coliforms 100 Presence/Absence Test is described in the document, "Readycult[®] Coliforms 100 Presence/Absence Test for the Detection and Identification of Coliform Bacteria and Escherichia coli in finished water", 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.
- 13 Membrane Filter Technique using Chromocult[®] Coliform Agar is described in the document, "Chromocult[®] Coliform Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and Escherichia coli in finished water", 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.
- 14 Colitag[®] 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>.

2. Where a determination of fecal coliform density is not required, public water systems must conduct fecal coliform analysis in accordance with the following procedure:

- (i) When the MTF Technique or Presence-Absence (P-A) Coliform Test is used to test for total coliforms, shake the lactose-positive presumptive tube or P-A bottle 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.
 - (ii) For EPA-approved analytical methods which use a membrane filter, 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 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 EC tubes to insure adequate mixing and incubate in a waterbath at $44.5 \pm 0.2^{\circ}\text{C}$ 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 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.
3. Public Water Systems choosing to test for E. coli in lieu of fecal coliform must use the following methods:
- (i) EC medium supplemented with 50 ug/ml of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222 G 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 Rule 1200-5-1-.14(10)(a)2, is supplemented with 50 ug/ml of MUG before autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in Rule 1200-5-1-.14(10)(a)2 for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at $44.5 \pm 0.2^{\circ}\text{C}$ for 24 ± 2 hours, and then observe fluorescence with an ultraviolet light (366nm) in the dark. If fluorescence is visible, E. coli are present.
 - (ii) Nutrient agar supplemented with 100 $\mu\text{g/ml}$ of 4methylumbelliferyl-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 ug/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 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 Table 1200-5-1-.14(10)(a)1.
- (vi) E*Colite[®] Test, a description of which is cited in footnote 10 to Table 1200-5-1-.14(10)(a)1.
- (vii) m-ColiBlue24[®] Test, a description of which is cited in footnote 11 to Table 1200-5-1-.14(10)(a)1.
- (viii) ReadyCult[®] Coliforms 100 Presence/Absence Test, a description of which is cited in footnote 12 to the Table 1200-5-1-.14(10)(a)1.
- (ix) Membrane Filter Technique using Chromocult[®] Coliform Agar, a description of which is cited in footnote 13 to Table 1200-5-1-.14(10)(a)1.
- (x) Colitag[®], a description of which is cited in footnote 14 to Table 1200-5-1-.14(10)(a)1.

(xi) As an option to Rule 1200-5-1-.14(10)(a)3(iii), 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 Rule 1200-5-1-.14(10)(a)3(i).

4. Public Water systems required to monitor under Rule 1200-5-1-.31 for total coliforms, fecal coliforms, or heterotrophic bacteria must use one of the methods listed in the following table.

Table 1200-5-1-.14(10)(a)4.

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 ⁹	

Footnotes

1. Except 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 <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. The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10 deg. C during transit.
3. Lactose 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.
4. Media should cover inverted tubes at least one-half to two-thirds after the sample is added.
5. No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
6. MI 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.
7. The ONPG-MUG Test is also known as the Autoanalysis Colilert System.
8. A-1 Broth may be held up to seven days in a tightly closed screw cap tube at 4 deg. C.
9. A description of the SimPlate method, "IDEXX SimPlate TM HPC Test Method for Heterotrophs in Water", November 2000, can be obtained from IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092, telephone (800) 321-0207.

5. Public water systems required to enumerate E. coli in source water as required by Rule 1200-5-1-.39 must use one of the approved methods in the following table:

Table 1200-5-1-.14(10)(a)5.

Parameter and units	Method ¹	EPA	Standard methods 18th,19th, 20th Ed.	Standard methods online	AOAC, ASTM, USGS	Other
E. coli, number per 100 ml ¹⁶	MPN ^{2,3,4} multiple tube,		9221B / 9221F ^{6,8}	9221B-99 / 9221F ^{6,8}		
	multiple tube/multiple well		9223B ⁷	9223B-97 ⁷	991.155	Colilert ^{®7,10} Colilert-18 ^{®7,9,10}
	MF two step	1103.1 ¹³	9222B/9222G ¹² , 9213D	9222B-97 / 9222G ¹²	D5392-93 ⁴	
	MF single step	1603 ¹⁴ , 1604 ¹⁵				mColiBlue-24 ^{®11}

Footnotes

- 1 The method must be specified when results are reported.
- 2 Tests must be conducted to provide organism enumeration (density). Select the appropriate configuration of tubes/filtrations and dilutions/volumes to account for the quality, character, consistency, and anticipated organism density of the water sample.
- 3 To assess the comparability of results obtained with individual methods, it is suggested that side-by-side tests be conducted across seasons of the year with the water samples routinely tested in accordance with the most current Standard Methods for the Examination of Water and Wastewater or EPA alternate test procedure (ATP) guidelines.
- 4 ASTM. 2000, 1999, 1996. Annual Book of ASTM Standards—Water and Environmental Technology. Section 11.02. ASTM International. 100 Barr Harbor Drive, West Conshohocken, PA 19428.
- 5 AOAC. 1995. Official Methods of Analysis of AOAC International, 16th Edition, Volume I, Chapter 17. Association of Official Analytical Chemists International. 481 North Frederick Avenue, Suite 500, Gaithersburg, MD 20877-2417.
- 6 The multiple-tube fermentation test is used in 9221B.1. Lactose broth may be used in lieu of lauryl tryptose broth (LTB), if at least 25 parallel tests are conducted between this broth and LTB using the water samples 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. No requirement exists to run the completed phase on 10 percent of all total coliform-positive tubes on a seasonal basis.
- 7 These tests are collectively known as defined enzyme substrate tests, where, for example, a substrate is used to detect the enzyme b-glucuronidase produced by E. coli.
- 8 After prior enrichment in a presumptive medium for total coliform using 9221B.1, all presumptive tubes or bottles showing any amount of gas, growth or acidity within 48 h ± 3 h of incubation shall be submitted to 9221F. Commercially available EC-MUG media or EC media supplemented in the laboratory with 50 µg/mL of MUG may be used.
- 9 Descriptions of the Colilert[®], Colilert-18[®], Quanti-Tray[®], and Quanti-Tray[®]/2000 may be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092.
- 10 Descriptions of the Colilert□, Colilert-18[®], Quanti-Tray[®], and Quanti-Tray[®]/2000 may be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092.
- 11 A description of the mColiBlue24[®] test, Total Coliforms and E. coli, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010.
- 12 Subject total coliform positive samples determined by 9222B or other membrane filter procedure to 9222G using NA MUG media.
- 13 USEPA. 2002. Method 1103.1: Escherichia coli (E. coli) In Water By Membrane Filtration Using membrane-Thermotolerant Escherichia coli Agar (mTEC). U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA-821-R-02-020.
- 14 USEPA. 2002. Method 1603: Escherichia coli (E. coli) In Water By Membrane Filtration Using Modified membrane-Thermotolerant Escherichia coli Agar (modified mTEC). U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA-821-R-02-023.
- 15 Preparation and use of MI agar with a standard membrane filter procedure is set forth in the article, Brenner et al. 1993. "New Medium for the Simultaneous Detection of Total Coliform and Escherichia coli in Water." Appl. Environ. Microbiol. 59:3534-3544 and in USEPA. 2002. Method 1604: Total Coliforms and Escherichia coli (E. coli) in Water by Membrane Filtration by Using a Simultaneous Detection Technique (MI Medium).U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA 821-R-02-024.
- 16 Recommended for enumeration of target organism in ambient water only.

- (i) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of Rule 1200-5-1-.14(10)(a)5(ii).
 - (ii) 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 Table 1200-5-1-.14(10) (a)5.
 - (iii) Systems must maintain samples between 0°C and 10°C during storage and transit to the laboratory.
6. Ground water systems must analyze all ground water source samples collected under Rule 1200-5-1-.40 (3) using one of the analytical methods listed in the following table for the presence of E. coli, enterococci, or coliphage.

Analytical Methods for Source Water Monitoring		
Fecal Indicator ¹	Methodology	Method citation
E. coli	Colilert ³ Colisure ³ Membrane Filter Method with MI Agar m-ColiBlue24 Test ⁵ E*Colite Test ⁶ EC-MUG ⁷ NA-MUG ⁷	9223 B. ² 9223 B. ² EPA Method 1604. ⁴ 9221 F. ² 9222 G. ²
Enterococci	Multiple-Tube Technique Membrane Filter Technique Membrane Filter Technique Enterolert ⁹	9230B. ² 9230C. ² EPA Method 1600. ⁸
Coliphage	Two-Step Enrichment Presence-Absence Procedure Single Agar Layer Procedure	EPA Method 1601. ¹⁰ 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.

Footnotes

- 1 The time from sample collection to initiation of analysis may not exceed 30 hours. The ground water system is encouraged but not required to hold samples below 10° C during transit.
- 2 Methods 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.
- 3 Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, West Brook, Maine 04092.
- 4 EPA 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/nerlccwww/1604sp02.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460.
- 5 A 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.
- 6 A 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.
- 7 EC-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.
- 8 EPA Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-b-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 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.
- 9 Medium 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.
- 10 EPA 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 EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460.
- 11 EPA 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 available at <http://www.epa.gov/nerlcwww/1602ap01.pdf> or EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460.

- (b) Public Water system required to monitor for turbidity by this Rule Chapter must use one of the methods listed in the following table:

Table 1200-5-1-.14(10)(b)

Turbidity ⁴	Nephelometric Method	2130 B
	NephelometricMethod	180.1 ¹
	Great Lakes Instruments	Method 2 ²
	Hach FilterTrak	10133 ³

Footnotes

- 1 "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA/600/R-93/100, August 1993. Available at NTIS, PB94-121811.
- 2 GLI Method 2, "Turbidity", November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, Wisconsin 53223.
- 3 A 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.
- 4 Styrene divinyl benzene beads (e.g. AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g. Hach StablCal TM or equivalent) are acceptable substitutes for formazin.

