



# Federal Register

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**Wednesday,  
October 23, 2002**

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## **Part III**

# **Environmental Protection Agency**

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**40 CFR Parts 136, 141, and 143  
Guidelines Establishing Test Procedures  
for the Analysis of Pollutants Under the  
Clean Water Act; National Primary  
Drinking Water Regulations; and National  
Secondary Drinking Water Regulations;  
Methods Update; Final Rule**

**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Parts 136, 141, and 143**

[FRL-7379-6]

RIN 2040-AD59

**Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; National Primary Drinking Water Regulations; and National Secondary Drinking Water Regulations; Methods Update**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Final rule.

**SUMMARY:** This final rule revises wastewater and drinking water regulations to include updated versions of test procedures (*i.e.*, analytical methods) for the determination of chemical, radiological, and microbiological pollutants and contaminants in wastewater and drinking water. The updated versions of analytical methods have been published by one or more of the following organizations: ASTM International (ASTM; formerly the American Society for Testing and Materials), United States Geological Survey (USGS), United States Department of Energy (DOE), American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). Previously approved versions of the methods remain approved.

**DATES:** This final rule is effective on November 22, 2002. The incorporation by reference of the publications listed in

today's rule is approved by the Director of the Federal Register as of November 22, 2002. For judicial review purposes, this final rule is promulgated as of 1 p.m. (Eastern time) on November 6, 2002 as provided at 40 CFR 23.2 and 23.7.

**ADDRESSES:** The record for this rulemaking has been established under docket number W-99-21. Copies of the public comments received, EPA responses, and all other supporting documents (including references included in this document) are available for review at the U.S. Environmental Protection Agency, Water Docket, on Monday through Friday, excluding Federal holidays, between 9 a.m. and 3:30 p.m. Eastern Time. Please contact the Water Docket for an appointment. From August 12, 2002 through August 26, 2002, the Water Docket will be closed. Beginning on August 27, 2002, the Water Docket will be located at EPA West, 1301 Constitution Avenue, NW., Room B135, Washington, DC 202-566-2426.

**FOR FURTHER INFORMATION CONTACT:** For information regarding wastewater methods contact Khouane Dithavong, Engineering and Analysis Division (4303T), USEPA Office of Science and Technology, 1200 Pennsylvania Ave., NW., Washington, DC 20460, 202-566-1068 (e-mail: [Dithavong.Khouane@epa.gov](mailto:Dithavong.Khouane@epa.gov)). For information regarding the drinking water methods, contact Herbert J. Brass, Technical Support Center (MS 140), USEPA, Office of Ground Water and Drinking, 26 West Martin Luther King Drive, Cincinnati, OH 45268 (e-mail: [Brass.Herb@epa.gov](mailto:Brass.Herb@epa.gov)).

**SUPPLEMENTARY INFORMATION:**

**Potentially Regulated Entities**

*A. Clean Water Act*

EPA Regions, as well as States, Territories, and Tribes, are authorized to implement the National Pollutant Discharge Elimination System (NPDES) program, issue permits that comply with the technology-based and water quality-based requirements of the Clean Water Act. In doing so, the NPDES permitting authorities, including authorized States, Territories, and Tribes, make a number of discretionary choices associated with permit writing, including the selection of pollutants to be measured and, in many cases, limited, in permits. If EPA has "approved" (*i.e.*, promulgated through rulemaking) standardized testing procedures for a given pollutant, the NPDES permit must specify that analysis of that pollutant be conducted in accordance with one of the approved testing procedures or an approved alternate test procedure. Permitting authorities may, at their discretion, require the use of any method approved at 40 CFR part 136 in the permits they issue. Therefore, NPDES permits may incorporate the testing procedures in today's rulemaking so dischargers with NPDES permits could be affected by the standardization of testing procedures in this rulemaking. In addition, States, Territories, or authorized Tribes responsible for providing certification of Federal licenses under Clean Water Act section 401, could be regulated by today's rulemaking because these organizations are directed to use the standardized testing procedures. Categories and entities that may ultimately be regulated include:

Category	Examples of potentially regulated entities
State, Territorial, and Tribal Governments .....	States, Territories, and Tribes authorized to administer the NPDES permitting program; States, Territories, and Tribes providing certification under Clean Water Act section 401.

