6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 141

[EPA-HQ-OW-2018-0558; FRL-9985-19-OW]

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: The Environmental Protection Agency (EPA) is announcing the Agency'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 authorizes the EPA to approve the use of alternative testing methods through publication in the *Federal Register*. The EPA is using this authority to make 100 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].

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA-HQ-OW-2018-0558. All documents in the docket are listed on the https://www.regulations.gov/ website. Although listed in the index, some information is not publicly available, e.g., confidential business information (CBI) or other information whose disclosure is restricted by

statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through https://www.regulations.gov/.

FOR FURTHER INFORMATION CONTACT: 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, Ohio 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. The EPA Regions as well as states and tribal governments with authority to administer the regulatory program for public water systems under the Safe Drinking Water Act (SDWA) may also measure contaminants in water samples. When the 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. The 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 testing method that has been approved in this action or in prior expedited approval actions. Categories and entities that may ultimately be interested in this expedited methods approval action include:

Category	Examples of potentially regulated entities	NAICS[1]
State, local, & tribal governments	State, local, and tribal governments that analyze water samples on behalf of public water systems required to conduct such analysis; state, local, and tribal governments that directly 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 intended to be exhaustive, but rather provides the EPA's guide for readers regarding entities likely to be interested in this action. Other types of entities not listed in the table may also have some interest. To determine whether this action may concern your facility, you should carefully examine the applicability language in the *Code of Federal Regulations* (CFR) at 40 CFR 141.2 (definition of a 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.

Abbreviations and Acronyms Used in this Action

APHA: American Public Health Association

ATP: Alternate Test Procedure

CBI: Confidential Business Information

CFR: *Code of Federal Regulations*

EPA: U.S. Environmental Protection Agency

NAICS: North American Industry Classification System

QC: Quality Control

QCS: Quality Control Sample

SDWA: The Safe Drinking Water Act

SM: Standard Method

VCSB: Voluntary Consensus Standard Bodies

II. Background

A. What is the Purpose of this Action?

In this action, the EPA is approving 100 analytical methods for determining contaminant concentrations in drinking water samples collected under the SDWA. Regulated entities required to sample and monitor may use either the testing methods already established in existing national primary drinking water regulations or the alternative testing methods being approved under this action or in prior expedited approval actions. The new methods are listed along with other methods similarly approved through previous expedited actions in 40 CFR part 141, Appendix A to subpart C and on the EPA's drinking water methods website at https://www.epa.gov/dwanalyticalmethods.

B. What is the Basis for this Action?

When the 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), the SDWA allows the EPA to approve the use of the alternative testing method through publication in the *Federal Register* (see section 1401(1) of the SDWA). The EPA is using this approval authority to make 100 additional methods available for determining contaminant concentrations in drinking water samples collected under the SDWA. The EPA has determined that, for each contaminant or group of contaminants listed in Section III of this action, the additional testing methods being approved are as effective as one or more of the testing methods already approved in the regulations for those contaminants. Section 1401(1) of the 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 100 analytical methods legally available as options for meeting the EPA's monitoring requirements.

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

III. Summary of Approvals

The EPA is approving 100 methods that are equally effective relative to methods previously promulgated in the regulations. This action adds these 100 methods to Appendix A to subpart C of 40 CFR part 141.

A. Methods developed by the EPA

1. EPA Method 900.0, Revision 1.0, Determination of Gross Alpha and Gross Beta in Drinking Water (USEPA 2018). EPA Method 900.0 (USEPA 1980) was promulgated in the drinking water regulations at 40 CFR 141.25(a) as a screening method for alpha- and beta-emitting radionuclides. EPA Method 900.0, Revision 1.0 was developed in response to comments from radiochemistry stakeholders indicating that the older, approved method does not address newer instrumental capabilities such as simultaneous alpha/beta counting and the concomitant need to properly address crosstalk. Moreover, stakeholders requested that a method revision provide more in-depth calibration details and quality control criteria to assure a more robust procedure capable of yielding improved consistency in generating and evaluating analytical results. EPA Method 900.0, Revision 1.0 addresses those concerns and also corrects

specific disparities between requirements in the promulgated Method 900.0 and the criteria defined in the regulations. For example, the approved Method 900.0 defines americium-241 as the gross alpha calibrant. However, americium-241 is not approved in the regulations at 40 CFR 141.25(a); footnote 11 to the table at 40 CFR 141.25(a) states that only natural uranium and thorium-230 are approved calibration standards for gross alpha evaporative methods (i.e., Method 900.0). Americium-241 is only approved as an alpha calibrant for co-precipitation methods.

The revised method also addresses the important issue of the time interval involved between sample preparation and counting. Timing events can have a significant impact on gross alpha results. The gross alpha maximum contaminant level specified at 40 CFR 141.66(c) is 15 pCi/L and excludes radon and uranium activity. The promulgated method specifies a minimum 72-hour hold time after preparation before counting the samples. Such a delay can allow radon ingrowth along with its alpha-emitting progeny. The revised method eliminates the hold time in order to more accurately meet the intent of the gross alpha maximum contaminant level specification.