- (c) Public water systems required to monitor by this Rule Chapter for any Inorganic contaminants listed in the following table must utilize one of the approved methods for that contaminant listed in the following table:

Inorganic Contaminants Analytical Methods
Table 1200-5-1-.14(10)(c)

Contaminant	Methodology ¹³	EPA	ASTM ³	SM ⁴ (18th, 19th ed.)	SM ⁴ (20th ed.)	SM Online ²²	Other
1. Alkalinity	Titrimetric Electrometric titration		D1067-92, 02 B	2320 B	2320 B	2320 B-97 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. Arsenic	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		D2972-97, 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 Spectrophotometric, Amenable. Spectro-photometric Manual. Spectro-photometric Semi-automated.	335.4 ⁶	D2036-98 A	4500-CN ⁻ C	4500-CN ⁻ C		I-3300-85 ⁵
			D2036-98 B	4500-CN ⁻ G	4500-CN ⁻ G	4500-CN ⁻ G- 99	
			D2036-98 A	4500-CN ⁻ E	4500-CN ⁻ E	4500-CN ⁻ E- 99	
	Selective Electrode			4500-CN ⁻ F	4500-CN ⁻ F	4500-CN ⁻ F- 99	
	UV, Distillation, Spectrophotometric.						Kelada-01 ¹⁶
	Micro Distillation, Flow Injection, Spectrophotometric.						QuikChem 10- 204-00-1- X ¹⁷
Ligand Exchange and Amperometry ¹⁹			D6888-04				OIA-1677, DW ¹⁹
13. Fluoride	Ion Chromatography	300.0 ⁶ , 300.1 ¹⁸	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 ²²
14. Lead	Atomic Absorption; Furnace		D3559-96, 03 D	3113 B		3113 B-99	
	ICP-Mass spectrometry Atomic Absorption;Platform	200.8 ² 200.9 ²					
	Differential Pulse Anodic Stripping Voltametry						Method 1001 ¹⁵
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 ²	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, Rev 2 ²²
19. Nitrite	Ion Chromatography	300.0 ⁶ 300.1 ²	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-N O ₃ ⁻ E-00	
	Spectrophotometric			4500-NO ₂ ⁻ B	4500-NO ₂ ⁻ B	4500-NO ₂ ⁻ B-00	
	Capillary Ion Electrophoresis						D6508, Rev. 2 ²²
20. Ortho-phosphate ¹²	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 Phosphomolybdate; Automated-segmented flow; Automated Discrete						I-1601-85 ⁵ I-2601-90 ⁵ I-2598-85 ⁵
	Ion Chromatography	300.0 ⁶ 300.1 ¹⁸	D4327-97, 03	4110 B	4110 B	4110 B-00	
	Capillary Ion Electrophoresis.						D6508, Rev. 2 ²²
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-segmentedFlow						I-2700-85 ⁵
	Colorimetric		D859-94, 00.				
	Molybdosilicate .			4500-Si D	4500-SiO2 C	4500-SiO2 C-97	
	Heteropoly blue			4500-Si E	4500-SiO2 D	4500-SiO2 D-97	
	Automated for Molybdate-reactive Silica.			4500-Si F	4500-SiO2 E	4500-SiO2 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					

Footnotes

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, 1994, 1996, 1999, or 2003, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. The previous versions of D1688-95A, D1688-95C (copper), D3559-95D (lead), D1293-95 (pH), D1125-91A (conductivity) and D859-94 (silica) are also approved. These previous versions D1688-90A, C; D3559-90D, D1293-84, D1125-91A and D859-88, respectively are located in the Annual Book of ASTM Standards, 1994, Vol. 11.01. Copies may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
4. 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, except that the versions of 3111 B, 3111 D, 3113 B and 3114 B in the 20th edition may not be used.
5. Method I-2601-90, 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; For Methods I-1030-85; I-1601-85; I-1700-85; I-2598-85; I-2700-85; and I-3300-85 See Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd edition., 1989; Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425.
6. "Methods for the Determination of Inorganic Substances in Environmental Samples," EPA/600/R-93/100, August 1993. Available at NTIS, PB94-120821.
7. The 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.
8. Method 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: 508/482-2131, Fax: 508/482-3625.
9. Method 100.1, "Analytical Method For Determination of Asbestos Fibers in Water," EPA/600/4-83/043, EPA, September 1983. Available at NTIS, PB83-260471.
10. Method 100.2, "Determination of Asbestos Structure Over 10-µm In Length In Drinking Water," EPA/600/R-94/134, June 1994. Available at NTIS, PB94-201902.
11. Industrial 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.
12. Unfiltered, no digestion or hydrolysis.
13. Because 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.
14. If ultrasonic nebulization is used in the determination of arsenic by Methods 200.7, 200.8, or SM 3120 B, the arsenic must be in the pentavalent state to provide uniform signal response. For Methods 200.7 and 3120 B, both samples and standards must be diluted in the same mixed acid matrix concentration of nitric and hydrochloric acid with the addition of 100 µL of 30% hydrogen peroxide per 100 mL of solution. For direct analysis of arsenic with Method 200.8 using ultrasonic nebulization, samples and standards must contain 1 mg/L of sodium hypochlorite.
 15. The 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.
 16. The 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-B01-009 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.
 17. The 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.
 18. "Methods for the Determination of Organic and Inorganic Compounds in Drinking Water," Vol. 1, EPA 815-R-00-014, August 2000. Available at NTIS, PB2000-106981.
 19. Method 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.
 20. Sulfide 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 in-terference is present, and treat samples accordingly.
 21. 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.
 22. Method D6508, Rev. 2, "Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte," available from Waters Corp, 34 Maple St, Milford, MA, 01757, Telephone: 508/482-2131, Fax: 508/482-3625.

(d) Detection Limits for Inorganic methodology specified below must be equal to or less than the requirements in the following:

Table 1200-5-1-.14(10)(d)
Detection Limits for Inorganic Contaminants

Contaminant (mg/l)	MCL	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	0.01 ⁶	Atomic Absorption Furnace	0.001
		Atomic Absorption: Platform	
		Stabilized Temperature	⁷ 0.0005
		Atomic Absorption: Gaseous Hydride	0.001
		ICP-Mass Spectrometry	⁸ 0.0014
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

Chromium	0.1	Inductively Coupled Plasma	0.001
		Atomic Absorption; furnace technique	0.001
Cyanide	0.2	Inductively Coupled Plasma	0.007(0.001)
		Distillation, Spectrophotometric ³	0.02
		Distillation, Automated Spectrophotometric ³	0.005
		Distillation, Selective Electrode ³	0.05
Mercury	0.002	Distillation, Amenable, Spectrophotometric ⁴	0.02
		Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	0.1	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0006 ⁵
		Inductively Coupled Plasma ²	0.005
		ICP-Mass Spectrometry	0.0005
Nitrate	10 (as N)	Manual Cadmium Reduction	0.01
		Automated Hydrazine Reduction	0.01
		Automated Cadmium Reduction	0.05
		Ion Selective Electrode	1
		Ion Chromatography	0.01
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
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

Footnotes

- 1 MFL = million fibers per liter > 10 microns.
- 2 Using a 2X preconcentration step as noted in Method 200.7 Lower method detection limits (MDLs) may be achieved using a 4X preconcentration.
- 3 Screening method for total cyanides.
- 4 Measures "free" cyanides.
- 5 Lower MDLs are reported using stabilized temperature graphite furnace atomic absorption.
- 6 The value for arsenic is effective January 23, 2006. Until then the MCL is 0.05 mg/L.
7. The MDL reported for EPA method 200.9 (Atomic Absorption; Platform-Stabilized Temperature) was determined using a 2X concentration step during sample digestion. The MCL 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.
- 8 Using selective ion monitoring, EPA Method 200.8 (ICP-MS) is capable of obtaining a MDL of 0.0001 mg/L.

1. Laboratories must achieve the method detection limit for lead of 0.001 mg/l according to the procedures in appendix B of part 136 of 40 CFR. This need only be accomplished if the laboratory will be processing source water composite samples under Rule 1200-5-1-.33(9)(a)1(iii).
 - (i) Lead: 0.001 mg/l (only if source water compositing is done under Rule 1200-5-1-.09); and
 - (ii) Copper: 0.001 mg/l or 0.020 mg/l when atomic absorption direct aspiration is used (only if source water compositing is done under Rule 1200-5-1-.09).

2. States have the authority to allow the use of previously collected monitoring data, if the data were collected and analyzed in accordance with the requirements of this rule.
3. All lead levels measured between the PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL (0.0025 mg/l). All levels below the lead MDL must be reported as zero; and
4. All copper levels measured between 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.

(e) Laboratories must analyze PE samples within the following acceptance criteria:

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

(f) 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:

Table 1200-5-1-.14(10)(f)

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

Footnotes

- 1 For 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.
- 2 P=plastic, hard or soft; G=glass, hard or soft.
- 3 In 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.
- 4 Instructions 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.
- 5 If the sample is chlorinated, the holding time for an unacidified sample kept at 4 °C is extended to 14 days.
- 6 Nitrate-Nitrite refers to a measurement of total nitrate.

(g) Certified Laboratories performing analyses for Public Water Systems as required by this chapter must utilize an approved method for Organic contaminants listed in the following table:

Table 1200-5-1-.14(10)(g)

Contaminant	EPA method ¹	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. Xylenes (total)	502.2, 524.2			
21. Vinyl chloride	502.2, 524.2			
22. 2,3,7,8-TCDD (dioxin)	1613			
23. 2,4-D ⁴ (as acid, salts and esters)	515.2, 555, 515.1, 515.3, 515.4			D5317-93,98 (Reapproved 2003)
24. 2,4,5-TP ⁴ (Silvex)	515.2, 555, 515.1, 515.3, 515.4			D5317-93,98 (Reapproved 2003)
25. Alachlor ²	507, 525.2, 508.1, 505, 551.1			
26. Atrazine ²	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. Dinoseb ⁴	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. PCBs ³ (as decachlorobiphenyl)	508A			
48. PCBs ³ (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. Picloram ⁴	515.2, 555, 515.1, 515.3, 515.4			D5317-93,98 (Reapproved 2003)
51. Simazine ²	507, 525.2, 508.1, 505, 551.1			
52. Toxaphene	508, 508.1, 525.2, 505			

Footnotes

1. Previously approved EPA methods remain available for compliance monitoring until June 1, 2001. EPA methods 502.2 Rev. 2.0, 505 Rev. 2.0, 507 Rev. 2.0, 508 Rev. 3.0, 531.1 Rev. 3.0 are in "Methods for the Determination of Organic Compounds in Drinking Water", December 1988, revised July 1991; methods 506 and 551 are in "Methods for the Determination of Organic Compounds in Drinking Water--Supplement I", July 1990; methods 515.2 Rev. 1.0 and 524.2 Rev. 4.0 are in "Methods for the Determination of Organic Compounds in Drinking Water--Supplement II," August 1992; and methods 504.1 Rev. 1.0, 508.1 Rev. 1.0, 525.2 Rev.1.0 are available from US EPA NERL, Cincinnati, OH 45268
2. Substitution 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 phosphorus detector may be used provided all regulatory requirements and quality control criteria are met.
3. PCBs 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.
4. Accurate 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 D 5317-93, 98 (Reapproved 2003).
5. This 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.

