

rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this action and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a “major rule” as defined by 5 U.S.C. 804(2).

Under section 307(b)(1) of the Clean Air Act, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by December 11, 2018. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this action for the purposes of judicial review nor does it extend the time

within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action of approving a SIP revision, submitted by the Commonwealth of Pennsylvania through the Pennsylvania PADEP, to EPA on September 29, 2017, for attainment of the 2010 1-hour SO<sub>2</sub> primary NAAQS in the Warren, Pennsylvania SO<sub>2</sub> nonattainment area may not be challenged later in proceedings to enforce its requirements. (See CAA section 307(b)(2).)

**List of Subjects in 40 CFR Part 52**

Environmental protection, Air pollution control, Incorporation by reference, Intergovernmental relations, Reporting and recordkeeping requirements, Sulfur oxides.

Dated: September 28, 2018.  
**Cosmo Servidio**,  
*Regional Administrator, Region III.*

40 CFR part 52 is amended as follows:

**PART 52—APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS**

■ 1. The authority citation for part 52 continues to read as follows:

*Authority:* 42 U.S.C. 7401 *et seq.*

**Subpart NN—Pennsylvania**

- 2. Amend § 52.2020 by:
  - a. In paragraph (d)(3), adding an entry for “United Refining Company” at the end of the table; and
  - b. In paragraph (e)(1), adding an entry for “Attainment Plan for the Warren, Pennsylvania Nonattainment Area for the 2010 Sulfur Dioxide Primary National Ambient Air Quality Standard” at the end of the table.

The additions read as follows:

**§ 52.2020 Identification of plan.**

*	*	*	*	*
(d)	*	*	*	*
(3)	*	*	*	*

Name of source	Permit No.	County	State effective date	EPA approval date	Additional explanation/ 52.2063 citation
* United Refining Company	* None .....	* Warren .....	* 9/29/17	* 10/12/18, [Insert <b>Federal Register</b> citation].	* Sulfur dioxide emission limits and related parameters in unredacted portions of the Consent Order and Agreement.

\* \* \* \* \*  
 (e) \* \* \*

Name of non-regulatory SIP revision	Applicable geographic area	State submittal date	EPA approval date	Additional explanation
* Attainment Plan for the Warren, Pennsylvania Nonattainment Area for the 2010 Sulfur Dioxide Primary National Ambient Air Quality Standard.	* Conewango Township, Glade Township, Pleasant Township, and the City of Warren in Warren County.	* .....	* 10/12/18, [Insert <b>Federal Register</b> citation].	* Includes base year emissions inventory.

\* \* \* \* \*  
 [FR Doc. 2018–22174 Filed 10–11–18; 8:45 am]  
**BILLING CODE 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 October 12, 2018.

**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; email address: [smith.glynda@epa.gov](mailto: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 <sup>1</sup>
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

<sup>1</sup> 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<sub>3</sub><sup>-</sup> 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, 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).

Standard methods, 23rd edition (APHA 2017)	Approved method	Contaminant	Regulation citations
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 <sup>-</sup> B, D .....	4500-Cl <sup>-</sup> B, D-97, online versions (APHA 1997h).	Chloride .....	40 CFR 143.4(b).
4500-ClO <sub>2</sub> C .....	4500-ClO <sub>2</sub> C-00, online version (APHA 2000d).	Chlorine dioxide .....	40 CFR 141.74(a)(2).
4500-ClO <sub>2</sub> E .....	4500-ClO <sub>2</sub> E-00, online version (APHA 2000d).	Chlorine dioxide .....	40 CFR 141.74(a)(2); 40 CFR 141.131(c)(1).
4500-ClO <sub>2</sub> E .....	4500-ClO <sub>2</sub> E-00, online version (APHA 2000d).	Chlorite .....	40 CFR 141.131(b)(1).
4500-CN <sup>-</sup> C, E, F, G.	4500-CN <sup>-</sup> , 20th Edition (APHA 1998)	Cyanide .....	40 CFR 141.23(k)(1).
4500-F <sup>-</sup> B, C, D, E	4500-F <sup>-</sup> 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 <sub>3</sub> <sup>-</sup> D .....	4500-NO <sub>3</sub> <sup>-</sup> D-00, online version (APHA 2000f).	Nitrate .....	40 CFR 141.23(k)(1).
4500-NO <sub>3</sub> <sup>-</sup> E, F .....	4500-NO <sub>3</sub> <sup>-</sup> E, F-00, online versions (APHA 2000f).	Nitrate, nitrite .....	40 CFR 141.23(k)(1).
4500-NO <sub>2</sub> <sup>-</sup> B .....	4500-NO <sub>2</sub> <sup>-</sup> B-00, online version (APHA 2000g).	Nitrite .....	40 CFR 141.23(k)(1).
4500-O <sub>3</sub> B .....	4500-O <sub>3</sub> 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 <sub>2</sub> C, D, E ..	4500-SiO <sub>2</sub> C, D, E-97, online versions (APHA 1997k).	Silica .....	40 CFR 141.23(k)(1).
4500-SO <sub>4</sub> <sup>2-</sup> C, D, E, F.	4500-SO <sub>4</sub> <sup>2-</sup> 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 1997)	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 and Gamma emitters.	40 CFR 141.25(a).