The EPA has determined that EPA Method 900.0, Revision 1.0 is equally as effective for determining gross alpha and gross beta radioactivity as the promulgated method. The basis for this determination is discussed in greater detail in Smith 2018a. Therefore, the EPA is approving EPA Method 900.0, Revision 1.0 for the routine determination of gross alpha and gross beta radioactivity in drinking water. EPA Method 900.0 Rev 1.0 is available at the National Service Center for Environmental Publications.

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

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

The 23rd edition of Standard Methods for the Examination of Water and Wastewater (APHA 2017) was published in July 2017. The EPA compared 89 methods in the 23rd edition to earlier versions of those methods that are promulgated in 40 CFR parts 141 and 143. Changes between the promulgated version and the version of each method published in the 23rd edition are summarized in Smith and Wendelken (2018) and Best (2018). The revisions primarily involve editorial changes (e.g., correction of errors, procedural clarifications, and reorganization of text). Errors in the nitrate methods (4500-NO_3^- D, E, and F) have been addressed in an appropriate errata sheet prepared for the 23rd edition (APHL 2018). The methods in the following table are the same as the earlier approved versions with respect to the sample handling protocols, analytical procedures, and method performance data. For these reasons, the EPA has concluded that the versions in the 23rd edition are equally effective relative to the promulgated versions in the regulations. Therefore, the EPA is approving the use of 89 Standard Methods in the 23rd edition for the contaminants and their respective regulations listed in the following table:

Standard Methods, 23rd Edition (APHA 2017)	Approved Method	Contaminant	Regulation Citations
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,	40 CFR 141.23(k)(1); 40 CFR 143.4(b)

		sodium, iron, manganese, silver, zinc	
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, nickel, silica, aluminum, iron, manganese, silver, zinc	40 CFR 141.23(k)(1); 40 CFR 143.4(b)
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^- C,E,F,G	4500-CN^-, 20th Edition (APHA 1998)	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 C,D,E	4500-SiO_2 C,D,E-97, online versions (APHA 1997k)	Silica	40 CFR 141.23(k)(1)
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	5310 B,C-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 (USEPA 2001)	Carbofuran, oxamyl	40 CFR 141.24(e)(1)
6640 B	EPA Method 515.4, Rev. 1.0 (USEPA 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 gross 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	40 CFR 141.25(a)

		cesium and iodine)	
7500-Cs B	7500-Cs B-00, online version (APHA 2000l)	Radioactive Cesium and 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 and 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-Ra E	GA Method (2004)	Radium-226 and Radium-228	40 CFR 141.25(a)
7500-Sr B	7500-Sr B-01, online version (APHA 2001d)	Strontium-89 and 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,C	9221 A,C, 20th Edition, (APHA 1998)	Total coliforms	40 CFR 141.74(a)(1)
9221 B	9221 B, 20th Edition, (APHA 1998)	Total coliforms	40 CFR 141.74(a)(1) 40 CFR 141.852(a)(5) [B.1, B.2, B.3, B.4]
9221 D	9221 D, 20th Edition, (APHA 1998)	Total coliforms	40 CFR 141.852(a)(5) [D.1, D.2, D.3]
9221 E	9221 E, 20th Edition, (APHA 1998)	Fecal coliforms	40 CFR 141.74(a)(1)
9221 F	9221 F, 20th Edition, (APHA 1998)	E. coli	40 CFR 141.402(c)(2) 40 CFR 141.852(a)(5) [F.1]
9222 A	9222 A 20th Edition, (APHA 1998)	Total coliforms	40 CFR 141.74(a)(1)
9222 B,C	9222 B,C, 20th Edition, (APHA 1998)	Total coliforms	40 CFR 141.74(a)(1) 40 CFR 141.852(a)(5)
9222 D	9222 D, 20th Edition, (APHA 1998)	Fecal coliforms	40 CFR 141.74(a)(1)
9222 H	9222 G, 20th Edition, (APHA 1998)	E. coli	40 CFR 141.852(a)(5)
9222 I	9222 G, 20th Edition, (APHA 1998)	E. coli	40 CFR 141.402(c)(2) 40 CFR 141.852(a)(5)
9222 J	m-ColiBlue24 Test (Hach Company 1999)	Total coliforms	40 CFR 141.852(a)(5)
9222 J	m-ColiBlue24 Test (Hach Company 1999)	E. coli	40 CFR 141.402(c)(2) 40 CFR 141.852(a)(5)
9223 B	9223 B, 20th Edition	Total coliforms	40 CFR 141.74(a)(1);