1. To obtain certification for contaminants 1 through 20 listed in Table 1200-5-1-.14(10)(g) laboratories must:
 - (i) Successfully analyze 80% of the contaminants included in the PE sample. To successfully analyze a contaminant a laboratory must achieve quantitative results which are: within ±40% of the actual amount in the PE sample when the actual amount is less than 0.010 mg/l, within ±20% of the actual amount in the PE sample when the actual amount is greater than or equal to 0.010 mg/l.
 - (ii) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in 40 CFR 136 Appendix B.
2. To obtain certification for vinyl chloride a laboratory must:
 - (i) Achieve quantitative results on PE samples which are within ±40% of the actual amount of vinyl chloride in the PE sample.
 - (ii) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in 40 CFR 136 Appendix B.
 - (iii) Achieve certification for contaminants 1 through 20 listed in Table 1200-5-1-.14(10)(g).
3. To obtain certification for contaminants 22 through 52 listed in Table 1200-5-1-.14(10)(g) certified laboratories must achieve quantitative results on PE samples within the following acceptance limits:

Table 1200-5-1-.14(10)(g)3.

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.
Hexachlorocyclopentadiene	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

4. Analysis for PCBs shall be conducted as follows:

- (i) Each system which monitors for PCBs shall analyze each sample using either Methods 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 by Table 1200-5-1-.14(10)(e)4.(ii) in any sample analyzed using Methods 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

Table 1200-5-1-.14 (10)(g)4.(ii)

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.
- (h) Analytical methods used to determine compliance with Rule 1200-5-1-.06(5) shall be in accordance with Table 1200-5-1-.14(10)(h).

Table 1200-5-1-.14(10)(h)

Contaminant	Methodology	Reference (method or 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	900.0	p 1	00-01	p 1	302, 7110 B		R-1120-76		
Gross alpha ¹¹	Co-precipitation			00-02		7110 C				
Radium 226	Radon emanation	903.1	p 16	Ra-04	p 19	7500-Ra C	D 3454-91	R-1141-76	Ra-05	N.Y. ⁹
	Radio chemical	903.0	p 13	Ra-03		304, 305, 7500-Ra B	D 2460-91	R-1140-76		GA ¹⁴
Radium 228	Radio chemical	904.0	p 24	Ra-05	p 19	304, 7500-Ra D		R-1142-76		N. Y. ⁹ N. J. ¹⁰
Uranium ¹²	Radio chemical	908.0				7500-U B				
	Fluorometric	908.1				7500-U C (17 th Ed.)	D 2907-91	R-1180-76 R-1181-76	U-04	
	ICP-MS	200.8 ¹³				3125	D 5673-03			
	Alpha spectrometry			00-07	P 33	7500-U C (18 th or 19 th Ed.)	D 3972-90	R-1182-76	U-02	
	Laser Phosphorimetry						D 5174-91			
Man-made Radioactive cesium.	Radio chemical	901.0	p 4			7500-Cs B	D 2459-72	R-1111-76		
	Gamma ray spectrometry.	901.1			p 92	7120 (19 th Ed.)	D 3649-91	R-1110-76	4.5.2.3	
Radioactive iodine	Radio chemistry	902.0	p 6 p 9			7500-I B 7500-I C 7500-I D	D 3649-91			
	Gamma ray spectrometry.	901.1			p 92	7120 (19 th Ed.)	D 4785-88		4.5.2.3	
Radioactive Strontium 89, 90.	Radio chemical	905.0	p 29	Sr-04	p 65	303, 7500-Sr B		R-1160-76	Sr-01 Sr-02	
Tritium	Liquid scintillation	906.0	p 34	H-02	p 87	306, 7500-3H B	D 4107-91	R-1171-76		
Gamma emitters	Gamma ray	901.1			p 92	7120 (19 th Ed.)	D 3649-91	R-1110-76	4.5.2.3	
	Spectrometry	902.0 901.0				7500-Cs B 7500-I B	D 4785-88			

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 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 800-426-4691. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460 (Telephone: 202-260-3027); or at the Office of Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

Footnotes

- 1 "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA 600/4-80-032, August 1980. Available at 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 at NTIS, *ibid.* PB 253258.
- 3 "Radiochemistry Procedures Manual", EPA 520/5-84-006, December 1987. Available at NTIS, *ibid.* PB 84-215581.
- 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 Editions, 1971, 1989, 1992, 1995. Available at American Public Health Association, 1015 Fifteenth Street N. W., Washington, D. C. 20005. All methods are in the 17th, 18th, and 19th editions except 7500-U C Fluorometric Uranium was discontinued after the 17th Edition, 7120 Gamma Emitters is only in the 19th Edition, and 302, 303, 304, 305 and 306 are only in the 13th Edition.
- 6 Annual Book of ASTM Standards, Vol. 11.02, 1994. Available at American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
- 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”, 27th Edition, Volume 1, 1990. 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 Center 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 Analysis Services, 9 Ewing Street, Trenton, NJ 08625.
- 11 Natural 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.
- 12 If uranium (U) is determined by mass, a 0.67 pCi/ug of uranium conversion factor must be used. This conservative factor is based on the 1:1 activity ratio of U-234 to 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.

1. When the identification and measurement of radionuclides other than those listed in Table 1200-5-1-.11(1), the following references are to be used, except in cases where alternative methods have been approved by the Department.
 - (i) Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions, H. L. Krieger and S. Gold, EPA-RA-73-014, USEPA, Cincinnati, Ohio, May, 1973.
 - (ii) HASL Procedure Manual, Edited by John H. Harley, HASL 300, ERDA Health and Safety Laboratory, New York, NY., 1973.
- (i) Public Water Systems required to monitor disinfectant residuals by this Rule Chapter must utilize one of the methods in the following table. In addition Water Systems may 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.

Table 1200-5-1-.14(10)(i)

Methodology	SM (19th or 20th ed)	SM Online ²	Other	Residual measured ¹				
				O ₃	Free Cl ₂	Combined Cl ₂	Total Cl ₂	ClO ₂
Amperometric Titration	4500-Cl D	4500-Cl-D-00	D 1253-03 ³		X	X	X	
Low Level Amperometric Titration	4500-Cl E	4500-Cl-E-00					X	
DPD Ferrous Titrimetric	4500-Cl F	4500-Cl-F-00			X	X	X	
DPD Colorimetric	4500-Cl G	4500-Cl-G-00			X	X	X	
Syringaldazine (FACTS)	4500-Cl H	4500-Cl-H-00			X			
Iodometric Electrode	4500-Cl I	4500-Cl-I-00					X	
DPD	4500-ClO ₂ D							X
Amperometric Method II	4500-ClO ₂ E	4500 ClO ₂ E-00						X
Spectrophotometric			327.0 Rev 1.1 ⁴					X
Indigo Method	4500-O ₃ B	4500-O ₃ B-97		X				

Footnotes

1 X 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.

- 2 The 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>.
- 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.
- 4 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. Available online at <http://www.epa.gov/safewater/methods/sourcalt.html>.

(j) Analysis conducted to determine compliance with Rule 1200-5-1-.12 shall be made in accordance with the methods described in the following table:

Table 1200-5-1-.14(10)(j)

Contaminant	EPA	ASTM ³	SM ⁴ 18th and 19th ed.	SM ⁴ 20th ed.	SM ⁷ Online	Other
1. Aluminum	200.7 ² 200.8 ² 200.9 ²		3120 B 3113 B 3111 D	3120 B	3120 B-99 3113 B-99 3111 D-99	
2. Chloride	300.0 ¹ 300.1 ⁶	D4327-97, 03 D512-89 Reapproved 1999) B	4110 B 4500-Cl ⁻ D 4500-Cl ⁻ B	4110 B 4500-Cl ⁻ D 4500-Cl ⁻ B	4110 B-00 4500-Cl ⁻ D-97 4500-Cl ⁻ B-97	D6508, Rev. 2 ⁸
3. Color			2120 B	2120 B	2120 B-01	
4. Foaming Agents			5540 C	5540 C	5540 C-00	
5. Iron	200.7 ² 200.9 ²		3120 B 3111 B 3113 B	3120 B	3120 B-99 3111 B-99 3113 B-99	
6. Manganese	200.7 ² 200.8 ² 200.9 ²		3120 B 3111 B 3113 B	3120 B	3120 B-99 3111 B-99 3113 B-99	
7. Odor			2150 B	2150 B	2150 B-97	
8. Silver	200.7 ² 200.8 ² 200.9 ²		3120 B 3111 B 3113 B	3120 B	3120 B-99 3111 B-99 3113 B-99	I-3720-85 ⁵
9. Sulfate	300.0 ¹ 300.1 ⁶ 375.2 ¹	D4327-97, 03 D516-90, 02	4110 B 4500-SO ₄ ²⁻ F 4500-SO ₄ ²⁻ C,D 4500-SO ₄ ²⁻ E	4110 B 4500-SO ₄ ²⁻ F 4500-SO ₄ ²⁻ C,D 4500-SO ₄ ²⁻ E	4110 B-00	D6508, Rev. 2 ⁸
10. Total Dissolved Solids	200.7 ²		2540 C	2540 C	2540 C-97	
11. Zinc	200.8 ²		3120 B	3120 B	3120 B-99	

Footnotes

- 1 “Methods for the Determination of Inorganic Substances in Environmental Samples,” EPA/600/R-93-100, August 1993. Available at NTIS, PB94-120821.
- 2 “Methods for the Determination of Metals in Environmental Samples—Supplement I,” EPA/600/R-94-111, May 1994. Available at NTIS, PB 95-125472.
- 3 Annual Book of ASTM Standards, 1994, 1996, 1999, or 2004, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. Copies may be obtained from the ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
- 4 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, except that the versions of 3111 B, 3111 D, and 3113 B in the 20th edition may not be used.
- 5 Method I-3720-85, Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd ed., 1989. Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425.
- 6 “Methods for the Determination of Organic and Inorganic Compounds in Drinking Water,” Vol. 1, EPA 815-R-00-014, August 2000. Available at NTIS, PB2000-106981.
- 7 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.
- 8 Method D6508, Rev. 2, “Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte,” available from Waters Corp, 34 Maple St., Milford, MA, 01757, Telephone: 508/482-2131, Fax: 508/482-3625.

(k) Disinfection byproducts

1. Systems required to monitor by this Rule Chapter for disinfection byproducts must utilize the approved methods in the following table:

Table 1200-5-1-.14(10)(k)1.
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

¹ P&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.

² 19th 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.

³ Annual Book of ASTM Standards, 2001 or any year containing the cited version of the method, Vol 11.01.

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

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

⁶ Ion 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 Rule 1200-5-1-.36(6)(b)3(ii).

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

⁸ Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in Rule 1200-5-1-.36(6)(b)2(i)(I). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in Rules 1200-5-1-.36(6)(b)2(i)(II) and (b)2(ii).

⁹ The 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. Laboratories 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 all 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	

3. Laboratories must 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 Rules 1200-5-1-.06, .36, .37, and .38:

DBP	Minimum reporting level (mg/L) ¹	Comments
TTHM ²		
Chloroform	0.0010	
Bromodichloromethane	0.0010	
Dibromochloromethane	0.0010	
Bromoform	0.0010	
HAA5 ²		
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 Rules 1200-5-1-.36(6)(b)2(i)(II) and (b)2(ii).
Bromate	0.0050 or 0.00010	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.

