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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 141

[EPA-HQ-OW-2013-0300; FRL- 9818-2]

Expedited Approval of Alternative Test Procedures for the Analysis of Contaminants Under the Safe Drinking Water Act; Analysis and Sampling Procedures

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: This action announces the U.S. Environmental Protection Agency's (EPA's) approval of alternative testing methods for use in measuring the levels of contaminants in drinking water and determining compliance with national primary drinking water regulations. The Safe Drinking Water Act (SDWA) authorizes EPA to approve the use of alternative testing methods through publication in the Federal Register. EPA is using this streamlined authority to make 84 additional methods available for analyzing drinking water samples. This expedited approach provides public water systems, laboratories, and primacy agencies with more timely access to new measurement techniques and greater flexibility in the selection of analytical methods, thereby reducing monitoring costs while maintaining public health protection.

DATES: This action is effective **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

FOR FURTHER INFORMATION CONTACT: Safe Drinking Water Hotline (800) 426-4791 or Glynda Smith, Technical Support Center, Standards and Risk Management Division, Office of Ground Water and Drinking Water (MS 140), Environmental Protection Agency, 26 West Martin Luther King Drive, Cincinnati, OH 45268; telephone number: (513) 569-7652; e-mail address: smith.glynda@epa.gov.

SUPPLEMENTARY INFORMATION:

I. General Information

A. *Does this Action Apply to Me?*

Public water systems are the regulated entities required to measure contaminants in drinking water samples. In addition, EPA Regions as well as States and Tribal governments with authority to administer the regulatory program for public water systems under SDWA may also measure contaminants in water samples. When EPA sets a monitoring requirement in its national primary drinking water regulations for a given contaminant, the agency also establishes in the regulations standardized test procedures for analysis of the contaminant. This action makes alternative testing methods available for particular drinking water contaminants beyond the testing methods currently established in the regulations. EPA is providing public water systems required to test

water samples with a choice of using either a test procedure already established in the existing regulations or an alternative test procedure that has been approved in this action or in prior expedited approval actions. Categories and entities that may ultimately be affected by this action include:

Category	Examples of potentially regulated entities	NAICS[1]
State, Local, & Tribal Governments	States, local and Tribal governments that analyze water samples on behalf of public water systems required to conduct such analysis; States, local and Tribal governments that themselves operate community and non-transient non-community water systems required to monitor.	924110
Industry	Private operators of community and non-transient non-community water systems required to monitor.	221310
Municipalities	Municipal operators of community and non-transient non-community water systems required to monitor.	924110

[1]North American Industry Classification System.

This table is not exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. This table lists the types of entities that EPA is now aware could potentially be affected by this action. Other types of entities not listed in the table could also be impacted. To determine whether your facility is affected by this action, you should carefully examine the applicability language in the Code of Federal Regulations (CFR) at 40 CFR 141.2 (definition of public water system). If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding "**FOR FURTHER INFORMATION CONTACT**" section.

B. *How Can I Get Copies of This Document and Other Related Information?*

Docket. EPA established a docket for this action under Docket ID No. EPA-HQ-OW-2013-0300.

Publicly available docket materials are available either electronically through www.regulations.gov or in hard copy at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. Copyrighted materials are available only in hard copy. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Water Docket is (202) 566-2426.

Abbreviations and Acronyms Used in this Action

APHA: American Public Health Association

CFR: Code of Federal Regulations

EPA: United States Environmental Protection Agency

GC: Gas Chromatography

GC/MS: Gas Chromatography/Mass Spectrometry

GWR: Ground Water Rule

NAICS: North American Industry Classification System

NEMI: National Environmental Methods Index

QC: Quality Control

SDWA: Safe Drinking Water Act

TTHM: Total trihalomethanes

VCSB: Voluntary Consensus Standard Bodies

II. Background

A. What is the Purpose of This Action?

In this action, EPA is approving 84 analytical methods for determining contaminant concentrations in samples collected under SDWA. Regulated parties required to sample and monitor may use either the testing methods already established in existing regulations or the alternative testing methods being approved in this action or in prior expedited approval actions. The new methods are listed along with other previously expedited methods in 40 CFR Part 141 Appendix A to Subpart C and on EPA's drinking water methods Web site at http://water.epa.gov/scitech/drinkingwater/labcert/analyticalmethods_expedited.cfm .

B. What is the Basis for This Action?

When EPA determines that an alternative analytical method is "equally effective" (i.e., as effective as a method that has already been promulgated in the regulations), SDWA allows EPA to approve the use of the alternative method through publication in the Federal Register. (See Section 1401(1) of SDWA.) EPA is using this streamlined approval authority to make 84 additional methods available for determining contaminant concentrations in samples collected under the SDWA. EPA has determined that, for each contaminant or group of contaminants listed in Section III, the additional testing methods being approved in this action are as effective as one or more of the testing methods already approved in the regulations for those contaminants.

Section 1401(1) of SDWA states that the newly approved methods "shall be treated as an alternative for public water systems to the quality control and testing procedures listed in the regulation." Accordingly, this action makes these additional 84 analytical methods legally available as options for meeting EPA's monitoring requirements.