	(APHA 1998)		40 CFR 141.852(a)(5)
9223 B	9223 B, 20th Edition (APHA 1998)	E. coli	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)
9230 C	9230 C, 20th Edition (APHA 1998)	Enterococci	40 CFR 141.402(c)(2)
	(Budnick 1996)	Enterococci	40 CFR 141.402(c)(2)

Two additional methods from earlier editions of Standard Methods for the Examination of Water and Wastewater are being approved under this action: Standard Method 4500-CN^- C in the 21st edition (APHA 2005) and Standard Method 4500-CN^- C in the 22nd edition (APHA 2012). Also, the identical online version, Standard Method 4500-CN^- C-99 (APHA 1999d) is being approved. The originally approved method, Standard Method 4500-CN^- C in the 20th edition (APHA 1998) specified addition of magnesium chloride in the distillation. Beginning with the 1999 online method, and in the subsequent 21st and 22nd editions, Standard Methods made the addition of magnesium chloride optional, without providing supporting data to verify that distillation efficiency was not adversely affected when magnesium chloride was not used. As a result, the EPA did not approve Standard Method 4500-CN^- C in the 1999 online method and subsequent editions of Standard Methods for the Examination of Water and Wastewater. The distillation performed in Standard Method 4500-CN^- C is required prior to conducting the analyses for all of the other approved cyanide methods. As a result, laboratories conducting cyanide analyses for drinking water compliance have had to rely on the approved version in the 20th edition. That may result in confusion because laboratories that also conduct cyanide analyses for wastewaters use the more recently published Standard Methods. In order to address this issue, the EPA is approving Standard Method 4500-CN^- C in the editions and online version as stated above, but with the requirement to add magnesium chloride in the distillation. The cyanide entry in

Appendix A to subpart C of part 141 has been revised to clarify this requirement.

The 23rd edition can be obtained from the American Public Health Association (APHA), 800 I Street, NW, Washington, DC 20001-3710. Approved online versions are available at http://www.standardmethods.org.

2. ASTM International. The EPA compared the most recent versions of five ASTM International methods to the earlier versions of those methods that are promulgated in 40 CFR part 141. Most of the changes in the updated versions include additional quality control specifications.

Changes between the earlier approved version and the most recent version of each method are described more fully in Smith (2018b). Besides additional quality control, the revisions involve (primarily) editorial changes (e.g., updated references, definitions, terminology, procedural clarifications, and reorganization of text). The revised methods are the same as the promulgated versions with respect to sample collection and handling protocols, sample preparation, analytical methodology, and method performance data; thus, the EPA finds that they are equally effective relative to the promulgated methods.

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

ASTM Revised Version	Approved Method	Contaminant	Regulation Citations
D 516-16 (ASTM 2016a)	D 516-02 (ASTM 2002a)	Sulfate	40 CFR 143.4(b)
D 859-16 (ASTM 2016b)	D 859-00 (ASTM 2000)	Silica	40 CFR 141.23(k)(1)
D 1067-16 B (ASTM 2016c)	D 1067-02 B (ASTM 2002b)	Alkalinity	40 CFR 141.23(k)(1)
D 1179-16 B (ASTM 2016d)	D 1179-99 B (ASTM 1999)	Fluoride	40 CFR 141.23(k)(1)
D 5673-16 (ASTM 2016e)	D 5673-03 (ASTM 2003)	Uranium	40 CFR 141.25(a)

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. Hach Method 10258, Rev. 2.0. *Determination of Turbidity by 360^{o} Nephelometry*, March 2018 (Hach Company 2018a). In July 2016, Hach Method 10258, Rev. 1.0 (Hach Company 2016) was approved in an expedited methods approval action (USEPA 2016) as an equally effective alternate method to the Hach FilterTrak Method 10133 (Hach Company 2000), which is approved at 40 CFR 141.74(a)(1), for determination of turbidity in drinking water.

Turbidimeter calibration and calibration verification have remained unchanged since promulgation of turbidity methods in 40 CFR 141.74(a)(1). Calibration and quarterly calibration validation through analysis of a Quality Control Sample (QCS) require preparation of a primary calibration standard. Sealed standards are considered as secondary calibration standards and used only as calibration verification checks between the quarterly calibration validation QCS evaluations.

Public water systems utilize multiple turbidimeters and many of the units are in line with process streams. The time and cost associated with preparing quarterly primary calibration standards can be significant. In 2016, Hach Company began to manufacture glass flame-sealed vials prefilled with StablCal™, which is an approved primary calibration standard. From December 2016 through March 2018, Hach conducted a long-term stability study with a set of sealed vials containing StablCal to determine whether the integrity of the vials and stability of the primary calibration standard could be maintained. After 515 days (1.4 years), the sealed StablCal primary calibration standards exhibited a %bias of < 0.1% and relative standard deviation of 0.7% compared to the initial certified turbidity values, indicating that no degradation

of the StablCal primary calibration standard occurred. The results of this study are discussed further in the validation report (Hach Company 2018b).