¹ The 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.

² When 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.

4. Additional analytical methods. Systems required to analyze parameters not included in Rules 1200-5-1-.14(10)(i) and 1200-5-1-.14(10)(k)1 must use the following methods. A party approved by the EPA or the state must measure these parameters.
 - (i) Alkalinity. All methods allowed in Rule 1200-5-1-.14(10)(c) for measuring alkalinity.
 - (ii) Bromide. EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0, or ASTM D 6581-00.
 - (iii) Total Organic Carbon (TOC). Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Standard 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.
 - (iv) Specific Ultraviolet Absorbance (SUVA). SUVA is equal to the UV absorption at 254 nm (UV254) (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 UV254 and DOC. When determining SUVA, systems must use the methods stipulated in subparagraph (d)4(i) to measure DOC and the method stipulated in subparagraph (d)4(ii) to measure UV254. SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV254 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 (UV254). 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, UV254 samples must be filtered through a 0.45 µm pore-diameter filter. The pH of UV254 samples may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed 48 hours.
- (v) pH. All methods allowed in Table 1200-5-1-.14(10)(c) for measuring pH.
- (vi) Magnesium. All methods allowed in Table 1200-5-1-.14(10)(c) for measuring magnesium.
- (I) 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. 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 Rule 1200-5-1-.14(1). 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 Rule 1200-5-1-.14(1), up to a packed pellet volume of at least 2 ml.
 - 2. (i) Matrix spike (MS) samples, as required by the methods in Rule 1200-5-1-.14(1), must be spiked and filtered by a

laboratory approved for Cryptosporidium analysis under Rule 1200-5-1-.14(1)4.

- (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.
 - 4. 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.

Authority: T.C.A. §§68—13—704 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed November 26, 1990; effective January 10, 1991. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed November 21, 2001; effective February 4, 2002. Amendment filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective .

Amendment

Paragraph (1) of Rule 1200-5-1-.15 Monitoring of Consecutive Public Water Systems shall be amended by replacing the three references to “1200-5-1-.28” with the following language “unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40” so that, as amended, the paragraph shall read as follows:

- (1) Each public water system is required to provide monitoring data to the Department as required by Rules 1200-5-1-.07 through 1200-5-1-.12, 1200-5-1-.21, 1200-5-1-.24, 1200-5-1-.26 and unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40. Those public water systems which do not practice disinfection and which purchase all of their water from one or more public water systems that treats water may utilize the monitoring results obtained under Rules 1200-5-1-.08 through 1200-5-1-.12, 1200-5-1-.24, 1200-5-1-.26 and unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40 to demonstrate compliance if the public water system that treats water is subject to the referenced monitoring requirements. Consecutive systems that do not disinfect will be required to collect and analyze all samples that must be collected at the tap including asbestos. Those systems purchasing water and which practice disinfection shall not use the monitoring results obtained by another system for contaminants to be monitored in unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40.

Amendment

Paragraph (2) of Rule 1200-5-1-.15 Monitoring of Consecutive Public Water Systems shall be amended by replacing the reference to “1200-5-1-.28” with the following language “unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40” so that, as amended, the paragraph shall read as follows:

- (2) Those public water systems which purchase all of their water and elect to perform the monitoring required by Rules 1200-5-1-.08 through 1200-5-1-.12, 1200-5-1-.21, 1200-5-1-.24, 1200-5-1-.26 and unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40 will have compliance with the MCL determined on the analytical results of its sampling.

Authority: T.C.A. §§68—13—704 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed ; effective .

Amendment

Paragraph (4) of Rule 1200-5-1-.17 Operation and Maintenance Requirements is amended by adding the following sentence at the end of the paragraph “Effective July 1, 2009, all community water systems using ground water as a raw water source and serving more than 50 connections or 150 persons, ground water systems serving fewer than 50 connections per month required to disinfect and all public water systems using surface water shall continuously chlorinate and meet a free chlorine residual in all parts of the distribution system not less than 0.5 mg/l for more than four hours per month.” so that, as amended, the paragraph shall read as follows:

- (4) Chlorine is the recommended disinfection agent. Other agents will be considered by the Department provided they are effective and testing procedures for their effectiveness are recognized in the latest edition of “Standard Methods for the Examination of Water and Wastewater”. All community water systems using ground water as a raw water source and serving more than 50 connections or 150 persons shall continuously chlorinate (unless other disinfection methods are approved) and shall maintain a free chlorine residual in all parts of the distribution system in the amount not less than 0.2 mg/l. Public Water Systems using surface water shall continuously chlorinate and maintain a free chlorine residual of 0.2 mg/l in all parts of the distribution system. The residual disinfectant concentration specified by this rule shall not be less than 0.2 mg/l in more than 5 percent of the samples each month, for any two consecutive months the system serves water to the public. All public water systems serving 50 or fewer connections per month that do not disinfect shall install continuous disinfection if the system fails to comply with the maximum contaminant level for coliform, experiences a disease outbreak or is directed to install disinfection by the department. Effective July 1, 2009, all community water systems using ground water as a raw water source and serving more than 50 connections or 150 persons, ground water systems serving fewer than 50 connections per month required to disinfect and all public water systems using surface water shall continuously chlorinate and meet a free chlorine residual in all parts of the distribution system not less than 0.5 mg/l for more than four hours per month.

Amendment

Paragraph (6) of Rule 1200-5-1-.17 Operation and Maintenance Requirements is amended by adding new subparagraphs (a) and (b) to read as follows:

- (a) Public water systems must develop and implement an ongoing cross-connection program. Cross-connection plans and policies shall present all information in conformance with the “Design Criteria for Community Public Water Systems” as published by the Department.
- (b) The public water system shall ensure that cross-connections between the distribution system and a consumer’s plumbing are eliminated or controlled by the installation of an approved backflow preventer commensurate with the degree of hazard.

Amendment

Paragraph (11) of Rule 1200-5-1-.17 Operation and Maintenance Requirements is amended by adding the words “All public water” to the beginning sentence of the second paragraph so that, as amended, Paragraph (11) shall read as follows:

- (11) All community public water systems serving more than 50 connections and which have their own source of water shall be required to install, operate and maintain duplicate disinfection equipment. Duplicate disinfection equipment means at least two chlorine cylinders connected to at least two chlorinators. Each set of chlorine cylinders consists of one or more cylinders which may be connected together by an automatic switchover valve. The two sets of chlorine cylinders may tee in to a common feed line leading to the chlorinators, but may not be connected together by an automatic switchover valve. The two sets of chlorine cylinders must be weighed independently and operated simultaneously. At least two chlorinators must be operated at all times with each feeding a part of the required dosage. The chlorinators may discharge to a common manifold piping network to allow multiple injection points. Facilities may be exempt from simultaneously operating duplicate disinfection equipment if the facility has a reliable chlorine residual analyzer with an alarm notifying a manned control center capable of immediately shutting down the treatment facility. Facilities, which are staffed during the time water is treated, can use one set of chlorine cylinders with the automatic switchover device provided the free chlorine residual is checked at the facility every two hours. A reliable free chlorine residual analyzer with an alarm system to a manned control center may be used for unmanned facilities that desire to use one set of chlorine cylinders with the automatic switchover device.

All public water systems which use a hypochlorinator shall be required to have two solution pumps, two tanks for bleach solution and operate both units at the same time.

Amendment

Paragraph (24) of Rule 1200-5-1-.17 Operation and Maintenance Requirements is amended by deleting the word “should” in the second sentence and replacing it with the word “shall” so that, as amended, the paragraph shall read as follows:

- (24) All community water systems must establish and maintain a file for customer complaints. This file shall contain name of the person with the complaint, date, nature of complaint, date of investigation and results or actions taken to correct any problems.

Amendment

Paragraph (30) of Rule 1200-5-1-.17 Operation and Maintenance Requirements is amended by adding the following sentence “Effective July 1, 2009, the free residual disinfectant concentration in the water entering the distribution system for surface supplied public water systems or ground water systems under the direct influence of surface water cannot be less than 2.0 mg/l for more than four hours.” To the end of it so that, as amended, paragraph shall read as follows:

- (30) Any surface supplied public water system or ground water systems under the direct influence of surface water required to filter shall employ filtration in combination with disinfection that will achieve 99.9% (3 log) and 99.99% (4 log) inactivation of Giardia lamblia and viruses respectively 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 the purposes of determining removal or inactivation efficiencies for Giardia lamblia and viruses Tables 1200-5-1-.17(30)1 and 1200-5-1-.17(30)2 shall apply. The free residual disinfectant concentration in the water entering the distribution system cannot be less than 0.2 mg/l for more than four hours. Effective July 1, 2009, the free

residual disinfectant concentration in the water entering the distribution system for surface supplied public water systems or ground water systems under the direct influence of surface water cannot be less than 2.0 mg/l for more than four hours.

Amendment

Rule 1200-5-1-.17 Operation and Maintenance Requirements is amended by adding new paragraphs (40) and (41) to read as follows:

- (40) Benchtop and continuous turbidimeters used to determine compliance with limits set forth in this chapter must be calibrated at least every three months with primary standards and documented. Documentation shall be maintained for a period not less than five years. Primary standards are Formazin, AMCO clear, Stabcal, or alternatives approved in writing by the Division. Dilute Formazin solutions are unstable and must be prepared on day of calibration. Manufacturers' recommendations on calibration procedure must be followed.
- (41) Verifications for benchtop turbidimeters are comparisons to approved reference materials. Verifications for continuous turbidimeters are comparisons to approved reference materials or comparisons to a properly calibrated benchtop turbidimeter. Secondary reference materials are assigned a value immediately after acceptable primary calibration has been completed. Acceptable verifications for turbidity measurements greater than 0.5 NTU must agree within $\pm 10\%$ from the reading assigned to the reference material after primary calibration. Acceptable verifications for measurements 0.5 NTU or less must be within ± 0.05 NTU or less from the reading assigned to the reference material after primary calibration. When comparisons are made from a continuous turbidimeter to a benchtop turbidimeter, the continuous measurement must be within $\pm 10\%$ of the benchtop reading for measurements above 0.5 NTU and ± 0.05 NTU for reading 0.5 NTU or less. When acceptable verifications are not achieved the instrument must be re-calibrated with primary standards according to Rule 1200-5-1-.17(40). Approved reference materials for benchtop turbidimeters are primary standards and materials suggested by the manufacturer such as sealed sample cells filled with metal oxide particles in a polymer gel. The 0.5 NTU ICE-PIC™ from Hach is an approved reference material for secondary turbidity verifications for Hach continuous turbidimeters when utilized as per Manufacturers' recommendations. All other reference materials for turbidimeter verifications must be approved in writing by the Division. Verifications for turbidimeters must be performed according to the following:
 - (a) Verification of benchtop turbidimeters must be performed daily and documented. Verifications must include a sample in the expected working range of the instrument or as close to the working range as possible. Documentation must include: assigned reference material value after calibration, recorded daily reading for all reference standards, instrument identification, and date.
 - (b) Combined filter effluent turbidimeters as required by Rule 1200-5-1-.31(5)(c)1. must be verified daily and documented. When reference material is utilized documentation must include: instrument identification, date, assigned reference material value after calibration, and daily value for reference material. When comparisons to benchtop turbidimeters are utilized documentation must include: instrument identification, date, continuous turbidimeter value, and benchtop turbidimeter value.
 - (c) Individual filter turbidimeters as required by Rule 1200-5-1-.31(5)(c)4. must be verified monthly and anytime the individual reading is 0.3 NTU or more for at least fifteen (15) minutes. Comparisons to a properly calibrated benchtop turbidimeter are the only allowed method for verification when the turbidity for

and individual turbidimeter is 0.3 NTU or more. Individual turbidimeter verifications must be documented. When reference material is utilized documentation must include: instrument identification, date, assigned reference material value after calibration, and daily value for reference material. When comparisons to benchtop turbidimeters are utilized documentation must include: instrument identification, date, continuous turbidimeter value, and benchtop turbidimeter value.