*B. Safe Drinking Water Act*

Public water systems are the regulated entities required to conduct analyses to measure for contaminants in water samples. However, EPA Regions, as well as States, and Tribal governments with primacy to administer the regulatory program for public water systems under

the Safe Drinking Water Act, sometimes conduct analyses to measure for contaminants in water samples. If EPA has established a maximum contaminant level ("MCL") for a given drinking water contaminant, the Agency also approves (*i.e.*, promulgates through rulemaking) standardized testing procedures for analysis of the

contaminant. Once EPA standardizes such test procedures, analysis using a standard (or approved alternate test procedures) is required. Public water systems required to test water samples must use one of the approved standardized test procedures. Categories and entities that may ultimately be regulated include:

Category	Examples of potentially regulated entities	NAICS <sup>a</sup>
State, Local, and 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 operate public water systems required to conduct analytic monitoring.	924110
Industry .....	Private operators of public water systems required to conduct analytic monitoring .....	221310

Category	Examples of potentially regulated entities	NAICS <sup>a</sup>
Municipalities .....	Municipal operators of public water systems required to conduct analytic monitoring ....	924110

<sup>a</sup> National American Industrial Classification System.

These tables are not intended to be exhaustive, but rather provide a guide for readers regarding entities likely to be regulated by this action. The tables list the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the tables could also be regulated. To determine whether your facility or organization is regulated by this action, you should carefully examine the applicability language at 40 CFR 136.1 (NPDES permits and CWA) and 40 CFR 141.2 (definition of public water system). If you have questions regarding the applicability of this action to a particular entity, consult the appropriate person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

#### Information on Internet Access

This **Federal Register** document has been placed on the Internet at the following location: <http://www.epa.gov/fedrgstr>.

#### Availability and Sources for Methods

Copies of final methods published by ASTM are available for a nominal cost through ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959. Copies of final methods published by USGS are available for a nominal cost through the United States Geological Survey, U.S. Geological Survey Information Services, Box 25286, Federal Center, Denver, CO 80225–0425. Copies of final methods published by DOE are available for a nominal cost through the Environmental Measurements Laboratory, U.S. Department of Energy, 376 Hudson Street, New York, NY 10014–3621. Copies of *Standard Methods* are available for a nominal cost from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005.

#### I. Legal Authorities

##### A. Clean Water Act

This regulation is promulgated under the authority of sections 301, 304(h), 307, and 501(a) of the Clean Water Act (CWA), 33 U.S.C. 1311, 1314(h), 1317, 1361(a) (the “Act”). Section 301 of the Act prohibits the discharge of any pollutant into navigable waters unless the discharge complies with a National Pollutant Discharge Elimination System (NPDES) permit, issued under section

402 of the Act. Section 304(h) of the Act requires the EPA Administrator to “promulgate guidelines establishing test procedures for the analysis of pollutants that shall include the factors which must be provided in any certification pursuant to section 401 of this Act or permit applications pursuant to section 402 of this Act.” Section 501(a) of the Act authorizes the Administrator to “prescribe such regulations as are necessary to carry out his functions under this Act.” EPA publishes CWA analytical method regulations at 40 CFR Part 136. The Administrator also has made these test procedures applicable to monitoring and reporting of NPDES permits (40 CFR part 122, §§ 122.21, 122.41, 122.44, and 123.25), and to implementation of the pretreatment standards issued under section 307 of the Act (40 CFR part 403, §§ 403.10 and 403.12).

##### B. Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), as amended in 1996, requires EPA to promulgate national primary drinking water regulations (NPDWRs) that specify maximum contaminant levels (MCLs) or treatment techniques for drinking water contaminants (SDWA section 1412 (42 U.S.C. 300g–1)). NPDWRs apply to public water systems pursuant to SDWA section 1401(1)(A) (42 U.S.C. 300f(1)(A)). According to SDWA section 1401(1)(D), NPDWRs include “criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; including accepted methods for quality control and testing procedures \* \* \*” (42 U.S.C. 300f(1)(D)). In addition, SDWA section 1445(a) authorizes the Administrator to establish regulations for monitoring to assist in determining whether persons are acting in compliance with the requirements of the SDWA (42 U.S.C. 300j–4). EPA’s promulgation of analytical methods is authorized under these sections of the SDWA as well as the general rulemaking authority in SDWA section 1450(a), (42 U.S.C. 300j–9(a)).