Standard methods, 23rd edition (APHA 2017)	Approved method	Contaminant	Regulation citations
7500- <sup>3</sup> H B .....	7500- <sup>3</sup> 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) ....	<i>E. coli</i> .....	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) ....	<i>E. coli</i> .....	40 CFR 141.852(a)(5).
9222 I .....	9222 G, 20th Edition, (APHA 1998) ....	<i>E. coli</i> .....	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).	<i>E. coli</i> .....	40 CFR 141.402(c)(2); 40 CFR 141.852(a)(5).
9223 B .....	9223 B, 20th Edition (APHA 1998) .....	Total coliforms .....	40 CFR 141.74(a)(1); 40 CFR 141.852(a)(5).
9223 B .....	9223 B, 20th Edition (APHA 1998) .....	<i>E. coli</i> .....	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<sup>-</sup> C in the 21st edition (APHA 2005) and Standard Method 4500-CN<sup>-</sup> C in the 22nd edition (APHA 2012). Also, the identical online version, Standard Method 4500-CN<sup>-</sup> C-99 (APHA 1999d) is being approved. The originally approved method, Standard Method 4500-CN<sup>-</sup> 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<sup>-</sup> 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<sup>-</sup> 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<sup>-</sup> 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° 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

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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 <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM Online <sup>3</sup>	ASTM <sup>4</sup>	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		
Arsenic	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES).	200.5, Revision 4.2 <sup>2</sup>						
	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.	
Barium	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES).	200.5, Revision 4.2 <sup>2</sup>						
	Inductively Coupled Plasma Atomic Absorption; Direct		3120 B 3111 D	3120 B 3111 D	3120 B 3111 D			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1)—Continued

Contaminant	Methodology	EPA method	SM 21st edition <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM Online <sup>3</sup>	ASTM <sup>4</sup>	Other
Beryllium	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Inductively Coupled Plasma Atomic Absorption; Furnace	200.5, Revision 4.2 <sup>2</sup>	3120 B 3113 B	3120 B 3113 B	3120 B 3113 B	3113 B-04, B-10.	D 3645-08 B, -15 B	
Cadmium	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Atomic Absorption; Furnace	200.5, Revision 4.2 <sup>2</sup>	3113 B	3113 B	3113 B	3113 B-04, B-10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). EDTA titrimetric Atomic Absorption; Direct Aspiration Inductively Coupled Plasma	200.5, Revision 4.2 <sup>2</sup>	3500-Ca B 3111 B 3120 B	3500-Ca B 3111 B 3120 B	3500-Ca B 3111 B 3120 B		D 511-09, -14 A D 511-09, -14 B	
Chromium	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Ion Chromatography Inductively Coupled Plasma Atomic Absorption; Furnace	200.5, Revision 4.2 <sup>2</sup>	3120 B 3113 B	3120 B 3113 B	3120 B 3113 B	3113 B-04, B-10	D 6919-09	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Atomic Absorption; Furnace	200.5, Revision 4.2 <sup>2</sup>	3113 B	3113 B	3113 B	3113 B-04, B-10.	D 1688-07, -12 C	
Copper	Atomic Absorption; Direct Aspiration Inductively Coupled Plasma Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Colorimetry	200.5, Revision 4.2 <sup>2</sup>	3111 B 3120 B	3111 B 3120 B	3111 B 3120 B		D 1688-07, -12 A	
	Conductance Manual Distillation with MgCl <sub>2</sub> followed by: Spectrophotometric, Amenable Spectrophotometric Manual Selective Electrode Gas Chromatography/Mass Spectrometry Headspace.	200.5, Revision 4.2 <sup>2</sup>	4500-CN <sup>-</sup> C 4500-CN <sup>-</sup> G 4500-CN <sup>-</sup> E 4500-CN <sup>-</sup> F	4500-CN <sup>-</sup> C 4500-CN <sup>-</sup> G 4500-CN <sup>-</sup> E 4500-CN <sup>-</sup> F	4500-CN <sup>-</sup> C 4500-CN <sup>-</sup> G 4500-CN <sup>-</sup> E 4500-CN <sup>-</sup> F	4500-CN <sup>-</sup> C-99.	D 1125-14 A D 2036-06 A D 2036-06 B D2036-06 A	Hach Method 8026; <sup>35</sup> Hach Method 10272. <sup>36</sup>
Fluoride	Ion Chromatography Manual Distillation; Colorimetric SPADNS. Manual Electrode Automated Alizarin Arsenite-Free Colorimetric SPADNS		4110 B 4500-F <sup>-</sup> B, D 4500-F <sup>-</sup> C 4500-F <sup>-</sup> E	4110 B 4500-F <sup>-</sup> B, D 4500-F <sup>-</sup> C 4500-F <sup>-</sup> E	4110 B 4500-F <sup>-</sup> B, D 4500-F <sup>-</sup> C 4500-F <sup>-</sup> E		D 4327-11 D 1179-04, 10 B, 16 B	ME355.01. <sup>7</sup>
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B-04, B-10.	D 3559-08 D, 15 D	Hach SPADNS 2 Method 10225. <sup>22</sup>
Magnesium	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Atomic Absorption Inductively Coupled Plasma Complexation Titrimetric Methods Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Ion Chromatography Manual, Cold Vapor	200.5, Revision 4.2 <sup>2</sup>	3111 B 3120 B 3500-Mg B	3111 B 3120 B 3500-Mg B	3111 B 3120 B 3500-Mg B		D 511-09, -14 B D 511-09, -14 A	
	Mercury Nickel		3112 B 3120 B 3111 B 3113 B	3112 B 3120 B 3111 B 3113 B	3112 B 3120 B 3111 B 3113 B	3112 B-09	D 6919-09 D 3223-12	
Nitrate	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Ion Chromatography Automated Cadmium Reduction Manual Cadmium Reduction Ion Selective Electrode Reduction/Colorimetric Colorimetric; Direct	200.5, Revision 4.2 <sup>2</sup>	4110 B 4500-NO <sub>3</sub> <sup>-</sup> F 4500-NO <sub>3</sub> <sup>-</sup> E 4500-NO <sub>3</sub> <sup>-</sup> D	4110 B 4500-NO <sub>3</sub> <sup>-</sup> F 4500-NO <sub>3</sub> <sup>-</sup> E 4500-NO <sub>3</sub> <sup>-</sup> D	4110 B 4500-NO <sub>3</sub> <sup>-</sup> F 4500-NO <sub>3</sub> <sup>-</sup> E 4500-NO <sub>3</sub> <sup>-</sup> D		D 4327-11	Systema Easy (1-Reagent); <sup>8</sup> NECI Nitrate-Reductase. <sup>40</sup> Hach TNTplus™ 835/836 Method 10206. <sup>23</sup>
	Nitrite	Capillary Ion Electrophoresis Ion Chromatography		4110 B	4110 B	4110 B		D 6508-15 D 4327-11