Hach Method 10258, Rev. 2.0 is an updated version of the promulgated Hach Method 10258, Rev. 1.0. The updated method provides for use of glass flame-sealed vials prefilled with StablCal as primary calibration standards, secondary calibration verification standards, and QCS checks. The EPA has determined that Hach Method 10258, Rev. 2.0 is equally as effective as the promulgated Hach Method 10258, Rev. 1.0. The basis for this determination is discussed in Adams and Smith (2018). Therefore, the EPA is approving Hach Method 10258, Rev. 2.0 for the determination of turbidity in drinking water. Hach Method 10258, Rev. 2.0 can be obtained from Hach Company, 5600 Lindbergh Drive, P.O. Box 389, Loveland, Colorado 80539.

2. Hach Method 8195, Rev. 3.0. *Determination of Turbidity by Nephelometry*, March 2018 (Hach Company 2018c). On April 20, 1998, the EPA Office of Water issued a letter (USEPA 1998) addressing the use of Hach Method 8195 (Hach Company 1997) as an alternate method to EPA Method 180.1 (USEPA 1993) for drinking water compliance monitoring of turbidity. Hach Method 8195 established the same requirements for primary calibration standards, secondary calibration verification standards, and QCS checks as described for Hach Method 10258, Rev. 1.0 in Section III.C.1 of this action. Hach Method 8195, Rev. 3.0 is an updated version of the 1997 Hach Method 8195. The updated method provides for use of glass flame-sealed vials prefilled with StablCal as primary calibration standards, secondary calibration verification standards, and QCS checks. The EPA has determined that Hach Method 8195, Rev. 3.0 is equally as effective as the 1997 Hach Method 8195 and EPA Method 180.1. The basis for this determination is discussed in Adams and Smith (2018). Therefore, the EPA is approving Hach Method 8195, Rev. 3.0 for the determination of turbidity in drinking water. Hach Method

8195, Rev. 3.0 can be obtained from Hach Company, 5600 Lindbergh Drive, P.O. Box 389, Loveland, Colorado 80539.

IV. Statutory and Executive Order Reviews

As noted in Section II of this action, under the terms of the 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 the SDWA, the EPA has concluded that other statutes and executive orders generally applicable to rulemaking do not apply to this approval action.

V. References

Adams and Smith. 2018. Memo to the record describing basis for expedited approval of Hach Company Methods 10258, Rev. 2.0 and 8195, Rev. 3.0. July 29, 2018. (Available at http://www.regulations.gov; docket ID No. EPA-HQ-OW-2018-0558.)

American Public Health Association (APHA). 1994. Standard Method 6251 B-94. Disinfection By-Products: Haloacetic Acids and Trichlorophenol. B. Micro Liquid-Liquid Extraction Gas Chromatographic Method. Approved by Standard Methods Committee 1994. Standard Methods Online (Available at http//www.standardmethods.org)

American Public Health Associate (APHA). 1995. 19th 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). 1997a. Standard Method 2150 B-97. Odor. B. Threshold Odor Test. Approved by Standard Methods Committee 1997. Standard Methods Online (Available at http//www.standardmethods.org)

American Public Health Association (APHA). 1997b. Standard Method 2320 B-97. Alkalinity. B. Titration Method. Approved by Standard Methods Committee 1997. Standard Methods Online (Available at http//www.standardmethods.org)

American Public Health Association (APHA). 1997c. Standard Method 2510 B-97. Conductivity. B. Laboratory Method. Approved by Standard Methods Committee 1997. Standard Methods Online (Available at http//www.standardmethods.org)

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

American Public Health Association (APHA). 1997e. Standard Method 3114 B-97. Arsenic and Selenium by Hydride Generation/Atomic Emission Spectrometry. B. Manual Hydride Generation/Atomic Absorption Spectrometric Method. Approved by Standard Methods Committee 1997. Standard Methods Online (Available at http//www.standardmethods.org)

American Public Health Association (APHA). 1997f. Standard Method 3500-Ca B-97. Calcium. B. EDTA Titrimetric Method. Approved by Standard Methods Committee 1997. 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, Reporting and recordkeeping requirements, Water supply.

Dated: September 28, 2018.

Peter Grevatt,
Director, Office of Ground Water and Drinking Water.

For the reasons stated in the preamble, the Environmental Protection Agency amends 40 CFR part 141 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. Amend Appendix A to Subpart C of Part 141 as follows:

a. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1)."

b. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24(e)(1)."

c. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.25(a)."

d. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)."

e. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.74(a)(2)."

f. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1)."

g. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1)."

h. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR PARAMETERS LISTED AT 40 CFR 141.131(d)."

i. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)."

j. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)."

k. Revise the table entitled "ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)."

l. Revise footnotes 9, 14, 16, 18, 22-23, 25-26, 29, 31, 34-39, and 48.

m. Add footnotes 49-52.