#### II. Regulatory Background and History

EPA has promulgated analytical methods for all currently regulated wastewater and drinking water pollutants and contaminants. For most contaminants, EPA has promulgated regulations approving the use of more

than one standardized analytical method, and regulated entities may use any one of these approved methods for determining compliance with an MCL, an NPDES permit or another monitoring requirement. After any regulation is published, EPA may amend the regulations to approve additional methods or modifications to existing approved methods, or withdraw approved methods that become obsolete.

On January 16, 2001, EPA published a direct final rule that was to approve many updated methods published by non-EPA organizations for use in wastewater and drinking water compliance monitoring (66 FR 3466–3497). On the same day, EPA published a companion proposal that proposed approval of all methods in the direct final rule methods (66 FR 3526–3527). The proposal was to serve as the basis for a final rule if the direct final was withdrawn due to adverse comments. Because adverse comments were received from one commenter, EPA withdrew the direct final rule on May 15, 2001 (66 FR 26795) and deferred final action in order to respond to those comments. Today’s rulemaking constitutes EPA’s final action on the proposed rule.

#### III. Summary of Final Rule

A. This rule amends the regulations at 40 CFR part 136 to:

(1) Allow the use of 19 updated methods published by the ASTM International (ASTM; formerly the American Society for Testing and Materials) in the 1999 *Annual Book of ASTM Standards*, Vols. 11.01 and 11.02.

(2) Allow the use of 189 updated methods published by the Standard Methods Committee in *Standard Methods for the Examination of Water and Wastewater*, 19th edition, 1995, and 20th edition, 1998.

(3) Allow the use of 22 methods published by the United States Geological Survey (USGS) in open file reports and method compendiums.

(4) Correct minor editorial errors and update method source references.

B. This rule amends the regulations at 40 CFR Part 141 to:

(1) Allow the use of 12 updated methods published in the 1999 *Annual Book of ASTM Standards*, Vols. 11.01 and 11.02.

(2) Allow the use of 62 updated methods published by the Standard

Methods Committee in *Standard Methods for the Examination of Water and Wastewater*, 20th edition, 1998.

(3) Allow the use of six updated methods published by the Department of Energy (DOE) in the document "EML Procedures Manual," 28th Edition, Volume 1, 1997, for determinations of radionuclide contaminants.

(4) Correct minor editorial errors and update method source references.

C. This rule amends the regulations at 40 CFR Part 143 to:

(1) Recommend an updated version of a method (D 4327-97) published in the 1999 *Annual Book of ASTM Standards*, Vol. 11.01.

(2) Recommend updated versions of 12 methods published by the Standard Methods Committee in *Standard Methods for the Examination of Water and Wastewater*, 20th edition, 1998.

(3) Correct update method source references.

**IV. Changes From the January 16, 2001 Rule Proposal**

*A. Editorial Corrections*

Standard Methods 6220 B, 6230 B, and 6200 C were correctly specified in the rule text of the January, 16, 2001, direct final rule, but they were incorrectly referenced in Table 3 (64 FR 3470) of the preamble to that rule. Corrections to the preamble errors are noted as follows:

**STANDARD METHODS NUMBER CHANGES (CORRECTED)**

18th edition	19th edition	20th edition
6220 B 6230 B	6220 B 6230 B	6200 C 6200 C

**Edits to 40 CFR Part 136**

Two errors in the rule section of the January 2001 direct final rule at 40 CFR part 136.3 are corrected in today's rule as follows:

(1) A portion of a citation originally intended as a placeholder in footnote 45 to Table IB was inadvertently included. This citation is corrected to reference the correct USGS document number. "98-xxx" is changed to "00-170."