This action does not add regulatory language, but does, for informational purposes, update an appendix to the regulations at 40 CFR Part 141 that lists all methods approved under Section 1401(1) of SDWA. Accordingly, while this action is not a rule, it is updating CFR text and therefore is being published in the "Final Rules" section of the Federal Register.

III. Summary of Approvals

EPA is approving 84 methods that are equally effective relative to methods previously promulgated in the regulations. By means of this notice, these 84 methods are added to Appendix A to Subpart C of 40 CFR Part 141.

A. *Methods developed by EPA*

1. EPA Method 524.4 (USEPA 2013) is a gas chromatography/mass spectrometry (GC/MS) method for the determination of 21 purgeable organic compounds, which are regulated in drinking water as specified at 40 CFR 141.61(a)(1) through (21), and total trihalomethanes (TTHM), which are regulated in drinking water as specified at 40 CFR 141.64(b)(1) and (2). The method analytes are purged from the water sample using nitrogen and trapped on a sorbent material. After purging, the sorbent trap is heated and back flushed with GC carrier gas and the analytes are transferred to a capillary GC column. The analytes eluting from the GC column are

directed into a mass spectrometer for detection and quantitation. The analytes are identified by comparing the acquired mass spectra and retention times for calibration standards acquired under identical GC/MS conditions. The concentration of each analyte is calculated using the internal standard technique and response curves are generated using procedural calibration standards.

EPA Method 524.4 is an extension of EPA Method 524.3 (USEPA 2009a) which was approved in an earlier expedited methods approval action (74 FR 38348, August 3, 2009) (USEPA 2009b). Both EPA Methods 524.4 and 524.3 are updated versions of EPA Method 524.2, Revision 4.1 (USEPA 1995), which is currently approved at 40 CFR 141.24(e)(1) for the analysis of benzene; carbon tetrachloride; chlorobenzene; 1,2-dichlorobenzene; 1,4-dichlorobenzene; 1,2-dichloroethane; cis-dichloroethylene; trans-dichloroethylene; dichloromethane; 1,2-dichloropropane; ethylbenzene; styrene; tetrachloroethylene; 1,1,1-trichloroethane; trichloroethylene; toluene; 1,2,4-trichlorobenzene; 1,1-dichloroethylene; 1,1,2-trichloroethane; vinyl chloride; total xylenes (sum of o-xylene, m-xylene, and p-xylene) and total trihalomethanes (TTHM; sum of chloroform, bromodichloromethane, dibromochloromethane, and bromoform). EPA Method 524.2, Revision 4.1 is also approved at 40 CFR 141.131(b)(1) for TTHM. The primary difference between EPA Method 524.4 and EPA Method 524.3 lies in the purge gas. The cost of helium continues to rise and EPA Method 524.4 was developed using less expensive nitrogen gas to purge the analytes from drinking water samples instead of helium.

For each of the purgeable organic compounds and TTHM contaminants, the method performance characteristics of EPA Method 524.4 were compared to those of the approved method, EPA Method 524.2, Revision 4.1. EPA has determined EPA Method 524.4 is equally as effective as the approved method for determining the concentrations of each of the regulated purgeable organic compounds and TTHM contaminants in drinking water. The basis for this determination

is discussed in detail in Smith and Wendelken (2012a). Therefore, EPA is approving the use of EPA Method 524.4 for each of the above named contaminants when analyzing drinking water compliance samples.

A copy of EPA Method 524.4 can be accessed and downloaded directly on-line at http://water.epa.gov/scitech/drinkingwater/labcert/analyticalmethods.cfm.

B. *Methods developed by Voluntary Consensus Standard Bodies (VCSB)*

1. Standard Methods for the Examination of Water and Wastewater (Standard Methods).

The 22nd edition of Standard Methods for the Examination of Water and Wastewater (APHA 2012) was published earlier this year. EPA compared 79 methods in the 22nd edition to earlier versions of those methods that are currently approved in 40 CFR Part 141. Changes between the approved version and the version of each method published in the 22nd edition are summarized in Smith and Wendelken (2012b) and Best (2013). The revisions primarily involve editorial changes (e.g., corrections of errors, procedural clarifications, and reorganization of text); in addition, most of the chemistry methods in the 22nd edition contain an editorial change that directs analysts to the appropriate Quality Control (QC) section that contains the QC criteria and practices that are to be followed as part of the method. The methods in the 22nd edition listed in the following table are the same as the earlier approved versions with respect to the chemistry, sample handling protocols, and method performance data. For all of these reasons, EPA has concluded that the versions in the 22nd edition are thus equally effective relative to those that are currently approved in the regulations. Therefore, EPA is approving the use of 79 updated

Standard Methods in the 22nd edition for the contaminants and their respective regulations listed in the following table:

Standard Method, 22nd Edition (APHA 2012)	Approved Method	Contaminant	Regulation
2120 B	2120 B-01, online version (APHA 2001a)	Color	40 CFR 143.4(b)
2130 B	2130 B-01, online version (APHA 2001b)	Turbidity	40 CFR 141.74(a)(1)
2150 B	2150 B-97, online version (APHA 1997a)	Odor	40 CFR 143.4(b)
2320 B	2320 B-97, online version (APHA 1997b)	Alkalinity	40 CFR 141.23(k)(1)
2510 B	2510 B-97, online version (APHA 1997c)	Conductivity	40 CFR 141.23(k)(1)
2540 C	2540 C-97, online version (APHA 1997d)	Total Dissolved Solids	40 CFR 143.4(b)
2550	2550-00, online version (APHA 2000a)	Temperature	40 CFR 141.23(k)(1)
3111 B	3111 B-99, online version (APHA 1999a)	Calcium, copper, magnesium, nickel, sodium, iron, manganese, silver, zinc	40 CFR 141.23(k)(1); 40 CFR 143.4(b)
3111 D	3111 D-99, online version (APHA 1999a)	Barium, aluminum	40 CFR 141.23(k)(1); 40 CFR 143.4(b)
3112 B	3112 B-99, online version (APHA 1999b)	Mercury	40 CFR 141.23(k)(1)
3113 B	3113 B, 19th Edition (APHA 1995)	Antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, selenium, aluminum, iron, manganese, silver	40 CFR 141.23(k)(1); 40 CFR 143.4(b)
3114 B	3114 B-97, online version (APHA 1997e)	Arsenic, selenium	40 CFR 141.23(k)(1)
3120 B	3120 B-99, online version (APHA 1999c)	Barium, beryllium, calcium, chromium, copper, magnesium,	40 CFR 141.23(k)(1); 40 CFR 143.4(b)

		nickel, silica, aluminum, iron, manganese, silver, zinc	
3500-Ca B	3500-Ca B-97, online version (APHA 1997f)	Calcium	40 CFR 141.23(k)(1)
3500-Mg B	3500-Mg B-97, online version (APHA 1997g)	Magnesium	40 CFR 141.23(k)(1)
4110 B	4110 B-00, online version (APHA 2000b)	Fluoride, nitrate, nitrite, ortho-phosphate, chloride, sulfate	40 CFR 141.23(k)(1); 40 CFR 143.4(b)
4500-Cl D,F, G,H,	4500-Cl D,F,G,H-00, online versions (APHA 2000c)	Free chlorine	40 CFR 141.74(a)(2); 40 CFR 141.131(c)(1)
4500-Cl D,E,F, G,I	4500-Cl D,E,F,G,I-00, online versions (APHA 2000c)	Total chlorine	40 CFR 141.74(a)(2); 40 CFR 141.131(c)(1)
4500-Cl D,F, G,	4500-Cl D,F,G-00, online versions (APHA 2000c)	Combined chlorine	40 CFR 141.131(c)(1)
4500-Cl- B,D	4500-Cl- B,D-97, online versions (APHA 1997h)	Chloride	40 CFR 143.4(b)
4500-ClO_2 C	4500-ClO_2 C-00, online version (APHA 2000d)	Chlorine Dioxide	40 CFR 141.74(a)(2)
4500-ClO_2 E	4500-ClO_2 E-00, online version (APHA 2000d)	Chlorine Dioxide	40 CFR 141.74(a)(2); 40 CFR 141.131(c)(1)
4500-ClO_2 E	4500-ClO_2 E-00, online version (APHA 2000d)	Chlorite	40 CFR 141.131(b)(1)
4500-CN- E,F,G	4500-CN- E,F,G-99, online versions (APHA 1999d)	Cyanide	40 CFR 141.23(k)(1)
4500-F- B,C,D,E	4500-F- B,C,D,E-97, online versions (APHA 1997i)	Fluoride	40 CFR 141.23(k)(1)
4500-H+ B	4500-H+ B-00, online version (APHA 2000e)	pH	40 CFR 141.23(k)(1)
4500-NO_3- D	4500-NO_3 D-00, online version (APHA 2000f)	Nitrate	40 CFR 141.23(k)(1)
4500-NO_3- E,F	4500-NO_3- E,F-00, online versions (APHA 2000f)	Nitrate, nitrite	40 CFR 141.23(k)(1)
4500-NO_2- B	4500-NO_2- B-00, online version (APHA 2000g)	Nitrite	40 CFR 141.23(k)(1)
4500-O_3 B	4500-O_3 B-97, online version (APHA 1997j)	Ozone	40 CFR 141.74(a)(2)
4500-P E,F	4500-P E,F, 19th Edition (APHA 1995)	Ortho-phosphate	40 CFR 141.23(k)(1)
4500-SiO_2	4500-SiO_2 C,D,E-97, online	Silica	40 CFR 141.23(k)(1)