Authority: T.C.A. §§68—221—704 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed November 26, 1990; effective January 10, 1991. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993, effective January 5, 1994. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed October 31, 2000, effective January 14, 2001. Amendment filed November 21, 2001, effective February 4, 2002. Amendment filed August 15, 2005; effective October 29, 2005. Amendment filed ; effective .

Amendment

Paragraph (6) of Rule 1200-5-1-.18 Reporting Requirements shall be amended by replacing the reference to “1200-5-1-.28” with the following language “unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40” so that, as amended, the paragraph shall read as follows:

- (6) The owner or operator of a community water system or a non-transient non-community water system who is required to monitor under unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40 shall send a copy of the results of such monitoring and any public notice issued under Rule 1200-5-1-.19 to the Department within 30 days of receipt of the results or the issuance of the notice.

Amendment

Paragraph (7) of Rule 1200-5-1-.18 Reporting Requirements shall be amended by replacing the reference to “1200-5-1-.28” with the following language “unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40” so that, as amended the paragraph shall read as follows:

- (7) The community water system or non-transient non-community water system shall furnish the following information on forms provided by the Department for each sample analyzed under unregulated contaminant monitoring as required by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40:

Authority: T.C.A. §§68—13—704 and 4—5—202. Administrative History: Original rule. filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed November 21, 2001; effective February 4, 2002. Amendment filed ; effective .

Amendment

Table 1200-5-1-.19(2) of paragraph (2) of Rule 1200-5-1-.19 Notification of Customers is amended by adding new entry 9 so that, as amended, the new entry shall read as follows:

9. Detection of E. coli, enterococci, or coliphage in source water samples as specified in Rule 1200-5-1-.40(3).

Amendment

Table 1200-5-1-.19(3) of paragraph (3) of Rule 1200-5-1-.19 Notification of Customers is amended by adding new entry 4 so that as amended the new entry shall read:

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 Rule 1200-5-1-.19(3).

Amendment

Subparagraph (a) of paragraph (7) of Rule 1200-5-1-.19 Notification of Customers is amended by replacing the reference to “1200-5-1-.28 or 40 CFR 141.40” with the following language “for unregulated contaminant monitoring and reporting by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40” so that, as amended, the subparagraph shall read as follows:

- (a) When is the special notice to be given? The owner or operator of a community water system of a non-transient, non-community water system required to monitor for unregulated contaminant monitoring and reporting by the Environmental Protection Agency under 40 CFR 141.35 and 40 CFR 141.40 must notify persons served by the system of the availability of the results of such sampling no later than 12 months after the monitoring results are known.

Amendment

Appendix A to Rule 1200-5-1-.19 Notification of Customers is amended by the addition of new entries I.A.11 and IV.G. such that the entries shall read:

Contaminant	MCL/MRDL/TT violations ²		Monitoring and testing violations procedure	
	Tier of public notice required	Citation	Tier of public notice required	Citation
	I. Violations of National		Regulations (NPDWR): ³	
		Primary Drinking Water		
11. Ground Water Rule violations	2	Rule 1200-5-1-.40(5)	3	Rule 1200-5-1-.40(3)(m) Rule 1200-5-1-.40(5)(d)
	IV. Other Situations Requiring		Public Notification	
G. Source Water Sample Positive for GWR Fecal indicators: E. coli, enterococci, or coliphage	1	Rule 1200-5-1-.40(3)(l)	N/A	N/A
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. The Department may 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 Rule 1200-5-1-.19(2) and Rule 1200-5-1-.19(3). 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.				

Amendment

Appendix B to Rule 1200-5-1-.19 Notification of Customers is amended by the addition of new entries A.1.c and A.1.d. so that the entries shall read as follows:

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health
	National Primary	Drinking Water Regulations A. Microbiological	(NPDWR) Contaminants
1c. Fecal indicators (GWR) i. E. coli 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.

Amendment

Appendix C of Rule 1200-5-1-.19 Notification of Customers is amended by adding “Ground Water Rule” with the acronym “GWR” as “GWR” in the appropriate alphabetical sequence so that, as amended, the item shall read as follows:

GWR Ground Water Rule

Authority: T.C.A. §§68—2213—704 and 4—5—202. Administrative History: Original rule filed June 30, 1977; effective August 1, 1977. Amendment filed February 3, 1984; effective February 12, 1985. Amendment filed September 26, 1988; effective November 10, 1988. Amendment filed April 10, 1989; effective May 25, 1989. Amendment filed November 26, 1990; effective January 10, 1991. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993, effective January 5, 1994. Amendment filed May 2, 1994; effective July 16, 1994. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed October 31, 2000, effective January 14, 2001. Amendment filed November 21, 2001; effective February 4, 2002. Amendment filed April 12, 2002, effective June 26, 2002. Amendment filed July 15, 2002, effective September 28, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective

Amendment

Paragraph (2) of Rule 1200-5-1-.26 Volatile Organic Chemical Sampling Analytical and Other Requirements is amended by deleting it in its entirety and reserving it so that, as amended, the paragraph shall read:

(2) Reserved

Amendment

Paragraph (5) of Rule 1200-5-1-.26 Volatile Organic Chemical Sampling Analytical and Other Requirements is amended by deleting it in its entirety and reserving it so that, as amended, the paragraph shall read:

(5) Reserved

Authority: T.C.A. §§68-221-704 and 4-5-202. Administrative History: Original rule filed May 17, 1978; effective June 16, 1978. Repeal filed February 3, 1984; effective February 12, 1985. Repeal and new rule filed September 26, 1988; effective November 10, 1988. Amendment filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993; effective January 5, 1994. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed November 21, 2001, effective February 4, 2002. Amendment filed July 15, 2002, effective September 28, 2002.. Amended August 15, 2005, effective October 29, 2005. Amendment filed ; effective

Amendment

Subpart (iii) of part 1 of subparagraph (b) of paragraph (2) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by adding the following sentence “Effective July 1, 2009, public water systems must meet 2.0 mg/l free chlorine residual at the entry point of distribution” so that, as amended, the subpart shall read as follows:

- (iii) The public water system must meet 0.2 mg/l free chlorine residual at the point of distribution. Effective July 1, 2009, public water systems must meet 2.0 mg/l free chlorine residual at the entry point of distribution.

Amendment

Part 6 of subparagraph (b) of paragraph (2) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by replacing the reference to “1200-5-1-.22 and .23” with “Rules 1200-5-1-.36 and .38” so that, as amended the part shall read as follows:

- 6. The public water system must comply with the requirements for trihalomethanes in Rules 1200-5-1-.36 and .38. After December 31, 2001, subpart H systems serving 10,000 or more persons shall comply with the trihalomethane, haloacetic acid, bromated, chlorite, chlorine dioxide and chloramines standards described in Rules 1200-5-1-.06 and 1200-5-1-.36.

Amendment

Paragraph (5) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by deleting the phrase “Analytical and Monitoring Requirements” and substituting it with “Monitoring Requirements” so that, as amended, the paragraph shall read as follows:

(5) Monitoring Requirements

Amendment

Subparagraph (a) of paragraph (5) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by deleting it in its entirety and reserving it so that, as amended, the subparagraph shall read as follows:

(a) Reserved

Amendment

Part 5 of subparagraph (b) of paragraph (5) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the following sentence “Effective July 1, 2009, if the free chlorine concentration falls below 2.0 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 free residual concentration is equal to or greater than 2.0 mg/l” after the last sentence past the table so that, as amended, the last two sentences shall read as follows:

If at any time the free chlorine 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 free residual concentration is equal to or greater than 0.2 mg/l. Effective July 1, 2009, if the free chlorine concentration falls below 2.0 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 free residual concentration is equal to or greater than 2.0 mg/l.

Amendment

Part 2 of subparagraph (c) of paragraph (5) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the sentence “Effective July 1, 2009, If at any time the free residual disinfectant concentration falls below 2.0 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 free residual disinfectant concentration is equal to or greater than 2.0 mg/l” after the last sentence past the table so that, as amended, the last two sentences shall read as follows:

If at any time the free 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 free residual disinfectant concentration is equal to or greater than 0.2 mg/l. Effective July 1, 2009, If at any time the free residual disinfectant concentration falls below 2.0 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 free residual disinfectant concentration is equal to or greater than 2.0 mg/l.

Amendment

Part 4 of subparagraph (c) of paragraph (5) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by deleting it in its entirety and replacing it with the following so that, as amended, the part shall read as follows:

4. In addition to monitoring required by parts 1, 2 and 3 of this subparagraph, a subpart H system serving 10,000 or more persons using conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in Rule 1200-5-1-.14(10)(b) and must calibrate turbidimeters using the procedure specified in Rule 1200-5-1-.14(40) and (41). Systems must record the results of individual filter monitoring every 15 minutes. In addition to monitoring required by parts 1,2 and 3 of this subparagraph by January 14, 2005, a subpart H system serving fewer than 10,000 persons using conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in Rule 1200-5-1-.14(10)(b) and must calibrate turbidimeters using the procedure specified in Rules 1200-5-1-.14(40) and (41). Systems must record the results of individual filter monitoring every 15 minutes.

Amendment

Subpart (ii) of part 2 of subparagraph (a) of paragraph (6) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the following sentence “Effective July 1, 2009, the date and duration of each

period when the residual disinfectant concentration in water entering the distribution system fell below 2.0 mg/l and when the State was notified of the occurrence” at the end so that, as amended, the subpart shall read as follows:

- (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. Effective July 1, 2009, the date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 2.0 mg/l and when the State was notified of the occurrence.