(2) Footnote 44 to Table 1B is renumbered, and a new footnote 44 is added to conform with a final rule that was published on December 30, 1999 (64 FR 73414). The December 1999 rule renumbered footnote 44 to footnote 51, and amended footnote 44 to specify information about a cyanide method that was the subject of the December 1999 rule. The direct final rule inadvertently overlooked these 1999 amendments.

**Edits to 40 CFR Part 141**

A commenter noted an error and EPA noted an omission in the references to methods at 40 CFR part 141.21 for determination of E coli. in drinking water. The error and omission are addressed, in today's rule, by revising 40 CFR 141.21 as follows:

(1) Footnote 1 to the table in paragraph (f)(3), paragraphs (f)(6)(i), (f)(6)(ii) and (f)(8) are revised to clarify instructions for the determining E coli. A commenter noted that the E coli. methods in the 19th and 20th editions of *Standard Methods* describe or reference procedures differently than the 18th edition version of these methods. These differences are editorial, not substantive, and all three versions of these methods provide equivalent results. Today's correction adds clarifying language to make the equivalency of the 18th, 19th and 20th

edition versions of these *E coli.* methods more apparent.

(2) Sentence 6 of paragraph (f)(5) is revised to add a citation to the 20th edition of *Standard Methods* that was inadvertently omitted in the January 2001 direct final rule. The Agency's intent in the January 16, 2001 direct final rulemaking was and is to allow use of more recent editions of *Standard Methods*, such as the 20th edition.

*B. Additional Technical Edits to 40 CFR Part 136.3*

A commenter noted several editorial errors in the current 40 CFR part 136.3 tables. EPA is correcting these errors in today's rule. Correction of these errors is not a substantive change to EPA regulations. These are simple editorial corrections that improve the clarity and accuracy of the regulations.

**Edits to Table 1C**

(1) A typographical error in the listing of the method for parameter 3 (acrolein) is corrected. Method "604" is changed to "624."

(2) An incorrect reference to Method 610 for parameter 4, acrylonitrile, is removed. Method 610 is not applicable to determinations of acrylonitrile.

(3) An incorrect reference to Method 6410B for parameter 22, carbon tetrachloride is removed. Method 6410B is not applicable to determinations of carbon tetrachloride.

(4) A misspelling of the analyte listing for parameter 27 is corrected, "chloraform" is changed to "chloroform." Also, a missing number in the note specified in the "Other" column was inadvertently omitted, "Note, p. 130." is changed to "Note 3, p. 130."

(5) A missing reference to footnote 5 is added to parameter 82, N-Nitrosodimethylamine, and removed for

parameters 83 and 103, N-Nitrosodi-n-propylamine, and 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, respectively. Footnote 5 expands the analytical scope of Method 625 to include additional parameters. However, the annotation of these parameters in Table IC omitted parameter 82, and should not have included parameters 83 and 103.

(6) A typographical error in the analyte listing for parameter 87 is corrected, 2,2'-oxybis(1-chloropropane) is changed to 2,2'-oxybis(1-chloropropane). In addition, an alternative analyte name, bis(2-chloroisopropyl) ether, is added for parameter 87. These changes conform the CFR listing of parameter 87 with the dual, equivalent name designation of this parameter in the methods (EPA Methods 611, 625 and 1625B) approved for compliance determinations of parameter 87.

(7) A typographical error in the reference to the compliance method for parameter 105, tetrachloroethene, is corrected. Method "6410 B [18th, 19th]" is changed to "6210 B [18th, 19th]." Method 6410 B is not applicable to determinations of tetrachloroethene.

(8) An incorrect reference to Method "1625<sup>5a</sup>" for parameter 103 (2,3,7,8-tetrachlorodibenzo-*p*-dioxin) is removed along with the superfluous footnote 5a to table 1C. Method 1625 is not applicable to determinations of this parameter.

**Edits to Table 1D**

A typographical error in the analyte listing for parameter 11 is corrected. "δ-BHC" is changed to "γ-BHC."

**Edits to Tables 1B and 1C**

To correctly specify the approved revision of listed EPA methods, a revision letter is added to the method

listings for EPA methods in Table 1C. References to EPA methods "1613," "1624" and "1625" are changed to "1613B," "1624B" and "1625B," respectively. In Table IB, EPA Method "1631" is changed to "1631C."