C,D,E	versions (APHA 1997k)		
4500-SO_4^{2-} C,D,E,F	4500-SO_4^{2-} C,D,E,F, 19th Edition (APHA 1995)	Sulfate	40 CFR 143.4(b)
5310 B,C,D	5310 B,C,D-00, online versions (APHA 2000h)	Dissolved and Total Organic Carbon	40 CFR 141.131(d)
5540 C	5540 C-00, online version (APHA 2000i)	Foaming agents	40 CFR 143.4(b)
5910 B	5910 B-00, online version (APHA 2000j)	UV Absorption at 254 nm	40 CFR 141.131(d)
6251 B	6251 B-94, online version (APHA 1994)	HAA5	40 CFR 141.131(b)(1)
6610 B	EPA Method 531.2, Rev. 1.0 (2001a)	Carbofuran, oxamyl	40 CFR 141.24(e)(1)
6640 B	EPA Method 515.4, Rev. 1.0 (2000)	2,4-D; 2,4,5-TP; Dalapon; Dinoseb; Pentachlorophenol; Picloram	40 CFR 141.24(e)(1)
6651 B	6651 B, 20th Edition (APHA 1998)	Glyphosate	40 CFR 141.24(e)(1)
7110 B	7110 B-00, online version (APHA 2000k)	Gross alpha and beta	40 CFR 141.25(a)
7110 C	7110 C-00, online version (APHA 2000k)	Gross alpha	40 CFR 141.25(a)
7120	7120-97, online version (APHA 1997l)	Gamma emitters (includes radioactive cesium and iodine)	40 CFR 141.25(a)
7500-Cs B	7500-Cs B-00, online version (APHA 2000l)	Radioactive Cesium Gamma emitters	40 CFR 141.25(a)
7500-^{3}H B	7500-^{3}H B-00, online version (APHA 2000m)	Tritium	40 CFR 141.25(a)
7500-I B	7500-I B-00, online version (APHA 2000n)	Radioactive Iodine Gamma emitters	40 CFR 141.25(a)
7500-I C,D	7500-I C,D-00, online versions (APHA 2000n)	Radioactive Iodine	40 CFR 141.25(a)
7500-Ra B,C	7500-Ra B,C-01, online versions (APHA 2001c)	Radium-226	40 CFR 141.25(a)
7500-Ra D	7500-Ra D-01, online version (APHA 2001c)	Radium-228	40 CFR 141.25(a)
7500-Sr B	7500-Sr B-01, online version (APHA 2001d)	Strontium-89, Strontium-90	40 CFR 141.25(a)
7500-U B,C	7500-U B,C-00, online versions (APHA 2000o)	Uranium	40 CFR 141.25(a)
9221 A	9221 A, 20th Edition (APHA 1998)	Total Coliforms	40 CFR 141.21(f)(3); 40 CFR 141.74(a)(1)

9221 B	9221 B, 20th Edition (APHA 1998)	Total Coliforms	40 CFR 141.21(f)(3); 40 CFR 141.74(a)(1)
9221 B.1, B.2	9221 B, 20th Edition (APHA 1998)	Total Coliforms	40 CFR 141.852(a)(5)
9221 C	9221 C, 20th Edition (APHA 1998)	Total Coliforms	40 CFR 141.74(a)(1)
9221 E	9221 E, 20th Edition (APHA 1998)	Fecal Coliforms	40 CFR 141.21(f)(5); 40 CFR 141.74(a)(1)
9221 F	9221 F, 20th Edition (APHA 1998)	E. coli	40 CFR 141.402(c)(2)
9221 F.1	9221 F, 20th Edition (APHA 1998)	E. coli	40 CFR 141.852(a)(5)
9222 D	9222 D, 20th Edition (APHA 1998)	Fecal Coliforms	40 CFR 141.74(a)(1)
9223 B	9223, 20th Edition (APHA 1998)	Total Coliforms	40 CFR 141.21(f)(3); 40 CFR 141.74(a)(1); 40 CFR 141.852(a)(5)
9223 B	9223 B, 20th Edition (APHA 1998)	E. coli	40 CFR 141.21(f)(6); 40 CFR 141.402(c)(2); 40 CFR 141.852(a)(5)
9215 B	9215 B, 20th Edition (APHA 1998)	Heterotrophic Bacteria	40 CFR 141.74(a)(1)

The 22nd edition can be obtained from the American Public Health Association (APHA), 800 I Street, NW, Washington, DC 20001-3710. Online versions of Standard Methods are available at http://www.standardmethods.org.

2. ASTM International. EPA compared the most recent versions of three ASTM International methods (ASTM Methods D516-11, D1067-11 B, and D1293-12) to the earlier versions of those methods that are currently approved in 40 CFR 141. Changes between the earlier approved version and the most recent version of each method are summarized in Smith (2012). The revisions primarily involve editorial changes (e.g., updated references, definitions, terminology, and reorganization of text). The revised methods are the same as the approved versions with respect to sample collection and handling protocols, sample preparation, analytical methodology,

and method performance data, and thus, EPA finds they are equally effective relative to the approved methods.

EPA is thus approving the use of the following ASTM methods for the contaminants and their respective regulations listed in the following table:

ASTM Revised Version	Approved Method	Contaminant	Regulation
D516-11 (ASTM 2011a)	D516-02 (ASTM 2002a)	Sulfate	40 CFR 143.4(b)
D1067-11 B (ASTM 2011b)	D1067-02 B (ASTM 2002b)	Alkalinity	40 CFR 141.23(k)(1)
D1293-12 (ASTM 2012)	D1293-99 (ASTM 1999)	pH	40 CFR 141.23(k)(1)

The ASTM methods are available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://www.astm.org.

C. *Methods Developed by Vendors*

1. Charm Sciences, Inc. Fast Phage (2012a) is a microbiological method for the detection of male-specific (F+) and somatic coliphages in ground water by a two-step enrichment procedure. Coliphages are detected as being present or absent in 100 mL samples of ground water by the formation of plaques on agar plates containing the host bacterium. Fast Phage includes a presumptive rapid fluorescence step that can predict coliphage positive samples in less than eight hours.