The revisions and additions 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 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
Alkalinity	Titrimetric		2320 B	2320 B	2320 B		D1067-06 B, 11 B, 16 B	
Antimony	Hydride – Atomic Absorption						D 3697-07, -12	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Arsenic	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 2972-08 C, -15 C	
	Hydride Atomic Absorption		3114 B	3114 B	3114 B	3114 B-09	D 2972-08 B, -15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Barium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Direct		3111 D	3111 D	3111 D			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed	200.5,						

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
	inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	Revision 4.2 [2]						
Beryllium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 3645-08 B, -15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Cadmium	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Calcium	EDTA titrimetric		3500-Ca B	3500-Ca B	3500-Ca B		D 511-09, -14 A	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B		D 511-09, -14 B	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Axially viewed inductively coupled	200.5, Revision						

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
	plasma-atomic emission spectrometry (AVICP–AES)	4.2 [2]						
	Ion Chromatography						D 6919-09	
Chromium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Copper	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 1688-07, -12 C	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B		D 1688-07, -12 A	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
	Colorimetry							Hach Method 8026 [35] Hach Method 10272 [36]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
Conductivity	Conductance		2510 B	2510 B	2510 B		D 1125-14 A	
Cyanide	Manual Distillation with $MgCl_2$ followed by:		4500-CN^- C	4500-CN^- C	4500-CN^- C	4500-CN^- C-99	D 2036-06 A	
	Spectrophotometric, Amenable		4500-CN^- G	4500-CN^- G	4500-CN^- G		D 2036-06 B	
	Spectrophotometric Manual		4500-CN^- E	4500-CN^- E	4500-CN^- E		D2036-06 A	
	Selective Electrode		4500-CN^- F	4500-CN^- F	4500-CN^- F			
	Gas Chromatography/ Mass Spectrometry Headspace							ME355.01 [7]
Fluoride	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Manual Distillation; Colorimetric SPADNS		4500-F^- B, D	4500-F^- B, D	4500-F^- B, D			
	Manual Electrode		4500-F^- C	4500-F^- C	4500-F^- C		D 1179-04, 10 B, 16 B	
	Automated Alizarin		4500-F^- E	4500-F^- E	4500-F^- E			
	Arsenite-Free Colorimetric SPADNS							Hach SPADNS 2 Method 10225 [22]
Lead	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 3559-08 D, 15 D	
	Axially viewed inductively coupled plasma-atomic emission	200.5, Revision 4.2 [2]						

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
	spectrometry (AVICP–AES)							
Magnesium	Atomic Absorption		3111 B	3111 B	3111 B		D 511-09, -14 B	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Complexation Titrimetric Methods		3500-Mg B	3500-Mg B	3500-Mg B		D 511-09, -14 A	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
	Ion Chromatography						D 6919-09	
Mercury	Manual, Cold Vapor		3112 B	3112 B	3112 B	3112 B-09	D 3223-12	
Nickel	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Direct		3111 B	3111 B	3111 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Nitrate	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
	Automated Cadmium Reduction		4500-NO_3^- F	4500-NO_3^- F	4500-NO_3^- F			
	Manual Cadmium Reduction		4500-NO_3^- E	4500-NO_3^- E	4500-NO_3^- E			
	Ion Selective Electrode		4500-NO_3^- D	4500-NO_3^- D	4500-NO_3^- D			
	Reduction/Colorimetric							Systea Easy (1-Reagent) [8] NECi Nitrate-Reductase [40]
	Colorimetric; Direct							Hach TNTplus™ 835/836 Method 10206 [23]
	Capillary Ion Electrophoresis						D 6508-15	
Nitrite	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Automated Cadmium Reduction		4500-NO_3^- F	4500-NO_3^- F	4500-NO_3^- F			
	Manual Cadmium Reduction		4500-NO_3^- E	4500-NO_3^- E	4500-NO_3^- E			
	Spectrophotometric		4500-NO_2^- B	4500-NO_2^- B	4500-NO_2^- B			
	Reduction/Colorimetric							Systea Easy (1-Reagent) [8] NECi Nitrate-

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
								Reductase [40]
	Capillary Ion Electrophoresis						D 6508-15	
Ortho-phosphate	Ion Chromatography		4110 B	4110 B	4110 B		D 4327-11	
	Colorimetric, ascorbic acid, single reagent		4500-P E	4500-P E	4500-P E	4500-P E-99		
	Colorimetric, Automated, Ascorbic Acid		4500-P F	4500-P F	4500-P F	4500-P F-99		Thermo Fisher Discrete Analyzer [41]
	Capillary Ion Electrophoresis						D 6508-15	
pH	Electrometric	150.3 [48]	4500-H^+ B	4500-H^+ B	4500-H^+ B		D 1293-12	
Selenium	Hydride-Atomic Absorption		3114 B	3114 B	3114 B	3114 B-09	D 3859-08 A, -15 A	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10	D 3859-08 B, -15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
Silica	Colorimetric						D859-05, 10, 16	
	Molybdosilicate		4500-SiO_2 C	4500-SiO_2 C	4500-SiO_2 C			
	Heteropoly blue		4500-	4500-	4500-			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23 (k)(1)								
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	ASTM [4]	Other
			SiO_2 D	SiO_2 D	SiO_2 D			
	Automated for Molybdate-reactive Silica		4500-SiO_2 E	4500-SiO_2 E	4500-SiO_2 E			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
Sodium	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]						
	Ion Chromatography						D 6919-09	
Temperature	Thermometric		2550	2550	2550	2550-10		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24 (e)(1)					
Contaminant	Methodology	EPA Method	SM 21st Edition[1]	SM 22nd Edition [28], SM 23rd Edition [49]	SM Online [3]
Benzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			