## V. Response to Comments

EPA proposed the method updates in today's rule on January 16, 2001 (66 FR 3526). The public comment period closed on March 19, 2001. EPA received comments from one commenter. A discussion of the significant comments follows. A complete copy of the comments and EPA's responses are included in the Docket for today's final rule.

### A. Approving Multiple Editions of Standard Methods

The commenter stated that approval of multiple editions of *Standard Methods* is a new requirement and an added burden to the regulatory authorities that must keep track of all approved methods. EPA disagrees that tracking multiple editions of *Standard Methods* is a new requirement or unduly burdensome. The Agency currently cites more than one edition of the same method, e.g. footnote 4 to the table of inorganic methods at 40 CFR 141.23 allows use of either the 18th or 19th edition versions of all the Standard Methods listed in the table. For this reason, the Agency always cites an approved method by both method number and date (or edition) of publication to avoid confusion about which versions are approved, and to allow incorporation of the method by reference in the CFR in lieu of publication of the entire method in the CFR. This citation policy means that existing State databases would be designed to accommodate the edition as well as the number of an approved method so that multiple versions of an approved method can be tracked.

EPA recognizes that there are tradeoffs between the current approach of allowing use of several versions of a test method, and the suggested revision (received in a comment) to allow only the most recent version of that method. Allowing use of only the 20th edition of *Standard Methods* may have more consequences than just the purchase of the 20th edition book. A laboratory may routinely use only a few methods that are published in *Standard Methods*, and these may be methods that have been reprinted in the 20th edition with no editorial or technical changes. Under the suggested revision to allow use of only the 20th edition of *Standard Methods*, a laboratory may be required to update method citations in existing

quality assurance manuals and laboratory standard operating procedures as well as provide analysts with a copy of the 20th edition version of the method even when the methods have not changed from previous editions.

Furthermore, withdrawal of previous editions of *Standard Methods* was not proposed for public comment in the January 2001 rule, and the suggestion to allow use of only the 20th edition of *Standard Methods* is outside the scope of today's regulatory amendments. Public comment on previous proposals to withdraw older versions of methods, indicated that most laboratories prefer the flexibility to use these versions if the methods have not changed significantly in new editions of the manuals. Thus, EPA continues to allow use of older editions of *Standard Methods*.

### B. Technical Differences Between Methods

The commenter suggested that some methods in the 18th edition of *Standard Methods* are obsolete because of technical and editorial updates in newer editions. EPA disagrees that the methods in the 18th edition of *Standard Methods* approved in today's rule are obsolete.

The methods approved by today's rule are technically equivalent to previously approved versions. Only methods using time-tested technologies are approved by today's rule. For the purposes of compliance monitoring, however, none of these methods are obsolete and all methods provide the necessary technical information. Therefore, EPA believes the use of previously approved editions of *Standard Methods* continues to be appropriate.

### C. Withdrawing Methods That Use Older Technology

The commenter suggested colorimetric methods for trace metals analysis, with the exception of hexavalent chromium, be dropped from the list of approved methods at 40 CFR part 136, Table IB, arguing that these methods are obsolete. The commenter stated that many of these methods list interferences not encountered by atomic absorption, atomic emission, or mass spectrometry techniques. The commenter also stated that many of these methods also increase the amount of hazardous waste generated in the laboratory and that the detection limits attained by the colorimetric methods may not be low enough to meet permit requirements. EPA disagrees for several reasons.

Colorimetric metals methods have been in use a long time, and explain

how to handle the analytical difficulties noted by the commenter. Although many of the colorimetric methods have the potential to generate more laboratory wastes than some newer methods, these methods produce acceptable compliance monitoring information, and the commenter did not provide any data to demonstrate otherwise. Colorimetric methods often provide a low-cost alternative to high energy analysis methods that have high labor and equipment costs. Finally, withdrawal of these methods was not proposed for public comment and is outside the scope of today's amendments.