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1)—Continued

Contaminant	Methodology	EPA method	SM 21st edition <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM Online <sup>3</sup>	ASTM <sup>4</sup>	Other
	Automated Cadmium Reduction .....	.....	4500-NO <sub>3</sub> <sup>-</sup> F.	4500-NO <sub>3</sub> <sup>-</sup> F.	4500-NO <sub>3</sub> <sup>-</sup> F.			
	Manual Cadmium Reduction .....	.....	4500-NO <sub>3</sub> <sup>-</sup> E.	4500-NO <sub>3</sub> <sup>-</sup> E.	4500-NO <sub>3</sub> <sup>-</sup> E.			
	Spectrophotometric .....	.....	4500-NO <sub>2</sub> <sup>-</sup> B.	4500-NO <sub>2</sub> <sup>-</sup> B.	4500-NO <sub>2</sub> <sup>-</sup> B.			
	Reduction/Colorimetric .....	.....						
Ortho-phosphate ....	Capillary Ion Electrophoresis .....	.....					D 6508-15	Systea Easy (1-Re-agent); <sup>9</sup> NECi Nitrate-Reductase. <sup>40</sup>
	Ion Chromatography .....	.....	4110 B .....	4110 B .....	4110 B .....		D 4327-11	
	Colorimetric, ascorbic acid, single reagent. Colorimetric, Automated, Ascorbic Acid .....	.....	4500-P E .....	4500-P E .....	4500-P E .....	4500-P E-99 .....		
pH .....	Capillary Ion Electrophoresis .....	.....					D 6508-15	Thermo Fisher Discrete Analyzer. <sup>41</sup>
	Electrometric .....	150.3 <sup>48</sup> .....	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	
Silica .....	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Colorimetric .....	200.5, Revision 4.2 <sup>2</sup> .....					D859-05, 10, 16	
	Molybdosilicate .....	.....	4500-SiO <sub>2</sub> C	4500-SiO <sub>2</sub> C	4500-SiO <sub>2</sub> C			
	Heteropoly blue .....	.....	4500-SiO <sub>2</sub> D	4500-SiO <sub>2</sub> D	4500-SiO <sub>2</sub> D			
	Automated for Molybdate-reactive Silica. Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Inductively Coupled Plasma .....	.....	3120 B .....	3120 B .....	3120 B .....			
Sodium .....	Atomic Absorption; Direct Aspiration ... Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES). Ion Chromatography .....	.....	3111 B .....	3111 B .....	3111 B .....			
	Thermometric .....	.....	2550 .....	2550 .....	2550 .....	2550-10	D 6919-09	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24(e)(1)

Contaminant	Methodology	EPA method	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>
Benzene .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Carbon tetrachloride ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Chlorobenzene .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,2-Dichlorobenzene ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,4-Dichlorobenzene ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,2-Dichloroethane ....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
cis-Dichloroethylene ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
trans-Dichloroethylene ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Dichloromethane .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,2-Dichloropropane ....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Ethylbenzene .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Styrene .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Tetrachloroethylene ...	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,1,1-Trichloroethane ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Trichloroethylene .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Toluene .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,2,4-Trichlorobenzene.	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,1-Dichloroethylene ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
1,1,2-Trichloroethane ..	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Vinyl chloride .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
Xylenes (total) .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3, <sup>9</sup> 524.4, <sup>29</sup>			
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). Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS). Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS). Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3, <sup>24</sup> .....	523. <sup>26</sup>		
Atrazine .....	.....	536. <sup>25</sup>			
Benzo(a)pyrene .....	.....	525.3, <sup>24</sup>			
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, <sup>24</sup>			
Dalapon .....	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS).	557. <sup>14</sup>			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24(e)(1)—Continued

Contaminant	Methodology	EPA method	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>
Di(2-ethylhexyl)adipate.	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. <sup>24</sup>			
Di(2-ethylhexyl)phthalate.	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3. <sup>9</sup>			
Dibromochloropropane (DBCP).	Gas Chromatography/Electron Capture Detection (GC/ECD) .....	.....	6640 B .....	6640 B .....	6640 B-01, B-06.
Dinoseb .....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Endrin .....	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3. <sup>9</sup>			
Ethyl dibromide (EDB)	High-Performance Liquid Chromatography (HPLC) with Post-Column Derivatization and Fluorescence Detection.	.....	6651 B .....	6651 B .....	6651 B-00, B-05.
Glyphosate .....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Heptachlor .....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Heptachlor Epoxide ...	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Hexachlorobenzene ...	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Hexachlorocyclopentadiene.	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Lindane .....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Methoxychlor .....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
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. <sup>24</sup>			
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. <sup>24</sup>			
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. <sup>25</sup>			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>	523. <sup>26</sup>		
Toxaphene .....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3. <sup>24</sup>			
Total Trihalomethanes	Purge & Trap/Gas Chromatography/Mass Spectrometry .....	524.3. <sup>9</sup> .....	524.4. <sup>29</sup>		