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 23rd Edition [49]	SM Online [3]
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]			

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 23rd Edition [49]	SM Online [3]
Toluene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,2,4-Trichlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,1-Dichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
1,1,2-Trichlorethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Vinyl chloride	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
Xylenes (total)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			
2,4-D	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06
2,4,5-TP (Silvex)	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06
Alachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Atrazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)	536 [25]			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24], 523 [26]			
Benzo(a)pyrene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			

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 23rd Edition [49]	SM Online [3]
Carbofuran	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B	6610 B-04
Chlordane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Dalapon	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 [14]			
	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06
Di(2-ethylhexyl)adipate	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Di(2-ethylhexyl)phthalate	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Dibromochloropropane (DBCP)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9]			
Dinoseb	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06
Endrin	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Ethyl dibromide (EDB)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9]			

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 23rd Edition [49]	SM Online [3]
Glyphosate	High-Performance Liquid Chromatography (HPLC) with Post-Column Derivatization and Fluorescence Detection		6651 B	6651 B	6651 B-00, B-05
Heptachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Heptachlor Epoxide	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Hexachlorobenzene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
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

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 23rd Edition [49]	SM Online [3]
PCBs (as Aroclors)	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Pentachlorophenol	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Picloram	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B-01, B-06
Simazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)	536 [25]			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24], 523 [26]			
Toxaphene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3 [24]			
Total Trihalomethanes	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3 [9], 524.4 [29]			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.25(a)						
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	ASTM [4]	SM Online [3]
Naturally Occurring:						
Gross alpha and beta	Evaporation	900.0, Rev. 1.0 [50]	7110 B	7110 B		
	Liquid Scintillation				D 7283-17	7110 D-17
Gross alpha	Coprecipitation		7110 C	7110 C		
Radium 226	Radon emanation		7500-Ra C	7500-Ra C	D 3454-05	
	Radiochemical		7500-Ra B	7500-Ra B	D 2460-07	
	Gamma Spectrometry			7500-Ra E		7500-Ra E-07
Radium 228	Radiochemical		7500-Ra D	7500-Ra D		
	Gamma Spectrometry			7500-Ra E		7500-Ra E-07
Uranium	Radiochemical		7500-U B	7500-U B		
	ICP-MS		3125		D 5673-05, 10, 16	
	Alpha spectrometry		7500-U C	7500-U C	D 3972-09	
	Laser Phosphorimetry				D 5174-07	
	Alpha Liquid Scintillation Spectrometry				D 6239-09	
Man-Made:						
Radioactive Cesium	Radiochemical		7500-Cs B	7500-Cs B		
	Gamma Ray Spectrometry		7120	7120	D 3649-06	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.25(a)						
Contaminant	Methodology	EPA Method	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	ASTM [4]	SM Online [3]
Radioactive Iodine	Radiochemical		7500-I B 7500-I C 7500-I D	7500-I B 7500-I C 7500-I D	D 3649-06	
	Gamma Ray Spectrometry		7120	7120	D 4785-08	
Radioactive Strontium 89, 90	Radiochemical		7500-Sr B	7500-Sr B		
Tritium	Liquid Scintillation		7500-^{3}H B	7500-^{3}H B	D 4107-08	
Gamma Emitters	Gamma Ray Spectrometry		7120 7500-Cs B 7500-I B	7120 7500-Cs B 7500-I B	D 3649-06 D 4785-08	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)						
ORGANISM	METHODOLOGY	SM 21st EDITION [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	Other
Total Coliform	Total Coliform Fermentation Technique	9221 A, B, C	9221 A, B, C	9221 A, B, C	9221 A,B,C-06	
	Total Coliform Membrane Filter Technique	9222 A, B, C		9222 A, B, C		
	ONPG-MUG Test	9223	9223 B	9223 B	9223 B-04	
Fecal Coliforms	Fecal Coliform Procedure	9221 E	9221 E	9221 E	9221 E-06	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)						
ORGANISM	METHODOLOGY	SM 21st EDITION [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	Other
	Fecal Coliform Filter Procedure	9222 D	9222 D	9222 D	9222 D-06	
Heterotrophic bacteria	Pour Plate Method	9215 B	9215 B	9215 B	9215 B-04	
Turbidity	Nephelometric Method	2130 B	2130 B	2130 B		Hach Method 8195, Rev. 3.0 [52]
	Laser Nephelometry (on-line)					Mitchell M5271 [10] Mitchell M5331, Rev. 1.2 [42] Lovibond PTV 6000 [46]
	LED Nephelometry (on-line)					Mitchell M5331 [11] Mitchell M5331, Rev. 1.2 [42] Lovibond PTV 2000 [45]
	LED Nephelometry (on-line)					AMI Turbiwell [15] Lovibond PTV 1000 [44]
	LED Nephelometry (portable)					Orion AQ4500 [12]
	360° Nephelometry					Hach Method 10258 Rev. 1.0 [39], Hach Method 10258, Rev. 2.0 [51]