Amendment

Item (I) of Subpart (viii) of part 2 of subparagraph (a) of paragraph (6) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the sentence “Effective July 1, 2009, number of instances where the free residual disinfectant concentration is measured and the number of instances where the free residual was below 0.5 mg/l.” at the end so that, as amended, the item shall read as follows:

- (I) Number of instances where the free residual disinfectant concentration is measured and the number of instances where the free residual was below 0.2 mg/l. Effective July 1, 2009, number of instances where the free residual disinfectant concentration is measured and the number of instances where the free residual was below 0.5 mg/l.

Amendment

Subpart (iii) of part 5 of subparagraph (a) of paragraph (6) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the sentences “Effective July 1, 2009, if at any time the disinfectant residual falls below 2.0 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 2.0 mg/l within 4 hours.” at the end so that, as amended, the subpart shall read as follows:

- (iii) If at any time the disinfectant 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. Effective July 1, 2009, if at any time the disinfectant residual falls below 2.0 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 2.0 mg/l within 4 hours.

Amendment

Subpart (ii) of part 2 of subparagraph (b) of paragraph (6) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the sentence “Effective July 1, 2009, the date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 2.0 mg/l and when the State was notified of the occurrence.” at the end so that, as amended, the subpart shall read as follows:

- (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. Effective July 1, 2009, the date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 2.0 mg/l and when the State was notified of the occurrence.

Amendment

Item (II) if subpart (iii) of part 2 of subparagraph (b) of paragraph (6) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the sentence “Effective July 1, 2009, the number of instances where the free residual is below 0.5 mg/l.” at the end so that, as amended, the item shall read as follows:

- (II) The number of instances where the free residual is below 0.2 mg/l. Effective July 1, 2009, the number of instances where the free residual is below 0.5 mg/l.

Amendment

Subpart (iii) of part 3 of subparagraph (b) of paragraph (6) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by inserting the two sentences “Effective July 1, 2009, if at any time the disinfectant residual falls below 2.0 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 2.0 mg/l within 4 hours.” At the end so that, as amended, the subpart shall read as follows:

- (iii) If at any time the disinfectant 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. Effective July 1, 2009, if at any time the disinfectant residual falls below 2.0 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 2.0 mg/l within 4 hours.

Amendment

Subparagraph (a) of paragraph (8) of Rule 1200-5-1-.31 Filtration and Disinfection is amended by deleting the third from the last sentence “Sampling analytical methods, frequency of sampling, and sample locations must be in accordance with procedures described in 1200-5-1-.36.” and substituting in its place “Sampling analytical methods, frequency of sampling, and sample locations must be in accordance with procedures described in Rules 1200-5-1-.14 and 1200-5-1-.36.” so that, as amended, the subparagraph shall read:

- (a) Subpart H public water systems serving 10,000 or more persons must conduct monitoring for haloacetic acids and trihalomethanes or conduct disinfection profiling beginning with the effective date of this rule. By January 14, 2005, subpart H public water systems must develop a disinfection profile unless the Department determines it is not necessary. Those systems that exceed 0.064 mg/L of total trihalomethanes or 0.048 mg/L of total haloacetic acids annual

arithmetic average based on four quarters of data must calculate disinfection profiles. Subpart H systems that serve between 500 and 9,999 persons must begin to collect data needed to calculate disinfection profiles or demonstrate exemption from the profiling requirements no later than July 1, 2003. Subpart H systems serving fewer than 500 persons must begin to collect data for profiling or demonstrate exemption from the profiling requirements no later than July 1, 2004. Systems that must calculate profiles and that are planning changes in the disinfection process must also calculate disinfection benchmarks and submit the benchmark calculations with engineering plans for Departmental approval prior to making any process changes. Sampling analytical methods, frequency of sampling, and sample locations must be in accordance with procedures described in Rules 1200-5-1-.14 and 1200-5-1-.36. Disinfection profiles and benchmarks must be determined by calculating daily inactivation ratios in accordance with Departmental and EPA rules. Systems may elect to calculate profiles in lieu of conducting trihalomethanes and haloacetic acid monitoring for the purpose of complying with the disinfection and filtration rule.

Authority: T.C.A. §§68-221-704 and 4-5-202. Administrative History: Original rule filed November 26, 1990; effective January 10, 1991. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed October 31, 2000, effective January 14, 2001. Amendment filed November 21, 2001, effective February 4, 2002. Amendment filed April 12, 2002, effective June 26, 2002. Amended August 15, 2005, effective October 29, 2005. Amendment filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective

Amendment

Subparagraphs (a) and (b) of paragraph (1) of Rule 1200-5-1-.32 Fees for Public Water Systems are amended by deleting them in their entirety and substituting the following so that, as amended, the subparagraphs shall read as follows:

(a) Community Water Systems

1. All community water systems, except as provided for in parts 2 and 3 of this subparagraph, shall pay fees based on the number of service connections as shown below:

Number of Connections

(i) greater than 200,000 connections	\$105,000 plus \$0.35 per each connection for each connection over 200,000
(ii) 100,001-200,000 connections	\$75,000 plus \$0.45 per each connection over 100,000
(iii) 50,000-100,000 connections	\$47,500 plus \$0.55 per each connection over 50,000
(iv) 30,001-49,999 connections	\$37,500 plus \$0.65 per each connection over 30,000
(v) 250-30,000 connections	\$1.30 per connection
(vi) less than 250 connections	\$300

- (i) For the purposes of calculating population served and facility maintenance fees, public water systems serving multi-family dwellings such as apartment complexes and mobile home

parcs shall count each separate dwelling unit as a connection and shall add the number of dwellings to the total number of connections served by the system unless each dwelling unit is billed separately by the water system and is already counted as an individual connection.

2. Systems with less than 15 service connections that are strictly wholesalers of water:
 - (i) surface water source \$2,000
 - (ii) ground water source \$400
3. State facilities:
 - (i) surface water source \$2,000
 - (ii) ground water source \$250

The number of connections and population will be based on the latest sanitary survey conducted by the Department.

(b) Non-Community Water Systems

1. Non-Transient Non-Community Water Systems
 - (i) Schools \$300
 - (ii) Industries (surface water source) \$2,000
 - (iii) Industries (ground water source) \$250
2. Transient Non-Community Water Systems
 - (i) Churches \$100
 - (ii) All others including, but not limited to, restaurants, campgrounds, motels, and rest areas \$200

Surface water systems include those systems that use surface water in whole or in part.

Amendment

Parts 1 – 14 of subparagraph (a) of paragraph (2) of Rule 1200-5-1-.32 Fees for Public Water Systems are amended by changing the fee for filter plants in part 4 to \$1000 from \$750, changing subpart 10(i) to read “less than 1,000 feet” from the “501 to 1000 feet” and its fee schedule to \$100 from \$50, changing part 14 to part 15 and deleting the two (2) sentences following the existing part 14 and by adding a new part 14 for “site evaluation for water treatment sludge beneficial use” for a fee of \$300 so that, as amended, the parts shall read as follows:

	Type Activity	Fee Schedule
1.	Well or Spring Development	\$ 200
2.	Chemical Control Plant	\$ 400
3.	Disinfection System	
	(i) Gaseous	\$ 300
	(ii) Hypochlorinator	\$ 150
4.	Filter Plant	\$1000
5.	Pump Station	\$ 250
6.	Tank	\$ 225

7.	Standard Specifications	\$ 100
8.	Tank Coating	\$ 50
9.	Sludge Treating	\$ 150
10.	Distribution Lines	
	(i) Less than 1000 feet	\$ 100
	(ii) Greater than 1000 feet	\$ 100 + \$.01/ft
11.	Change Orders	\$ 50
12.	Review of Operations and Maintenance Manuals	\$ 150
13.	New Raw Water Source and Site Evaluation for Public Water Systems and Water Bottling Operations	\$ 300
14.	Site Evaluation for Water Treatment Sludge Use	\$ 300
15.	Miscellaneous (Includes other items not specifically mentioned above)	\$ 50

Amendment

Subparagraph (d) of paragraph (2) of Rule 1200-5-1-.32 Fees for Public Water Systems is amended by deleting it in its entirety.

Authority: T.C.A. §§68-221-704 and 4-5-202. Administrative History: Original rule filed August 9, 1991; effective September 23, 1991. Amendment filed August 12, 1992; effective September 26, 1992. Amendment filed May 2, 1994; effective July 16, 1994. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed March 5, 2002 effective May 19, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed ; effective .

Amendment

Subparagraph (c) of paragraph (7) of Rule 1200-5-1-.33 Control of Lead and Copper is amended by deleting the footnote at the end of Table 1200-5-1-.33(7)(c) and substituting the following so that, as amended, the footnote shall read as follows:

¹ Populations shall be determined by count of the population served or by the household factor multiplied by the number of connections the system has as determined by the latest federal census. Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.

Amendment

Part 1 of subparagraph (d) of paragraph (7) of Rule 1200-5-1-.33 Control of Lead and Copper is amended by deleting the footnote at the end of Table 1200-5-1-.33(7)(d)1 and substituting the following so that, as amended , the footnote shall read as follows:

¹ Populations shall be determined by count of the population served or by the household factor multiplied by the number of connections the system has as determined by the latest federal census. Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.

Amendment

Paragraph (10) of Rule 1200-5-1-.33 Control of Lead and Copper is amended by deleting it in its entirety and reserving it so that, as amended, the paragraph shall read as follows:

(10) Reserved

Authority: T.C.A. §§68-221-704 and 4-5-202. Administrative History: Original rule filed August 24, 1992; effective October 8, 1992. Amendment filed October 22, 1993; effective January 5, 1994. Amendment filed April 12, 1996; effective June 26, 1996. Amendment filed February 17, 1999; effective May 3, 1999. Amendment filed January 4, 2001, effective March 21, 2001. Amendment filed ; effective .