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

Contaminant	Methodology	EPA method	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	ASTM <sup>4</sup>	SM Online <sup>3</sup>
Naturally Occurring:						
Gross alpha and beta	Evaporation .....	900.0, Rev. 1.0 <sup>50</sup> ...	7110 B .....	7110 B.	D 7283-17 .....	7110 D-17.
	Liquid Scintillation .....	.....				
Gross alpha .....	Coprecipitation .....	.....	7110 C .....	7110 C.		
Radium 226 .....	Radon emanation .....	.....	7500-Ra C .....	7500-Ra C .....	D 3454-05.	7500-Ra E-07.
	Radiochemical .....	.....	7500-Ra B .....	7500-Ra B .....	D 2460-07.	
Radium 228 .....	Gamma Spectrometry .....	.....	7500-Ra D .....	7500-Ra D.		
	Radiochemical .....	.....	7500-Ra E .....	7500Ra-E .....		
Uranium .....	Gamma Spectrometry .....	.....	7500-U B .....	7500-U B.		
	Radiochemical .....	.....	3125 .....	.....	D 5673-05, 10, 16.	
	ICP-MS .....	.....	7500-U C .....	7500-U C .....	D 3972-09.	
	Alpha spectrometry .....	.....	.....	.....	D 5174-07.	
	Laser Phosphorimetry .....	.....	.....	.....	D 6239-09.	
Alpha Liquid Scintillation Spectrometry.	.....	.....	.....	.....		
Man-Made:						
Radioactive Cesium ...	Radiochemical .....	.....	7500-Cs B .....	7500-Cs B.		
	Gamma Ray Spectrometry .....	.....	7120 .....	7120 .....	D 3649-06.	
Radioactive Iodine ....	Radiochemical .....	.....	7500-I B .....	7500-I B .....	D 3649-06.	
			7500-I C .....	7500-I C.		
			7500-I D .....	7500-I D.		
			7120 .....	7120 .....		
Radioactive Strontium 89, 90.	Gamma Ray Spectrometry .....	.....	7500-Sr B .....	7500-Sr B.	D 4785-08.	
	Radiochemical .....	.....	.....	.....		
Tritium .....	Liquid Scintillation .....	.....	7500- <sup>3</sup> H B .....	7500- <sup>3</sup> H B .....	D 4107-08.	
Gamma Emitters .....	Gamma Ray .....	.....	7120 .....	7120 .....	D 3649-06.	
			Spectrometry .....	7500-Cs B .....	7500-Cs B .....	D 4785-08.
			7500-I B .....	7500-I B.		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)

Organism	Methodology	SM 21st edition <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM Online <sup>3</sup>	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.		
Fecal Coliforms .....	ONPG-MUG Test .....	9223 .....	9223 B .....	9223 B .....	9223 B-04.	
	Fecal Coliform Procedure.	9221 E .....	9221 E .....	9221 E .....	9221 E-06.	
	Fecal Coliform Filter Procedure.	9222 D .....	9222 D .....	9222 D .....	9222 D-06.	
Heterotrophic bacteria Turbidity .....	Pour Plate Method .....	9215 B .....	9215 B .....	9215 B .....	9215 B-04.	
	Nephelometric Method	2130 B .....	2130 B .....	2130 B .....	.....	Hach Method 8195, Rev. 3.0. <sup>52</sup>
	Laser Nephelometry (on-line).	.....	.....	.....	.....	Mitchell M5271, <sup>10</sup> Mitchell M5331, Rev. 1.2, <sup>42</sup> Lovibond PTV 6000. <sup>46</sup>
	LED Nephelometry (on-line).	.....	.....	.....	.....	Mitchell M5331, <sup>11</sup> Mitchell M5331, Rev. 1.2, <sup>42</sup> Lovibond PTV 2000. <sup>45</sup>
	LED Nephelometry (on-line).	.....	.....	.....	.....	AMI Turbiwell, <sup>15</sup> Lovibond PTV 1000. <sup>44</sup>
	LED Nephelometry (portable).	.....	.....	.....	.....	Orion AQ4500. <sup>12</sup>
360° Nephelometry .....	.....	.....	.....	.....	Hach Method 10258 Rev. 1.0, <sup>39</sup> Hach Method 10258, Rev. 2.0. <sup>51</sup>	

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.74(a)(2)

Residual	Methodology	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	ASTM <sup>4</sup>	Other
Free Chlorine .....	Amperometric Titration .....	4500-CI D .....	4500-CI D .....	D 1253-08, -14.	
	DPD Ferrous Titrimetric .....	4500-CI F .....	4500-CI F .....	.....	Hach Method 10260. <sup>31</sup>
	DPD Colorimetric .....	4500-CI G .....	4500-CI G .....	.....	Hach Method 10241. <sup>34</sup>
	Indophenol Colorimetric .....	.....	.....	.....	EPA 334.0. <sup>16</sup>
	Syringaldazine (FACTS) .....	4500-CI H .....	4500-CI H .....	.....	ChloroSense. <sup>17</sup>
	On-line Chlorine Analyzer .....	.....	.....	.....	
Total Chlorine .....	Amperometric Sensor .....	.....	.....	.....	
	Amperometric Titration .....	4500-CI D .....	4500-CI D .....	D 1253-08, -14.	
	Amperometric Titration (Low level measurement).	4500-CI E .....	4500-CI E.	.....	
	DPD Ferrous Titrimetric .....	4500-CI F .....	4500-CI F.	.....	Hach Method 10260. <sup>31</sup>
	DPD Colorimetric .....	4500-CI G .....	4500-CI G .....	.....	EPA 334.0. <sup>16</sup>
	Iodometric Electrode .....	4500-CI I .....	4500-CI I.	.....	ChloroSense. <sup>17</sup>
Chlorine Dioxide .....	On-line Chlorine Analyzer .....	.....	.....	.....	
	Amperometric Sensor .....	.....	.....	.....	
	Amperometric Titration .....	4500-CIO <sub>2</sub> C	4500-CIO <sub>2</sub> C.	.....	
Ozone .....	Amperometric Titration .....	4500-CIO <sub>2</sub> E.	4500-CIO <sub>2</sub> E.	.....	ChlordioX Plus. <sup>32</sup>
	Amperometric Sensor .....	.....	.....	.....	
Indigo Method .....	4500-O <sub>3</sub> B	4500-O <sub>3</sub> B.	.....		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1)