EPA Method 1601 (USEPA 2001b) is currently approved under the Ground Water Rule (GWR) at 40 CFR 141.402(c)(2) for the detection of coliphages in ground water source waters. Fast Phage is similar to EPA Method 1601 but has modifications to the medium and incubation

temperature, which make the method more rapid. Fast Phage is able to detect coliphages in 16 to 30 hours compared to 40 to 60 hours for EPA Method 1601. Additionally, Fast Phage includes kits, which supply the medium, antibiotics and freeze-dried host bacteria in a pre-packaged and standardized form for easier use.

A multi-laboratory study was conducted to compare the method performance of Fast Phage to the performance of the approved method, EPA Method 1601. Three geographically diverse wastewaters were used as sources of somatic and male-specific coliphages for the study. In four different laboratories, Fast Phage was compared side by side with EPA Method 1601 for somatic and male-specific coliphage detection in local ground waters that were inoculated with low level coliphages from each of the test wastewaters. Ten replicates of inoculated ground waters were evaluated for both Fast Phage and EPA Method 1601, and each test wastewater was evaluated as an inoculant. The study report (Charm Sciences Inc. 2012b) details the study design and implementation along with the validation data obtained from the multi-laboratory evaluation.

The results of the multi-laboratory studies indicate that Fast Phage is equally as effective as EPA Method 1601 in method performance for detecting male-specific and somatic coliphages in ground water. The basis for this determination is discussed in Sinclair (2013). EPA is thus approving Fast Phage as an alternate method to EPA Method 1601 for the detection of male-specific and somatic coliphages in ground water under the Ground Water Rule.

The Fast Phage method is available from Charm Sciences, Inc., 659 Andover Street, Lawrence, MA 01843, and also at www.charmsciences.com.

IV. Statutory and Executive Order Reviews

As noted in Section II, under the terms of SDWA Section 1401(1), this streamlined method approval action is not a rule. Accordingly, the Congressional Review Act, 5 U.S.C. 801 et seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, does not apply because this action is not a rule for purposes of 5 U.S.C. 804(3). Similarly, this action is not subject to the Regulatory Flexibility Act because it is not subject to notice and comment requirements under the Administrative Procedure Act or any other statute. In addition, because this approval action is not a rule but simply makes alternative testing methods available as options for monitoring under SDWA, EPA has concluded that other statutes and executive orders generally applicable to rulemaking do not apply to this approval action.

V. References

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American Public Health Association (APHA). 1997d. Standard Method 2540 C-97. Total Dissolved Solids Dried at 180^{o}C. Approved by Standard Methods Committee 1997. Standard Methods Online. (Available at http://www.standardmethods.org.)

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American Public Health Association (APHA). 1998. *20th Edition of Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.

American Public Health Association (APHA). 1999a. Standard Method 3111 B,D-99. Metals by Flame Atomic Absorption Spectrometry. B. Direct Air-Acetylene Flame Method. D. Direct Nitrous Oxide-Acetylene Flame Method. Approved by Standard Methods Committee 1999. Standard Methods Online. (Available at http://www.standardmethods.org.)

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List of Subjects in 40 CFR Part 141

Environmental protection, Chemicals, Indians-lands, Intergovernmental relations, Radiation protection, Reporting and recordkeeping requirements, Water supply.

Dated: May 21, 2013.

Peter Grevatt,

Director, Office of Ground Water and Drinking Water.

For the reasons stated in the preamble, 40 CFR Part 141 is amended as follows:

PART 141 - NATIONAL PRIMARY DRINKING WATER REGULATIONS

1. The authority citation for part 141 continues to read as follows:

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

2. Appendix A to Subpart C of Part 141 is amended as follows:

a. By revising the entire table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(3)."

b. By adding the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(5)" after the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(3)."

c. By revising the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(6)."

d. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1).”

e. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24(e)(1).”

f. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.25(a).”

g. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1).”

h. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.74(a)(2).”

i. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1).”

j. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1).”

k. By revising the table entitled “ALTERNATIVE TESTING METHODS FOR PARAMETERS LISTED AT 40 CFR 141.131(d).”

l. By revising the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)."

m. By adding the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)" after the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.704(b)."

n. By revising the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)."

o. By revising footnotes 19, 20, and 21.

p. By adding footnotes 24 through 30 to the table.

The additions and revisions read as follows:

Appendix A to Subpart C of Part 141 - Alternative Testing Methods Approved for Analyses Under the Safe Drinking Water Act.