Amendment

Subpart (ii) of part 1. of subparagraph (d) of paragraph (3) of Rule 1200-5-1-.35 Consumer Confidence Reports is amended by deleting the reference to “by 1200-5-1-.28” and substituting the following language “for unregulated contaminant monitoring by the Environmental Protection Agency under 40 CFR 141.40” so that, as amended, the subpart shall read as follows:

- (ii) Contaminants for which monitoring is required for unregulated contaminant monitoring by the Environmental Protection Agency under 40 CFR 141.40 and,

Amendment

Part 6. of subparagraph (f) of paragraph (3) of Rule 1200-5-1-.35 is amended by deleting the reference to “1200-5-1-.28” and substituting the following language “unregulated contaminant monitoring by the Environmental Protection Agency under 40 CFR 141.40” so that, as amended, the part shall read as follows:

- 6. Special monitoring requirements prescribed by unregulated contaminant monitoring by the Environmental Protection Agency under 40 CFR 141.40 and Rule 1200-5-1-.24; and,

Amendment

Paragraph (4) of Rule 1200-5-1-.35 Consumer Confidence Reports is amended by adding new subparagraphs (g) and (h) added so that, as amended the subparagraphs shall read as follows:

- (g) Any ground water system that receives notice from the Department of a significant deficiency or notice from the laboratory of a fecal indicator-positive ground water source sample that is not invalidated by the Department under Rule 1200-5-1-.40(3)(h) 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 Department determines that a particular significant deficiency is corrected or the fecal contamination in the ground water is addressed under Rule 1200-5-1-.40(4). Each report must include the following elements:
 - 1. The nature of the particular significant deficiency or the source of the fecal contamination (if known) and the date the significant deficiency was identified by the State or the dates of the fecal indicator-positive ground water source samples;
 - 2. If the fecal contamination in the ground water source has been addressed under Rule 1200-5-1-.40(4) and the date of such action;
 - 3. For each significant deficiency or fecal contamination in the ground water source that has not been addressed under Rule 1200-5-1-.40(4),

the State-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed;

4. If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the State under Rule 1200-5-1-.40(3)(h), the potential health effects using the health effects language of Appendix A of Rule 1200-5-1-.35.
 - (h) 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 Rule 1200-5-1-.35(4)(g).

Amendment

Appendix A of Rule 1200-5-1-.35 Consumer Confidence Reports is amended by adding a new entry “Fecal Indicators (Enterococci or coliphage) following the existing “Total Organic Carbon” entry under Microbiological Contaminants as follows:

Contaminants (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:						
Fecal Indicators (enterococci or coliphage).	TT		TT		Human and animal fecal waste	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human 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.
TT=Treatment Technique						

Authority: T.C.A. 68-221-704 and 4-5-202. Administrative History: Original rule filed February 8, 1999; effective April 4, 1999. Amendment filed October 31, 2000, effective January 14, 2001. Amendment filed November 21, 2001, effective January 24, 2002. Amendment filed April 12, 2002, effective June 26, 2002. Amendment filed July 15, 2002, effective September 28, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective

Amendment

Paragraph (5) of Rule 1200-5-1-.36 Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors is amended by deleting it in its entirety and reserving it so that, as amended, the paragraph shall read as follows:

(5) Reserved

Authority: T.C.A. §§53—2002, 53—2003; 68—13—701 et seq. and 4—5—202; Public Acts of 1983, Chapter 324. Administrative History: Amendment filed October 31, 2000, effective January 14, 2001. Amendment filed November 21, 2001, effective February 4, 2002. Amendment filed August 15, 2005, effective October 29, 2005. Amendment filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective

Amendment

Subparagraph (e) of paragraph (1) of Rule 1200-5-1-.37 Stage 2 Initial Distribution System Evaluation for Disinfection Byproducts is amended by deleting the reference to “1200-5-1-.36” and substituting “Rule 1200-5-1-.14” so that, as amended, the subparagraph shall read as follows:

- (e) You must use only the analytical methods specified in Rule 1200-5-1-.14, or otherwise approved by the state or the EPA for monitoring under the provisions of Rules 1200-5-1-.36, 37 and 38.

Authority: T.C.A. Sections 68-221-704 and T.C.A. Section 4-5-202. Administrative History: Original rule filed July 31 ,2006; effective October 14, 2006. Amendment filed ; effective

Amendment

Part 1 of subparagraph (c) of paragraph (1) of Rule 1200-5-1-.38 Stage 2 Disinfection Byproducts Requirements (LRAA) is amended by deleting “1200-5-1-.38(1)(c)” and substituting “Rule 1200-5-1-.38(2)(a)2” so that, as amended, the part shall read as follows:

1. Your monitoring frequency is specified in Rule 1200-5-1-.38(2)(a)2.

Amendment

Subparagraph (b) of paragraph (2) of Rule 1200-5-1-.38 Stage 2 Disinfection Byproducts Requirements (LRAA) is amended by deleting the two references to “1200-5-1-.36” and substituting “Rule 1200-5-1-.14” in its place so that, as amended, the subparagraph shall read as follows:

- (b) Analytical methods. You must use an approved method listed in Rule 1200-5-1-.14 for TTHM and HAA5 analyses. Analyses must be conducted by laboratories that have received certification by EPA or the State as specified in Rule 1200-5-1-.14.

Authority: T.C.A. Sections 68-221-704 and T.C.A. Section 4-5-202. Original rule filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective

Amendment

Paragraph (5) of Rule 1200-5-1-.39 Enhanced Treatment for Cryptosporidium is amended by deleting it in its entirety and reserving it so that, as amended, the paragraph shall read as follows:

(5) Reserved

Amendment

Subparagraph (b) of paragraph (10) of Rule 1200-5-1-.39 Enhanced Treatment for Cryptosporidium is amended by substituting the reference to “1200-5-1-.31(5)(a)” with “Rule 1200-5-1-.14(10)” so that, as amended, the subparagraph shall read as follows:

- (b) Systems with a single point of disinfection application prior to the entrance to the distribution system must conduct the monitoring in parts 1 through 4 of this subparagraph, Systems with more than one point of disinfection application must conduct the monitoring in parts 1 through 4 of this subparagraph for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ration, using analytical methods in Rule 1200-5-1-.14(10).

Amendment

Part 2 of subparagraph (c) of paragraph (15) of Rule 1200-5-1-.39 Enhanced Treatment for Cryptosporidium is amended by adding the phrase “removal of at least 4-log virus, 3-log Giardia lamblia, and 2-log” before the word “Cryptosporidium” so that, as amended, the part shall read as follows:

- 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.

Authority: T.C.A. Sections 68-221-704 and T.C.A. Section 4-5-202. Administrative History: Original rule filed July 31, 2006; effective October 14, 2006. Amendment filed ; effective .

New Rule

Table of Contents

1200-5-1-.40 Ground Water Rule

1200-5-1-.40 Ground Water Rule

(1) General Requirements:

- (a) The requirements of Rule 1200-5-1-.40 constitute national primary drinking water standards.
- (b) This rule 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 Rule 1200-5-1-.31. For purposes of this rule, “ground water system” is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.
- (c) All community public water systems designated as ground water systems for purposes of this rule which serve more than 50 connections or 150 persons, except for the provisions under Rule 1200-5-1-.40(1)(b), shall meet 4 log treatment of viruses by continuous chlorination (unless other disinfection methods are approved) with a contact time of 15 minutes as specified in rule Rules 1200-5-1-.17(4) and (29). Systems meeting 4 log removal of viruses shall be required to conduct compliance monitoring and the monitoring requirements under Rules 1200-5-1-.40(4)(b) and (c).
- (d) Systems subject to this rule must comply with the following requirements:

1. Sanitary survey information requirements for all ground water systems as described in Rule 1200-5-1-.40(2).
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 Department-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in Rule 1200-5-1-.40(3).
3. Treatment technique requirements, described in Rule 1200-5-1-.40(4), that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under Rule 1200-5-1-.40(3), or that have significant deficiencies that are identified by the State or that are identified by the Environmental Protection Agency under section 1445 of the Safe Drinking Water Act, a ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this rule 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 the contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses (including inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before the first customer.
4. Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a Department-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 Rule 1200-5-1-.40(4)(b).
5. If requested by the Department, ground water systems must provide the Department with any existing information that will enable the State to perform a hydrogeologic sensitivity assessment. For purposes of this rule, "hydrogeologic sensitivity assessment" is a determination of whether ground water systems obtain water from hydrogeologically sensitive settings.
 - (i) Ground water systems must comply, unless otherwise noted, with the requirements of this rule beginning December 1, 2009.

(2) Sanitary Surveys for Ground Water Systems

- (a) Ground water systems must provide the Department, at the Department's request, any existing information that will enable the Department to conduct a sanitary survey.
- (b) For the purposes of this Rule, a "sanitary survey," as conducted by the Department, 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. Sanitary surveys for the purpose of this paragraph include the applicable components listed in Rules 1200-5-1-.40(2)(c)1 through 1200-5-1-.40(2)(c)8.

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 Department requirements.

(3) General requirements.

(a) A ground water system must conduct triggered source water monitoring if the conditions identified in Rules 1200-5-1-.40(3)(a)1 and 1200-5-1-.40(3)(a)2 exist.

1. The system does not provide at least 4-log treatment of viruses (using inactivation, removal or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and
2. The system is notified that a sample collected under Rule 1200-5-1-.07(1) is total coliform-positive and the sample is not invalidated under Rule 1200-5-1-.07(3).

(b) 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 Rule 1200-5-1-.07(1), except as provided in Rule 1200-5-1-.40(3)(b)2.

1. The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the sample.
2. If approved by the Department, systems with more than one ground water source may meet the requirements of Rule 1200-5-1-.40(3)(b) by sampling representative ground water source or sources. If directed by the Department, systems must submit for Department 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 Rule 1200-5-1-.07(1) and that the system intends to use for representative sampling under this rule.
3. A ground water system serving 1,000 people or fewer may use a repeat sample collected from a ground water source to meet both the requirements of both Rule 1200-5-1-.07(1) and to satisfy the monitoring requirements of Rule 1200-5-1-.40(3)(b) for that ground water source only if the Department approves the use of E. coli as a fecal indicator for source water monitoring under Rule 1200-5-1-.40(3).

If the repeat sample collected from the ground water source is E. coli positive, the system must comply with Rule 1200-5-1-.40(3)(c).

- (c) If the Department does not require corrective action under Rule 1200-5-1-.40(5) for fecal-indicator positive source water sample collected under Rule 1200-5-1-.40(3)(b) that is not invalidated under Rule 1200-5-1-.40(3)(h), 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.
- (d) Consecutive and Wholesale Systems
 - 1. In addition to the other requirements of Rule 1200-5-1-.40(3), a consecutive ground water system that has a total coliform-positive sample collected under Rule 1200-5-1-.07(1) must notify the wholesale system(s) within 24 hours of being notified of the total coliform-positive sample.
 - 2. In addition to the other requirements of Rule 1200-5-1-.40(3), a wholesale ground water system must comply with Rule 1200-5-1-.40(3)(d)2(i) and Rule 1200-5-1-.40(3)(d)2(ii).
 - (i) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under Rule 1200-5-1-.07(1) is total coliform-positive must, within 24 hours of being notified, collect a sample from its ground water source(s) under Rule 1200-5-1-.40(3)(b) and analyze it for a fecal indicator under Rule 1200-5-1-.14(10)(a)6.
 - (ii) If the sample collected under Rule 1200-5-1-.40 (3)(d)2(i) 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 Rule 1200-5-1-.40(3)(c).
- (e) Exceptions to the Triggered Source Water Monitoring Requirements. A ground water system is not required to comply with the source water monitoring requirements of Rule 1200-5-1-.40(3) if either of the following conditions exists:
 - 1. The Department determines, and documents in writing, that the total coliform-positive sample collected under Rule 1200-5-1-.07(4)(d) is a distribution system deficiency; or
 - 2. The total coliform-positive sample collected under Rule 1200-5-1-.07(4)(d) is collected at a location that meets Department criteria for distribution system conditions that will cause total coliform-positive samples.
- (f) Assessment Source Water Monitoring. If directed by the Department, ground water systems must conduct assessment source water monitoring that meets Department-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under Rule 1200-5-1-.40(3)(a) to meet the

requirements of Rule 1200-5-1-.40(3)(f). Department-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 Department 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 standard sample volume of at least 100 ml for fecal indicator analysis regardless of fecal indicator or analytical method used,
4. Analysis of all ground water source samples using one of the analytical methods listed in the Rule 1200-5-1-.14(10)(a)1 for the presence of E. coli, enterococci, or coliphage,
5. Collection of ground water samples at a location prior to any treatment of the ground water source unless the Department 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 Department approves an alternate sampling location that is representative of the water quality of that well.