Contaminant	Methodology	EPA method	ASTM <sup>4</sup>	SM online <sup>3</sup>	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	Other
TTHM .....	P&T/GC/MS .....	524.3, <sup>9</sup> 524.4. <sup>29</sup>	.....	.....	.....	.....	
HAA5 .....	LLE (diazomethane)/GC/ECD .....	.....	.....	6251 B-07 .....	6251 B .....	6251 B.	
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS).	557. <sup>14</sup>	.....	.....	.....	.....	Thermo Fisher 557.1. <sup>47</sup>
Bromate ..	Two-Dimensional Ion Chromatography (IC) with Suppressed Conductivity Detection.	.....	.....	.....	.....	.....	
	Two-Dimensional Ion Chromatography (IC).	302.0. <sup>18</sup>	.....	.....	.....	.....	
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS).	557. <sup>14</sup>	.....	.....	.....	.....	
	Chemically Suppressed Ion Chromatography.	.....	D 6581-08 A.	.....	.....	.....	
Electrolytically Suppressed Ion Chromatography.	.....	.....	D 6581-08 B.	.....	.....	.....	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1)—Continued

Contaminant	Methodology	EPA method	ASTM <sup>4</sup>	SM online <sup>3</sup>	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	Other
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 Sensor .....	Amperometric Titration.	.....	.....	4500–ClO <sub>2</sub> E	4500–ClO <sub>2</sub> E.	Chlordiox Plus. <sup>32</sup>

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1)

Residual	Methodology	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	ASTM <sup>4</sup>	Other
Free Chlorine .....	Amperometric Titration .....	4500–Cl D .....	4500–Cl D .....	D 1253–08, –14.	
	DPD Ferrous Titrimetric .....	4500–Cl F .....	4500–Cl F .....	.....	Hach Method 10260. <sup>31</sup>
	DPD Colorimetric .....	4500–Cl G .....	4500–Cl G .....	.....	Hach Method 10241. <sup>34</sup>
	Indophenol Colorimetric .....	.....	.....	.....	
	Syringaldazine (FACTS) .....	4500–Cl H .....	4500–Cl H.	.....	
	Amperometric Sensor .....	.....	.....	.....	ChloroSense. <sup>17</sup>
Combined Chlorine .....	On-line Chlorine Analyzer .....	.....	.....	.....	EPA 334.0. <sup>16</sup>
	Amperometric Titration .....	4500–Cl D .....	4500–Cl D .....	D 1253–08, –14.	
	DPD Ferrous Titrimetric .....	4500–Cl F .....	4500–Cl F .....	.....	
Total Chlorine .....	DPD Colorimetric .....	4500–Cl G .....	4500–Cl G .....	.....	Hach Method 10260. <sup>31</sup>
	Amperometric Titration .....	4500–Cl D .....	4500–Cl D .....	D 1253–08, –14.	
Chlorine Dioxide .....	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. <sup>31</sup>
	Iodometric Electrode .....	4500–Cl I .....	4500–Cl I.	.....	
	Amperometric Sensor .....	.....	.....	.....	ChloroSense. <sup>17</sup>
	On-line Chlorine Analyzer .....	.....	.....	.....	EPA 334.0. <sup>16</sup>
	Amperometric Method II .....	4500–ClO <sub>2</sub> E .....	4500–ClO <sub>2</sub> E.	.....	
	Amperometric Sensor .....	.....	.....	.....	Chlordiox Plus. <sup>32</sup>

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ALTERNATIVE TESTING METHODS FOR PARAMETERS LISTED AT 40 CFR 141.131(d)

Parameter	Methodology	SM 21st edition <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>	EPA	Other
Total Organic Carbon (TOC) ...	High Temperature Combustion	5310 B .....	5310 B .....	5310 B .....	.....	415.3, Rev 1.2. <sup>19</sup>	Hach Method 10267. <sup>38</sup>
	Persulfate-Ultraviolet or Heated Persulfate Oxidation.	5310 C .....	5310 C .....	5310 C .....	.....	415.3, Rev 1.2. <sup>19</sup>	
	Wet Oxidation .....	5310 D .....	5310 D .....	.....	.....	415.3, Rev 1.2. <sup>19</sup>	Hach Method 10261. <sup>37</sup>
	Ozone Oxidation .....	.....	.....	.....	.....	415.3, Rev 1.2. <sup>19</sup>	
Specific Ultraviolet Absorbance (SUVA) Dissolved Organic Carbon (DOC).	Calculation using DOC and UV <sub>254</sub> data.	.....	.....	.....	.....	415.3, Rev 1.2. <sup>19</sup>	
	High Temperature Combustion	5310 B .....	5310 B .....	5310 B .....	.....	415.3, Rev 1.2. <sup>19</sup>	
Ultraviolet absorption at 254 nm (UV <sub>254</sub> ).	Persulfate-Ultraviolet or Heated Persulfate Oxidation.	5310 C .....	5310 C .....	5310 C .....	.....	415.3, Rev 1.2. <sup>19</sup>	
	Wet Oxidation .....	5310 D .....	5310 D .....	.....	.....	415.3, Rev 1.2. <sup>19</sup>	
	Spectrophotometry .....	5910 B .....	5910 B .....	5910 B .....	5910 B–11	415.3, Rev 1.2. <sup>19</sup>	

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ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)