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ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(3)				
Organism	**Methodology**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**Other**
Total Coliforms	Total Coliform Fermentation Technique	9221 A, B	9221 A, B	

	Total Coliform Membrane Filter Technique	9222 A, B, C		
	Presence-Absence (P-A) Coliform Test	9221 D		
	ONPG-MUG Test	9223	9223 B	
	Colitag™			Modified Colitag™ [13]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(5)		
Organism	**Methodology**	**SM 22nd Edition [28]**
Fecal Coliforms	Fecal Coliform Procedure	9221 E

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(6)						
Organism	**Methodology**	**SM 20th Edition [6]**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**SM Online [3]**	**Other**
E.coli	ONPG-MUG Test	9223 B	9223 B	9223 B	9223 B-97	
	Colitag™					Modified Colitag™ [13]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)							
Contaminant	**Methodology**	**EPA Method**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**SM Online [3]**	**ASTM [4]**	**Other**
Alkalinity	Titrimetric		2320 B	2320 B		D1067-06 B, 11 B	
Antimony	Hydride – Atomic Absorption					D 3697-07	

	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Arsenic	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04	D 2972-08 C	
	Hydride Atomic Absorption		3114 B	3114 B	3114 B-09	D 2972-08 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Barium	Inductively Coupled Plasma		3120 B	3120 B			
	Atomic Absorption; Direct		3111 D	3111 D			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Beryllium	Inductively Coupled Plasma		3120 B	3120 B			
	Atomic Absorption;		3113 B	3113 B	3113 B-04	D 3645-08	

	Furnace					B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Cadmium	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Calcium	EDTA titrimetric		3500-Ca B	3500-Ca B		D 511-09 A	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B		D 511-09 B	
	Inductively Coupled Plasma		3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
	Ion Chromatography					D 6919-09	
Chromium	Inductively Coupled Plasma		3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04		
	Axially viewed inductively coupled	200.5, Revision 4.2 [2]					

	plasma-atomic emission spectrometry (AVICP–AES)						
Copper	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04	D 1688-07 C	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B		D 1688-07 A	
	Inductively Coupled Plasma		3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Conductivity	Conductance		2510 B	2510 B			
Cyanide	Manual Distillation followed by					D 2036-06 A	
	Spectrophotometric, Amenable		4500-CN^- G	4500-CN^- G		D 2036-06 B	
	Spectrophotometric Manual		4500-CN^- E	4500-CN^- E		D2036-06 A	
	Selective Electrode		4500-CN^- F	4500-CN^- F			
	Headspace Gas Chromatography/Mass Spectrometry						ME355.01 [7]
Fluoride	Ion Chromatography		4110 B	4110 B			
	Manual Distillation; Colorimetric SPADNS		4500-F^- B, D	4500-F^- B, D			

	Manual Electrode		4500-F^- C	4500-F^- C		D 1179-04, 10 B	
	Automated Alizarin		4500-F^- E	4500-F^- E			
	Arsenite-Free Colorimetric SPADNS						Hach SPADNS 2 Method 10225 [22]
Lead	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04	D 3559-08 D	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Magnesium	Atomic Absorption		3111 B	3111 B		D 511-09 B	
	Inductively Coupled Plasma		3120 B	3120 B			
	Complexation Titrimetric Methods		3500-Mg B	3500-Mg B		D 511-09 A	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
	Ion Chromatography					D 6919-09	
Mercury	Manual, Cold Vapor		3112 B	3112 B	3112 B-09		
Nickel	Inductively Coupled Plasma		3120 B	3120 B			
	Atomic Absorption;		3111 B	3111 B			

	Direct						
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Nitrate	Ion Chromatography		4110 B	4110 B			
	Automated Cadmium Reduction		4500-NO_3^- F	4500-NO_3^- F			
	Manual Cadmium Reduction		4500-NO_3^- E	4500-NO_3^- E			
	Ion Selective Electrode		4500-NO_3^- D	4500-NO_3^- D			
	Reduction/Colorimetric						Systea Easy (1-Reagent) [8]
	Colorimetric; Direct						Hach TNTplus™ 835/836 Method 10206 [23]
Nitrite	Ion Chromatography		4110 B	4110 B			
	Automated Cadmium Reduction		4500-NO_3^- F	4500-NO_3^- F			
	Manual Cadmium Reduction		4500-NO_3^- E	4500-NO_3^- E			
	Spectrophotometric		4500-NO_2^- B	4500-NO_2^- B			

	Reduction/Colorimetric						Systea Easy (1-Reagent) [8]
Orthophosphate	Ion Chromatography		4110 B	4110 B			
	Colorimetric, ascorbic acid, single reagent		4500-P E	4500-P E	4500-P E-99		
	Colorimetric, Automated, Ascorbic Acid		4500-P F	4500-P F	4500-P F-99		
pH	Electrometric		4500-H^+ B	4500-H^+ B		D 1293-12	
Selenium	Hydride-Atomic Absorption		3114 B	3114 B	3114 B-09	D 3859-08 A	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B-04	D 3859-08 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
Silica	Colorimetric					D859-05, 10	
	Molybdosilicate		4500-SiO_2 C	4500-SiO_2 C			
	Heteropoly blue		4500-SiO_2 D	4500-SiO_2 D			
	Automated for Molybdate-reactive Silica		4500-SiO_2 E	4500-SiO_2 E			
	Axially viewed inductively coupled plasma-atomic	200.5, Revision 4.2 [2]					

	emission spectrometry (AVICP–AES)						
	Inductively Coupled Plasma		3120 B	3120 B			
Sodium	Atomic Absorption; Direct Aspiration		3111 B	3111 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]					
	Ion Chromatography					D 6919-09	
Temperature	Thermometric		2550	2550			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24 (e)(1)					
Contaminant	**Methodology**	**EPA Method**	**SM 21st Edition[1]**	**SM 22nd Edition [28]**	**SM Online [3]**
Benzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Carbon tetrachloride	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Chlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,2-Dichlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,4-Dichlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,2-Dichloroethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			

cis-Dichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
trans-Dichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Dichloromethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,2-Dichloropropane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Ethylbenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Styrene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Tetrachloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,1,1-Trichloroethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Trichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Toluene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,2,4-Trichlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,1-Dichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,1,2-Trichlorethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Vinyl chloride	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Xylenes (total)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			