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.74(a)(2)					
Residual	Methodology	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	ASTM [4]	Other
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08, -14	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260 [31]
	Indophenol Colorimetric				Hach Method 10241 [34]
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H		
	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, -14	
	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		Hach Method 10260 [31]
	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		
	Amperometric Sensor				ChlordioX Plus [32]
Ozone	Indigo Method	4500–O_3 B	4500–O_3 B		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1)							
Contaminant	Methodology	EPA Method	ASTM [4]	SM Online [3]	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	Other
TTHM	P&T/GC/MS	524.3 [9], 524.4 [29]					
HAA5	LLE (diazomethane)/GC/ECD			6251 B-07	6251 B	6251 B	
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 [14]					
	Two-Dimensional Ion Chromatography (IC) with Suppressed Conductivity Detection						Thermo Fisher 557.1 [47]
Bromate	Two-Dimensional Ion Chromatography (IC)	302.0 [18]					
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 [14]					
	Chemically Suppressed Ion Chromatography		D 6581-08 A				
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B				
Chlorite	Chemically Suppressed Ion Chromatography		D 6581-08 A				
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B				

Chlorite – daily monitoring as prescribed in 40 CFR 141.132(b)(2)(i)(A)	Amperometric Titration				4500–ClO_2 E	4500–ClO_2 E	
	Amperometric Sensor						ChlordioX Plus[32]

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1)					
Residual	Methodology	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	ASTM [4]	Other
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08, -14	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260[31]
	Indophenol Colorimetric				Hach Method 10241[34]
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H		
	Amperometric Sensor				ChloroSense [17]
	On-line Chlorine Analyzer				EPA 334.0 [16]
Combined Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08, -14	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260[31]
Total Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D	D 1253-08, -14	

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1)					
Residual	Methodology	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	ASTM [4]	Other
	Low level Amperometric Titration	4500-Cl E	4500-Cl E		
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F		
	DPD Colorimetric	4500-Cl G	4500-Cl G		Hach Method 10260[31]
	Iodometric Electrode	4500-Cl I	4500-Cl I		
	Amperometric Sensor				ChloroSense [17]
	On-line Chlorine Analyzer				EPA 334.0 [16]
Chlorine Dioxide	Amperometric Method II	4500–ClO_2 E	4500–ClO_2 E		
	Amperometric Sensor				ChlordioX Plus[32]

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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]	SM 23rd Edition [49]	SM Online [3]	EPA	Other
Total Organic Carbon (TOC)	High Temperature Combustion	5310 B	5310 B	5310 B		415.3, Rev 1.2 [19]	
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	5310 C	5310 C		415.3, Rev 1.2 [19]	Hach Method 10267[38]
	Wet Oxidation	5310 D	5310 D			415.3, Rev 1.2 [19]	
	Ozone Oxidation						Hach Method 10261[37]

ALTERNATIVE TESTING METHODS FOR PARAMETERS LISTED AT 40 CFR 141.131(d)							
Parameter	Methodology	SM 21st Edition [1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	EPA	Other
Specific Ultraviolet Absorbance (SUVA)	Calculation using DOC and UV_{254} data					415.3, Rev 1.2 [19]	
Dissolved Organic Carbon (DOC)	High Temperature Combustion	5310 B	5310 B	5310 B		415.3, Rev 1.2 [19]	
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	5310 C	5310 C		415.3, Rev 1.2 [19]	
	Wet Oxidation	5310 D	5310 D			415.3, Rev 1.2 [19]	
Ultraviolet absorption at 254 nm (UV_{254})	Spectrophotometry	5910 B	5910 B	5910 B	5910 B-11	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 23rd Edition [49]	SM Online [3]	Other
E. coli	Colilert		9223 B	9223 B	9223 B	9223 B-97, B-04	
	Colisure		9223 B	9223 B	9223 B	9223 B-97, B-04	
	Colilert-18	9223 B	9223 B	9223 B	9223 B	9223 B-97, B-04	
	Readycult®						Readycult® [20]
	Colitag						Modified Colitag™ [13]
	Chromocult®						Chromocult® [21]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)							
Organism	Methodology	SM 20th Edition [6]	SM 21st Edition[1]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]	Other
	EC-MUG			9221 F	9221 F	9221 F-06	
	NA-MUG				9222 I		
	m-ColiBlue24 Test				9222 J		
	Tecta EC/TC [33, 43]						
Enterococci	Multiple-Tube Technique					9230 B-04	
	Membrane Filter Techniques				9230 C		
	Fluorogenic Substrate Enterococcus Test (using Enterolert)				9230 D		
Coliphage	Two-Step Enrichment Presence-Absence Procedure						Fast Phage [30]