Organism	Methodology	SM 20th edition <sup>6</sup>	SM 21st edition <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>	Other
<i>E. coli</i> .....	ColiIert .....	.....	9223 B .....	9223 B .....	9223 B .....	9223 B–97, B–04.	ReadiCult®. <sup>20</sup> Modified Colitag. <sup>TM 13</sup> Chromocult®. <sup>21</sup>
	Colisure .....	.....	9223 B .....	9223 B .....	9223 B .....	9223 B–97, B–04.	
	ColiIert-18 .....	9223 B .....	9223 B .....	9223 B .....	9223 B .....	9223 B–97, B–04.	
	ReadiCult® .....	.....	.....	.....	.....	.....	
	Colitag .....	.....	.....	.....	.....	.....	
	Chromocult® .....	.....	.....	.....	.....	.....	
	EC-MUG .....	.....	.....	9221 F .....	9221 F .....	9221 F–06.	
	NA-MUG .....	.....	.....	.....	9222 I.	.....	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)—Continued

Organism	Methodology	SM 20th edition <sup>6</sup>	SM 21st edition <sup>1</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>	Other	
Enterococci	m-ColiBlue24 Test				9222 J.	9230 B-04.		
	Tecta EC/TC							
	Multiple-Tube Technique				9230 C.			
Coliphage	Membrane Filter Techniques.							
	Fluorogenic Substrate Enterococcus Test (using Enterolert).				9230 D.			
	Two-Step Enrichment Presence-Absence Procedure.						Fast Phage. <sup>30</sup>	

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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 <sup>1 6</sup>	SM 22nd edition <sup>28</sup>	SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>	
Total Coliforms	Lactose Fermentation Methods.	Standard Total Coliform Fermentation Technique.		9221 B.1, B.2 ..	9221 B.1, B.2, B.3, B.4.	9221 B.1, B.2-06.	
		Presence-Absence (P-A) Coliform Test.					
	Membrane Filtration Methods.	Standard Total Coliform Membrane Filter Procedure using Endo Media.				9222 B, C.	
		Simultaneous Detection of Total Coliforms and <i>E. coli</i> by Dual Chromogen Membrane Filter Procedure (using mColiBlue24 medium).				9222 J.	
<i>Escherichia coli</i>	Enzyme Substrate Methods	Colilert <sup>®</sup>		9223 B	9223 B	9223 B-04.	
		Colisure <sup>®</sup>		9223 B	9223 B	9223 B-04.	
		Colilert-18	9223 B	9223 B	9223 B	9223 B-04.	
		Tecta EC/TC					
	Escherichia coli Procedure (following Lactose Fermentation Methods).	EC-MUG medium		9221 F.1	9221 F.1	9221 F.1-06.	
		EC broth with MUG (EC-MUG).				9222 H.	
	Escherichia coli Partitioning Methods (following Membrane Filtration Methods).	NA-MUG medium				9222 I.	
		Simultaneous Detection of Total Coliforms and <i>E. coli</i> by Dual Chromogen Membrane Filter Procedure.	mColiBlue24 medium			9222 J.	
Enzyme Substrate Methods	Colilert <sup>®</sup>			9223 B	9223 B	9223 B-04.	
	Colisure <sup>®</sup>			9223 B	9223 B	9223 B-04.	
	Colilert-18	9223 B	9223 B	9223 B	9223 B	9223 B-04.	
		Tecta EC/TC					

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)

Contaminant	Methodology	EPA method	ASTM <sup>4</sup>	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>
Aluminum	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES).	200.5, Revision 4.2. <sup>2</sup>				
	Atomic Absorption; Direct			3111 D	3111 D.	3113 B-04, B-10.
	Atomic Absorption; Furnace			3113 B	3113 B	
Chloride	Inductively Coupled Plasma			3120 B	3120 B.	3113 B-04, B-10.
	Silver Nitrate Titration		D 512-04 B, 12 B.	4500-Cl ..	4500-Cl	
Color	Ion Chromatography		D 4327-11	4110 B	4110 B.	3113 B-04, B-10.
	Potentiometric Titration			4500-Cl- D ..	4500-Cl- D.	
Foaming Agents	Visual Comparison			2120 B	2120 B.	
Iron	Methylene Blue Active Substances (MBAS)			5540 C	5540 C.	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES).	200.5, Revision 4.2. <sup>2</sup>				
	Atomic Absorption; Direct			3111 B	3111 B.	3113 B-04, B-10.
Atomic Absorption; Furnace			3113 B	3113 B		
	Inductively Coupled Plasma			3120 B	3120 B.	

## ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)—Continued

Contaminant	Methodology	EPA method	ASTM <sup>4</sup>	SM 21st edition <sup>1</sup>	SM 22nd edition, <sup>28</sup> SM 23rd edition <sup>49</sup>	SM online <sup>3</sup>	
Manganese	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES).	200.5, Revision 4.2. <sup>2</sup>					
	Atomic Absorption; Direct			3111 B	3111 B	3113 B-04, B-10.	
	Atomic Absorption; Furnace			3113 B	3113 B		
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. <sup>2</sup>					
	Atomic Absorption; Direct			3111 B	3111 B	3113 B-04, B-10.	
	Atomic Absorption; Furnace			3113 B	3113 B		
Inductively Coupled Plasma		3120 B	3120 B.				
Sulfate	Ion Chromatography		D 4327-11	4110 B	4110 B.		
	Gravimetric with ignition of residue			4500-SO <sub>4</sub> 2 <sup>-</sup> C.	4500-SO <sub>4</sub> 2 <sup>-</sup> C.	4500-SO <sub>4</sub> 2 <sup>-</sup> C-97.	
	Gravimetric with drying of residue			4500-SO <sub>4</sub> 2 <sup>-</sup> D.	4500-SO <sub>4</sub> 2 <sup>-</sup> D.	4500-SO <sub>4</sub> 2 <sup>-</sup> D-97.	
	Turbidimetric method		D 516-07, 11, 16.	4500-SO <sub>4</sub> 2 <sup>-</sup> E.	4500-SO <sub>4</sub> 2 <sup>-</sup> E.	4500-SO <sub>4</sub> 2 <sup>-</sup> E-97.	
	Automated methylthymol blue method			4500-SO <sub>4</sub> 2 <sup>-</sup> F.	4500-SO <sub>4</sub> 2 <sup>-</sup> F.	4500-SO <sub>4</sub> 2 <sup>-</sup> 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. <sup>2</sup>				
	Atomic Absorption; Direct Aspiration			3111 B	3111 B.		
	Inductively Coupled Plasma			3120 B	3120 B.		