2,4-D	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01
2,4,5-TP (Silvex)	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01
Alachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Atrazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)	536 [25]			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24], 523 [26]			
Benzo(a)pyrene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Carbofuran	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B	6610 B-04
Chlordane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Dalapon	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 [14]			
	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01
Di(2-ethylhexyl)adipate	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			

Di(2-ethylhexyl)phthalate	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Dibromochloropropane (DBCP)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9]			
Dinoseb	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01
Endrin	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Ethyl dibromide (EDB)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9]			
Glyphosate	High-Performance Liquid Chromatography (HPLC) with Post-Column Derivatization and Fluorescence Detection		6651 B	6651 B	6651 B-00
Heptachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Heptachlor Epoxide	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Hexachlorobenzene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Hexachlorocyclo-pentadiene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Lindane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			

Methoxychlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Oxamyl	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B	6610 B-04
PCBs (as Aroclors)	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Pentachlorophenol	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Picloram	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01
Simazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)	536 [25]			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24], 523 [26]			
Toxaphene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Total Trihalomethanes	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.25(a)

Contaminant	Methodology	SM 21st Edition [1]	SM 22nd Edition [28]	ASTM [4]
Naturally Occurring:				
Gross alpha and beta	Evaporation	7110 B	7110 B	
Gross alpha	Coprecipitation	7110 C	7110 C	
Radium 226	Radon emanation	7500-Ra C	7500-Ra C	D3454-05
	Radiochemical	7500-Ra B	7500-Ra B	D2460-07
Radium 228	Radiochemical	7500-Ra D	7500-Ra D	
Uranium	Radiochemical	7500-U B	7500-U B	
	ICP-MS	3125		D5673-05, 10
	Alpha spectrometry	7500-U C	7500-U C	D3972-09
	Laser Phosphorimetry			D5174-07
	Alpha Liquid Scintillation Spectrometry			D6239-09
Man-Made:				
Radioactive Cesium	Radiochemical	7500-Cs B	7500-Cs B	
	Gamma Ray Spectrometry	7120	7120	D3649-06
Radioactive Iodine	Radiochemical	7500-I B 7500-I C 7500-I D	7500-I B 7500-I C 7500-I D	D3649-06
	Gamma Ray Spectrometry	7120	7120	D4785-08
Radioactive Strontium 89, 90	Radiochemical	7500-Sr B	7500-Sr B	
Tritium	Liquid Scintillation	7500-^{3}H B	7500-^{3}H B	D4107-08
Gamma Emitters	Gamma Ray Spectrometry	7120 7500-Cs B 7500-I B	7120 7500-Cs B 7500-I B	D3649-06 D4785-08

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)				
Organism	**Methodology**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**Other**
Total Coliform	Total Coliform Fermentation Technique	9221 A, B, C	9221 A, B, C	
	Total Coliform Membrane Filter Technique	9222 A, B, C		
	ONPG-MUG Test	9223	9223 B	
Fecal Coliforms	Fecal Coliform Procedure	9221 E	9221 E	
	Fecal Coliform Filter Procedure	9222 D	9222 D	
Heterotrophic bacteria	Pour Plate Method	9215 B	9215 B	
Turbidity	Nephelometric Method	2130 B	2130 B	
	Laser Nephelometry (on-line)			Mitchell M5271 [10]
	LED Nephelometry (on-line)			Mitchell M5331 [11]
	LED Nephelometry (on-line)			AMI Turbiwell [15]
	LED Nephelometry (portable)			Orion AQ4500 [12]

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.74(a)(2)					
Residual	**Methodology**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**ASTM [4]**	**Other**
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H		
	On-line Chlorine Analyzer				EPA 334.0 [16]

	Amperometric Sensor				ChloroSense [17]
Total Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08	
	Amperometric Titration (Low level measurement)	4500-Cl E	4500-Cl E		
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		
	Iodometric Electrode	4500-Cl I	4500-Cl I		
	On-line Chlorine Analyzer				EPA 334.0 [16]
	Amperometric Sensor				ChloroSense [17]
Chlorine Dioxide	Amperometric Titration	4500–ClO_2 C	4500–ClO_2 C		
	Amperometric Titration	4500–ClO_2 E	4500–ClO_2 E		
Ozone	Indigo Method	4500–O_3 B	4500–O_3 B		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1)					
Contaminant	**Methodology**	**EPA Method**	**ASTM [4]**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**
TTHM	P&T/GC/MS	524.3 [9], 524.4 [29]			
HAA5	LLE (diazomethane)/GC/ECD			6251 B	6251 B
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 [14]			
Bromate	Two-Dimensional Ion Chromatography (IC)	302.0 [18]			
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 [14]			

	Chemically Suppressed Ion Chromatography		D 6581-08 A		
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B		
Chlorite	Chemically Suppressed Ion Chromatography		D 6581-08 A		
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B		
Chlorite – daily monitoring as prescribed in 40 CFR 141.132(b)(2)(i)(A)	Amperometric Titration			4500–ClO_2 E	4500–ClO_2 E