(g) Analytical and Sampling methods.

1. A ground water system subject to the source water monitoring requirements of this paragraph 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. The analytical method to be used is prescribed in Rule 1200-5-1-.14(10)(a)6.

(h) Invalidation of fecal indicator-positive ground water source sample. A ground water system may obtain Department invalidation of a fecal indicator-positive ground water source sample collected under Rule 1200-5-1-.40(3) only under the conditions specified in Rules 1200-5-1-.40(3)(h)1 and 1200-5-1-.40(3)(h)2.

1. The system provides the Department with written notice from the laboratory that improper sample analysis has occurred; or
2. The Department 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.

(i) If the Department invalidates a fecal indicator-positive ground water sample, the ground water system must collect another source water sample under Rule 1200-5-1-.40(3) within 24 hours of being notified by the Department of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods in Rule 1200-5-1-.14(10)(a)1. The Department 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 Department must specify how much time the system has to collect the sample.

- (j) Sampling location. Any ground water source sample required under Rule 1200-5-1-.40(3) must be collected at a location prior to any treatment of the ground water source unless the Department approves a sampling location after treatment.
 - 1. If the system's configuration does not allow sampling at the well itself, the system may collect a sample at a Department-approved location to meet the requirements of Rule 1200-5-1-.40(3) if the sample is representative of the water quality of that well.
 - (k) New Sources. If directed by the Department, a ground water system that places a new ground water source into service after November 30, 2009, must conduct assessment source water monitoring under Rule 1200-5-1-.40(3). If directed by the Department, the system must begin monitoring before the ground water source is used to provide water to the public.
 - (l) Public Notification. A ground water system with a ground water source sample collected under Rule 1200-5-1-.40(3) that is fecal indicator-positive and that is not invalidated under Rule 1200-5-1-.40(3)(h), including consecutive systems served by the ground water source, must conduct public notification under Rule 1200-5-1-.19.
 - (m) Monitoring Violations. Failure to meet the requirements of Rule 1200-5-1-.40(3)(a)-(f) is a monitoring violation and requires the ground water system to provide public notification under Rule 1200-5-1-.19.
- (4) 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 rule must be met by ground water systems when a significant deficiency is identified or when a ground water source sample collected under Rule 1200-5-1-.40(3) is fecal-positive.
 - 2. If directed by the Department, a ground water system with a ground water source sample collected under Rules 1200-5-1-.40(3)(b), 1200-5-1-.40(3)(d), or 1200-5-1-.40(3)(f) that is fecal indicator-positive must comply with the treatment technique requirements of this rule.
 - 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 rule 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 Department directs the ground water system to implement a specific corrective action, the ground water system must consult with

the Department regarding the appropriate corrective action within 30 days of receiving written notice from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under Rule 1200-5-1-.40(3)(c) was found to be fecal indicator-positive, or direction from the Department that a fecal indicator positive collected under Rules 1200-5-1-.40(3)(b), 1200-5-1-.40(3)(d), or 1200-5-1-.40(3)(f) requires corrective action. For purposes of this rule, 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 Department determines to be causing, or have the potential of causing, the introduction of contamination into the water delivered to consumers.

5. Within 120 days (or earlier if directed by the Department) of receiving written notification from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under Rule 1200-5-1-.40(3)(c) was found to be fecal indicator-positive, or direction from the Department that a fecal indicator-positive sample collected under Rules 1200-5-1-.40(3)(b), 1200-5-1-.40(3)(d), or 1200-5-1-.40(3)(f) requires corrective action, the ground water system must either:
 - (i) Have completed corrective action in accordance with applicable Department plan review processes or other Department guidance or direction, if any, including Department-specified interim measures, or
 - (ii) Be in compliance with a Department -approved corrective action plan and schedule subject to conditions in Rules 1200-5-1-.40(4)(a)5(ii)(I) and 1200-5-1-.40(4)(a)5(ii)(II).
 - (I) Any subsequent modifications to a Department-approved corrective action plan and schedule must also be approved by the Department.
 - (II) If the Department specifies interim measures for protection of the public health pending Department 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 Department.
6. Corrective Action Alternatives. Ground water systems that meet the conditions of Rules 1200-5-1-.40(1)(c)2 or 1200-5-1-.40(1)(c)3 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

Department -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 Rule 1200-5-1-.19, a community ground water system that receives notice from the Department of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the Department under Rule 1200-5-1-.40(3)(h) must inform the public served by the water system under Rule 1200-5-1-.35(4)(g) 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 Department to be corrected under Rule 1200-5-1-.40(4)(a)6.
 - (ii) In addition to the applicable public notification requirements of Rule 1200-5-1-.19, a non-community ground water system that receives notice from the Department of a significant deficiency must inform the public served by the water system in a manner approved by the Department of any significant deficiency that has not been corrected within 12 months of being notified by the Department, or earlier if directed by the Department. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:
 - (I) The nature of the deficiency and the date the significant deficiency was identified by the Department;
 - (II) The Department-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed; and
 - (III) For systems with a large proportion of non-English speaking consumers, as determined by the Department, 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 Department, a non-community water system with significant deficiencies that have been corrected must inform the customers of the significant deficiencies, how the deficiencies were corrected, and the dates of the correction under Rule 1200-5-1-.40(4)(a)7(ii).

- (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 rule for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department 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 Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department 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 Rule 1200-5-1-.40(4)(c) by December 1, 2009. Notification to the Department must include engineering, operational, or other information that the State requests to evaluate the submission.
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 rule for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department 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 Rules 1200-5-1-.40(4)(b)3, 1200-5-1-.40(4)(b)4 and 1200-5-1-.40(4)(b)5.
3. The system must notify the Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission.
4. The system must conduct compliance monitoring as required under Rule 1200-5-1-.40(4)(c) within 30 days of placing the source into service.

(c) Monitoring Requirements

1. A ground water system subject to the requirements of Rules 1200-5-1-.40(a)6(iv), 1200-5-1-.40(4)(b)1 and 1200-5-1-.40(4)(b)2 must monitor the effectiveness and reliability of the treatment for that ground water source before or at the first customer as follows:
 - (i) A ground water system that serves greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods specified in Rule 1200-5-1-.14(10)(i) at a location approved by the Department 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 Department-determined residual disinfectant concentration every day the ground water 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 5 days.

- (ii) A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods specified in Rule 1200-5-1-.14(10)(i) at a location approved by the Department and record the residual disinfection each day that water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water serves water from the ground water source to the public. The ground water system must take a daily grab sample during the peak hour of flow or at another time specified by the Department. If any daily grab sample measurement falls below the Department-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 Department-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of Rule 1200-5-1-.40(c)1.(i).
- (iii) Membrane filtration. A ground water system that uses membrane filtration to meet the requirements of this rule must monitor the membrane filtration process in accordance with all Department-specified monitoring requirements and must operate the membrane filtration in accordance with all Department-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:
 - (I) The membrane has an absolute molecular weight cutoff (MWCO), or alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;
 - (II) The membrane process is operated in accordance with Department-specified compliance; and
 - (III) The integrity of the membrane is intact.
- (iv) Alternative treatment. A ground water system that uses a Department-approved alternative treatment to meet the requirements of this rule 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 the first customer must:
 - (I) Monitor the alternative treatment in accordance with all Department-specified monitoring requirements; and

- (II) Operate the alternative treatment in accordance with all compliance requirements that the Department determines to be necessary to achieve at least 4-log treatment of viruses.
- (d) Failure to meet the monitoring requirements of Rule 1200-5-1-.40(3) is a monitoring violation and requires the ground water system to provide public notification under Rule 1200-5-1-.19(4).
- (5) 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 Department) of receiving written notice from the Department of a significant deficiency, the system:
 - 1. Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department specified interim actions and measures, or
 - 2. Is not in compliance with a Department-approved corrective action plan and schedule.
 - (b) Unless the Department invalidates a fecal indicator-positive ground water source sample under Rule 1200-5-1-.40(3)(h), a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of meeting the conditions of Rules 1200-5-1-.40(a)1 or 1200-5-1-.40(a)2, the system:
 - 1. Does not complete corrective action in accordance with any applicable Department plan review processes or other State guidance and direction, including State-specified interim measures, or
 - 2. Is not in compliance with a Department-approved corrective action plan and schedule.
 - (c) A ground water system subject to the requirements of Rule 1200-5-1-.40(4)(c) that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department 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) The ground water system must give public notification under Rule 1200-5-1-.19(3) for the treatment technique violations specified in Rules 1200-5-1-.40(4)(a), 1200-5-1-.40(4) (b) and 1200-5-1-.40(4) (c).
- (6) Reporting and Recordkeeping for Ground Water Systems
 - (a) In addition to the requirements of Rule 1200-5-1-.18, a ground water system regulated under this rule must provide the following information to the State:
 - 1. A ground water system conducting compliance monitoring under Rule 1200-5-1-.40(4)(c) must notify the Department any time the system

fails to meet any Department-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or 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 Department as soon as possible, but in no case later than the end of the next business day.

2. After completing any corrective action under Rule 1200-5-1-.40(4)(a), a ground water system must notify the Department within 30 days of completion of the corrective action.
- (b) Recordkeeping. In addition to the requirements of Rule 1200-5-1-.20, a ground water system regulated under Rule 1200-5-1-.40 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 Rule 1200-5-1-.40(4)(a)7. Documentation shall be kept for a period of not less than three years.
 3. Records of decisions under Rule 1200-5-1-.40(3)(e)2 and records of invalidation of fecal indicator-positive ground water source samples under Rule 1200-5-1-.40(3)(h). 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 Rule 1200-5-1-.07(3). Documentation shall be kept for a period not less than five years.
 5. For systems, including wholesale systems, that are required to perform compliance monitoring under Rule 1200-5-1-.40(4)(b):
 - (i) Records of Department-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 Department-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 Department-specified compliance requirements for membrane filtration and of parameters specified by the Department for Department-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.

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