<sup>1</sup> Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.

<sup>2</sup> EPA Method 200.5, Revision 4.2. "Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry." 2003. EPA/600/R-06/115. (Available at <http://www.epa.gov/water-research/epa-drinking-water-research-methods>.)

<sup>3</sup> Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

<sup>4</sup> 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.

<sup>6</sup> Standard Methods for the Examination of Water and Wastewater, 20th edition (1998). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.

<sup>7</sup> Method ME355.01, Revision 1.0. "Determination of Cyanide in Drinking Water by GC/MS Headspace," May 26, 2009. Available at <https://www.nemi.gov> or from James Eaton, H & E Testing Laboratory, 221 State Street, Augusta, ME 04333. (207) 287-2727.

<sup>8</sup> Systeas Easy (1-Reagent). "Systeas Easy (1-Reagent) Nitrate Method," February 4, 2009. Available at <https://www.nemi.gov> or from Systeas Scientific, LLC., 900 Jorie Blvd., Suite 35, Oak Brook, IL 60523.

<sup>9</sup> EPA Method 524.3, Version 1.0. "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry," June 2009. EPA 815-B-09-009. Available at <https://www.nemi.gov>.

<sup>10</sup> Mitchell Method M5271, Revision 1.1. "Determination of Turbidity by Laser Nephelometry," March 5, 2009. Available at <https://www.nemi.gov> or from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

<sup>11</sup> Mitchell Method M5331, Revision 1.1. "Determination of Turbidity by LED Nephelometry," March 5, 2009. Available at <https://www.nemi.gov> or from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

<sup>12</sup> Orion Method AQ4500, Revision 1.0. "Determination of Turbidity by LED Nephelometry," May 8, 2009. Available at <https://www.nemi.gov> or from Thermo Scientific, 166 Cummings Center, Beverly, MA 01915. <http://www.thermo.com>.

<sup>13</sup> Modified Colitag™ Method. "Modified Colitag™ Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water (ATP D05-0035)," August 28, 2009. Available at <https://www.nemi.gov> or from CPI International, 5580 Skyline Boulevard, Santa Rosa, CA 95403.

<sup>14</sup> EPA Method 557. "Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)," September 2009. EPA 815-B-09-012. Available at <https://www.nemi.gov>.

<sup>15</sup> AMI Turbiwell. "Continuous Measurement of Turbidity Using a SWAN AMI Turbiwell Turbidimeter," August 2009. Available at <https://www.nemi.gov> or from Markus Bernasconi, SWAN Analytische Instrumente AG, Stubbachstrasse 13, CH-8340 Hinwil, Switzerland.

<sup>16</sup> 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 <https://www.nemi.gov>.

<sup>17</sup> ChloroSense. "Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense," August 2009. Available at <https://www.nemi.gov> or from Palintest Ltd., 1455 Jamike Avenue (Suite 100), Erlanger, KY 41018.

<sup>18</sup> EPA Method 302.0. "Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection," September 2009. EPA 815-B-09-014. Available at <https://www.nemi.gov>.

<sup>19</sup> EPA 415.3, Revision 1.2. "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," September 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/water-research/epa-drinking-water-research-methods>.

<sup>20</sup> ReadyCult® Method. "ReadyCult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," January, 2007. Version 1.1. Available from EMD Millipore (division of Merck KGaA, Darmstadt, Germany), 290 Concord Road, Billerica, MA 01821.

<sup>21</sup> Chromocult® Method. "Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," November, 2000. Version 1.0. EMD Millipore (division of Merck KGaA, Darmstadt, Germany), 290 Concord Road, Billerica, MA 01821.

<sup>22</sup> Hach Company. "Hach Company SPADNS 2 (Arsenite-Free) Fluoride Method 10225—Spectrophotometric Measurement of Fluoride in Water and Wastewater," January 2011. 5600 Lindbergh Drive, P.O. Box 389, Loveland, Colorado 80539.

<sup>23</sup> Hach Company. "Hach Company TNTplus™ 835/836 Nitrate Method 10206—Spectrophotometric Measurement of Nitrate in Water and Wastewater," January 2011. 5600 Lindbergh Drive, P.O. Box 389, Loveland, Colorado 80539.

<sup>24</sup> EPA Method 525.3. "Determination of Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS)," February 2012. EPA/600/R-12/010. Available at <http://www.epa.gov/water-research/epa-drinking-water-research-methods>.

<sup>25</sup> EPA Method 536. "Determination of Triazine Pesticides and their Degradates in Drinking Water by Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)," October 2007. EPA 815-B-07-002. Available at the National Service Center for Environmental Publications (EPA Method 536).

<sup>26</sup> EPA Method 523. "Determination of Triazine Pesticides and their Degradates in Drinking Water by Gas Chromatography/Mass Spectrometry (GC/MS)," February 2011. EPA 815-R-11-002. Available at the National Service Center for Environmental Publications (EPA Method 523).