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1)					
Residual	**Methodology**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**ASTM [4]**	**Other**
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H		
	Amperometric Sensor				ChloroSense [17]
	On-line Chlorine Analyzer				EPA 334.0 [16]
Combined Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		
Total Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08	
	Low level Amperometric Titration	4500-Cl E	4500-Cl E		

	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		
	Iodometric Electrode	4500-Cl I	4500-Cl I		
	Amperometric Sensor				ChloroSense [17]
	On-line Chlorine Analyzer				EPA 334.0 [16]
Chlorine Dioxide	Amperometric Method II	4500–ClO_2 E	4500–ClO_2 E		

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ALTERNATIVE TESTING METHODS FOR PARAMETERS LISTED AT 40 CFR 141.131(d)				
Parameter	**Methodology**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**EPA**
Total Organic Carbon (TOC)	High Temperature Combustion	5310 B	5310 B	415.3, Rev 1.2 [19]
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	5310 C	415.3, Rev 1.2 [19]
	Wet Oxidation	5310 D	5310 D	415.3, Rev 1.2 [19]
Specific Ultraviolet Absorbance (SUVA)	Calculation using DOC and UV_{254} data			415.3, Rev 1.2 [19]
Dissolved Organic Carbon (DOC)	High Temperature Combustion	5310 B	5310 B	415.3, Rev 1.2 [19]
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	5310 C	415.3, Rev 1.2 [19]
	Wet Oxidation	5310 D	5310 D	415.3, Rev 1.2 [19]
Ultraviolet absorption at 254 nm (UV_{254})	Spectrophotometry	5910 B	5910 B	415.3, Rev 1.2 [19]

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ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)						
Organism	**Methodology**	**SM 20th Edition [6]**	**SM 21st Edition[1]**	**SM 22nd Edition [28]**	**SM Online [3]**	**Other**
E. coli	Colilert®		9223 B	9223 B	9223 B-97	
	Colisure®		9223 B	9223 B	9223 B-97	
	Colilert-18	9223 B	9223 B	9223 B	9223 B-97	
	Readycult®					Readycult® [20]
	Colitag					Modified Colitag™ [13]
	Chromocult®					Chromocult® [21]
	EC-MUG			9221 F		
Enterococci	Multiple-Tube Technique				9230 B-04	
Coliphage	Two-Step Enrichment Presence-Absence Procedure					Fast Phage [30]

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ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)			
Organism	**Methodology Category**	**Method**	**SM 22nd Edition [28]**
Total Coliforms	Lactose Fermentation Methods	Standard Total Coliform Fermentation Technique	9221 B.1, B.2
	Enzyme Substrate Methods	Colilert®	9223 B
		Colisure®	9223 B

Escherichia coli	*Escherichia coli* Procedure (following Lactose Fermentation Methods)	EC-MUG medium	9221 F.1
	Enzyme Substrate Methods	Colilert®	9223 B
		Colisure®	9223 B

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)						
Contaminant	**Methodology**	**EPA Method**	**ASTM [4]**	**SM 21st Edition [1]**	**SM 22nd Edition [28]**	**SM Online [3]**
Aluminum	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 D	3111 D	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04
	Inductively Coupled Plasma			3120 B	3120 B	
Chloride	Silver Nitrate Titration		D 512-04 B	4500-Cl^- B	4500-Cl^- B	
	Ion Chromatography			4110 B	4110 B	
	Potentiometric Titration			4500-Cl^- D	4500-Cl^- D	
Color	Visual Comparison			2120 B	2120 B	
Foaming Agents	Methylene Blue Active Substances (MBAS)			5540 C	5540 C	
Iron	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 B	3111 B	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04
	Inductively Coupled Plasma			3120 B	3120 B	

Manganese	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 B	3111 B	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04
	Inductively Coupled Plasma			3120 B	3120 B	
Odor	Threshold Odor Test			2150 B	2150 B	
Silver	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 B	3111 B	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04
	Inductively Coupled Plasma			3120 B	3120 B	
Sulfate	Ion Chromatography			4110 B	4110 B	
	Gravimetric with ignition of residue			4500-SO_4^{2-} C	4500-SO_4^{2-} C	4500-SO_4^{2-} C-97
	Gravimetric with drying of residue			4500-SO_4^{2-} D	4500-SO_4^{2-} D	4500-SO_4^{2-} D-97
	Turbidimetric method		D 516-07, 11	4500-SO_4^{2-} E	4500-SO_4^{2-} E	4500-SO_4^{2-} E-97
	Automated methylthymol blue method			4500-SO_4^{2-} F	4500-SO_4^{2-} F	4500-SO_4^{2-} F-97
Total Dissolved Solids	Total Dissolved Solids Dried at 180 deg C			2540 C	2540 C	
Zinc	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				

	Atomic Absorption; Direct Aspiration			3111 B	3111 B	
	Inductively Coupled Plasma			3120 B	3120 B	

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[4] Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://astm.org. The methods listed are the only alternative versions that may be used.

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[16] EPA Method 334.0. "Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer," September 2009. EPA 815-B-09-013. Available at http://water.epa.gov/drink/.

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