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ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)						
Organism	Methodology Category	Method	SM 20th, 21st Editions [1,6]	SM 22nd Edition [28]	SM 23rd Edition [49]	SM Online [3]
Total Coliforms	Lactose Fermentation Methods	Standard Total Coliform Fermentation Technique		9221 B.1, B.2	9221 B.1, B.2, B.3, B.4	9221 B.1, B.2-06
		Presence-Absence (P-A) Coliform			9221 D.1, D.2, D.3	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)						
		Test				
	Membrane Filtration Methods	Standard Total Coliform Membrane Filter Procedure using Endo Media			9222 B, C	
		Simultaneous Detection of Total Coliforms and *E. coli* by Dual Chromogen Membrane Filter Procedure (using mColiBlue24 medium)			9222 J	
	Enzyme Substrate Methods	Colilert®		9223 B	9223 B	9223 B-04
		Colisure®		9223 B	9223 B	9223 B-04
		Colilert-18	9223 B	9223 B	9223 B	9223 B-04
		Tecta EC/TC [33, 43]				
Escherichia coli	*Escherichia coli* Procedure (following Lactose Fermentation Methods)	EC-MUG medium		9221 F.1	9221 F.1	9221 F.1-06
	Escherichia coli Partitioning Methods (following Membrane Filtration Methods)	EC broth with MUG (EC-MUG)			9222 H	
		NA-MUG medium			9222 I	
	Simultaneous Detection of Total Coliforms and *E. coli* by Dual Chromogen	mColiBlue24 medium			9222 J	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)						
	Membrane Filter Procedure					
	Enzyme Substrate Methods	Colilert®		9223 B	9223 B	9223 B-04
		Colisure®		9223 B	9223 B	9223 B-04
		Colilert-18	9223 B	9223 B	9223 B	9223 B-04
		Tecta EC/TC [33, 43]				

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)						
Contaminant	Methodology	EPA Method	ASTM [4]	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	SM Online [3]
Aluminum	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 D	3111 D	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10
	Inductively Coupled Plasma			3120 B	3120 B	
Chloride	Silver Nitrate Titration		D 512-04 B, 12 B	4500-Cl⁻ B	4500-Cl⁻ B	
	Ion Chromatography		D 4327-11	4110 B	4110 B	
	Potentiometric Titration			4500-Cl⁻ D	4500-Cl⁻ D	
Color	Visual Comparison			2120 B	2120 B	
Foaming Agents	Methylene Blue Active Substances (MBAS)			5540 C	5540 C	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)						
Contaminant	Methodology	EPA Method	ASTM [4]	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	SM Online [3]
Iron	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 B	3111 B	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10
	Inductively Coupled Plasma			3120 B	3120 B	
Manganese	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 B	3111 B	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10
	Inductively Coupled Plasma			3120 B	3120 B	
Odor	Threshold Odor Test			2150 B	2150 B	
Silver	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct			3111 B	3111 B	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B-04, B-10
	Inductively Coupled Plasma			3120 B	3120 B	
Sulfate	Ion Chromatography		D 4327-11	4110 B	4110 B	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)						
Contaminant	Methodology	EPA Method	ASTM [4]	SM 21st Edition [1]	SM 22nd Edition [28], SM 23rd Edition [49]	SM Online [3]
	Gravimetric with ignition of residue			4500-SO_4^{2-} C	4500-SO_4^{2-} C	4500-SO_4^{2-} C-97
	Gravimetric with drying of residue			4500-SO_4^{2-} D	4500-SO_4^{2-} D	4500-SO_4^{2-} D-97
	Turbidimetric method		D 516-07, 11, 16	4500-SO_4^{2-} E	4500-SO_4^{2-} E	4500-SO_4^{2-} E-97
	Automated methylthymol blue method			4500-SO_4^{2-} F	4500-SO_4^{2-} F	4500-SO_4^{2-} F-97
Total Dissolved Solids	Total Dissolved Solids Dried at 180 deg C			2540 C	2540 C	
Zinc	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES)	200.5, Revision 4.2 [2]				
	Atomic Absorption; Direct Aspiration			3111 B	3111 B	
	Inductively Coupled Plasma			3120 B	3120 B	

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