<sup>28</sup> Standard Methods for the Examination of Water and Wastewater, 22nd edition (2012). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.

<sup>29</sup> EPA Method 524.4, Version 1.0. "Measurement of Purgeable Organic Compounds in Water by Gas Chromatography/Mass Spectrometry using Nitrogen Purge Gas," May 2013. EPA 815-R-13-002. Available at the National Service Center for Environmental Publications (EPA Method 524.4).



<sup>30</sup> Charm Sciences Inc. "Fast Phage Test Procedure. Presence/Absence for Coliphage in Ground Water with Same Day Positive Prediction". Version 009. November 2012. 659 Andover Street, Lawrence, MA 01843. Available at [www.charmsciences.com](http://www.charmsciences.com).

<sup>31</sup> Hach Company. "Hach Method 10260—Determination of Chlorinated Oxidants (Free and Total) in Water Using Disposable Planar Reagent-filled Cuvettes and Mesofluic Channel Colorimetry," April 2013. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>32</sup> ChlordioX Plus. "Chlorine Dioxide and Chlorite in Drinking Water by Amperometry using Disposable Sensors," November 2013. Available from Palintest Ltd., 1455 Jamike Avenue (Suite 100), Erlanger, KY 41018.

<sup>33</sup> Tecta EC/TC. "Tecta™ EC/TC Medium and Tecta™ Instrument: A Presence/Absence Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* (*E. coli*) in Drinking Water," version 1.0, May 2014. Available from Pathogen Detection Systems, Inc., 382 King Street East, Kingston, Ontario, Canada, K7K 2Y2.

<sup>34</sup> Hach Company. "Hach Method 10241—Spectrophotometric Measurement of Free Chlorine (Cl<sub>2</sub>) in Drinking Water," November 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>35</sup> Hach Company. "Hach Method 8026—Spectrophotometric Measurement of Copper in Finished Drinking Water," December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>36</sup> Hach Company. "Hach Method 10272—Spectrophotometric Measurement of Copper in Finished Drinking Water," December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>37</sup> Hach Company. "Hach Method 10261—Total Organic Carbon in Finished Drinking Water by Catalyzed Ozone Hydroxyl Radical Oxidation Infrared Analysis," December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>38</sup> Hach Company. "Hach Method 10267—Spectrophotometric Measurement of Total Organic Carbon (TOC) in Finished Drinking Water," December 2015. Revision 1.2. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>39</sup> Hach Company. "Hach Method 10258—Determination of Turbidity by 360° Nephelometry," January 2016. Revision 1.0. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>40</sup> Nitrate Elimination Company Inc. (NECi). "Method for Nitrate Reductase Nitrate-Nitrogen Analysis of Drinking Water," February 2016. Superior Enzymes Inc., 334 Hecla Street, Lake Linden, Michigan 49945.

<sup>41</sup> Thermo Fisher. "Thermo Fisher Scientific Drinking Water Orthophosphate Method for Thermo Scientific Gallery Discrete Analyzer," February 2016. Revision 5. Thermo Fisher Scientific, Ratastie 2, 01620 Vantaa, Finland.

<sup>42</sup> Mitchell Method M5331, Revision 1.2. "Determination of Turbidity by LED or Laser Nephelometry," February 2016. Available from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

<sup>43</sup> Tecta EC/TC. "Tecta™ EC/TC Medium and the Tecta™ Instrument: A Presence/Absence Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* (*E. coli*) in Drinking Water," version 2.0, February 2017. Available from Pathogen Detection Systems, Inc., 382 King Street East, Kingston, Ontario, Canada, K7K 2Y2.

<sup>44</sup> Lovibond PTV 1000. "Continuous Measurement of Drinking Water Turbidity Using a Lovibond PTV 1000 White Light LED Turbidimeter," December 2016. Revision 1.0. Available from Tintometer, Inc., 6456 Parkland Drive, Sarasota, FL 34243.

<sup>45</sup> Lovibond PTV 2000. "Continuous Measurement of Drinking Water Turbidity Using a Lovibond PTV 2000 660-nm LED Turbidimeter," December 2016. Revision 1.0. Available from Tintometer, Inc., 6456 Parkland Drive, Sarasota, FL 34243.

<sup>46</sup> Lovibond PTV 6000. "Continuous Measurement of Drinking Water Turbidity Using a Lovibond PTV 6000 Laser Turbidimeter," December 2016. Revision 1.0. Available from Tintometer, Inc., 6456 Parkland Drive, Sarasota, FL 34243.

<sup>47</sup> Thermo Fisher. "Thermo Fisher Method 557.1: Determination of Haloacetic Acids in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection," January 2017. Version 1.0. Available from Thermo Fisher Scientific, 490 Lakeside Dr., Sunnyvale, CA 94085 ([Richard.jack@thermofisher.com](mailto:Richard.jack@thermofisher.com)).

<sup>48</sup> EPA Method 150.3. "Determination of pH in Drinking Water," February 2017. EPA 815-B-17-001. Available at the National Service Center for Environmental Publications (EPA Method 150.3).

<sup>49</sup> *Standard Methods for the Examination of Water and Wastewater*, 23rd edition (2017). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.

<sup>50</sup> EPA Method 900.0, Rev. 1.0. "Determination of Gross Alpha and Gross Beta in Drinking Water," February 2018. EPA 815-B-18-002. Available at the National Service Center for Environmental Publications (EPA Method 900.0 Rev 1.0).

<sup>51</sup> Hach Company. "Hach Method 10258—Determination of Turbidity by 360° Nephelometry," March 2018. Revision 2.0. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

<sup>52</sup> Hach Company. "Hach Method 8195—Determination of Turbidity by Nephelometry," March 2018. Revision 3.0. 5600 Lindbergh Drive, P.O. Box 389, Loveland, CO 80539.

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