### D. Digestion Preceding Sample Analysis

The commenter noted that 40 CFR part 136.3, Table IB, parameter 31, referring to total Kjeldahl nitrogen (TKN), specifies "digestion and distillation followed by" one of several new techniques. The commenter asked if "digestion and distillation followed by" means that digestion and distillation are required prior to analysis of a sample for NPDES compliance monitoring. EPA requires the use of separate digestion and distillation procedures prior to TKN analysis by certain methods, as specified in Table IB. "Digestion and distillation followed by," in the context of Table IB, requires the use of one of the listed digestion and distillation procedures for the Titration, Nesslerization and Electrode test methods. Today's rule reformats Table IB with appropriate indentation to reflect this requirement more clearly.

Other TKN methods explicitly require alternate sample preparation procedures, such as the semiautomated block digestion (e.g., EPA Method 351.2). For these methods, TKN analysis does not require the use the digestion and distillation procedures discussed in the preceding paragraph, because the alternate sample preparation procedures will provide the desired results.

### E. Metals Methods in 20th Edition of Standard Methods

The commenter inquired about the status of the graphite furnace and flame atomic absorption methods for metals analyses (GFAA and FLAA, respectively) that were revised in the 20th edition of *Standard Methods*, but not proposed for approval in the January 16, 2001 rule. The commenter recommended that EPA either approve or not approve all versions (18th, 19th and 20th edition) and not split approval of these methods by edition number. EPA did not propose, and today's rule does not approve, the 20th Edition versions of Methods 3111B, 3111D,

3112 B, 3113 B and 3114 B, which include the GFAA and FLAA methods noted by the commenter. These versions of the five methods are not acceptable because the method performance requirements specified in the 20th edition are not equivalent or better than in the 18th and 19th edition versions of these methods. The 20th edition of *Standard Methods* introduces less stringent quality control (QC) acceptance criteria (in Section 3020 of each method) than in the older versions. Specifically, the 18th and 19th edition versions specify that a recovery of a check standard outside the range of 95% to 105% suggests a potential problem, and a recovery outside the range of 90% to 110% indicates that the system is out of control. The 20th edition weakened and increased these limits to 90% to 100% and 80% to 120%, respectively. The editors of *Standard Methods* did not provide a basis for weakening the QC requirements in these methods, and they did not suggest applying these less stringent criteria to previous editions of the methods.

## VI. Administrative Requirements

### A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735; October 4, 1993), the Agency must determine whether the regulatory action is "significant" and, therefore, subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

- (1) Have an annual effect on the economy of \$100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or Tribal governments or communities;
- (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

It has been determined that this rule is not a "significant regulatory action" under the terms of Executive Order 12866 and is therefore not subject to OMB review.

*B. Regulatory Flexibility Act (RFA), as Amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et. seq.*

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

The RFA provides default definitions for each type of small entity. It also authorizes an agency to use alternative definitions for each category of small entity, "which are appropriate to the activities of the agency" after proposing the alternative definition(s) in the **Federal Register** and taking comment (5 U.S.C. 601(3)-(5).) In addition to the above, to establish an alternative small business definition, agencies must consult with the Small Business Administration's (SBA) Chief Counsel for Advocacy.

For purposes of assessing the impacts of today's rule on small entities under the SDWA, EPA considered small entities to be public water systems serving fewer than 10,000 persons. This is the cut-off level specified by Congress in the 1996 Amendments to the SDWA for small system flexibility provisions. In accordance with the RFA requirements, EPA proposed using this alternative definition in the **Federal Register** (63 FR 7620, February 13, 1998), requested comment, consulted with the SBA, and expressed its intention to use the alternative definition for all future drinking water regulations in the Consumer Confidence Reports regulation (63 FR 44511, August 19, 1998). As stated in that final rule, the alternative definition would be applied to this regulation as well.

For purposes of assessing the impacts of today's rule on small entities under the CWA, we defined: (1) Small businesses according to SBA size standards; (2) small governmental jurisdictions as governments of a city, county, town, school district or special district with a population of less than 50,000; and (3) small organizations as any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities.

This final rule will not impose any requirements on small entities. Today's rule approves additional updated versions of ASTM Methods, *Standard Methods*, United States Geological Survey (USGS) methods, and United States Department of Energy (DOE) methods for compliance with wastewater monitoring and drinking water standards and monitoring requirements but does not require the use of these specific versions. Previous versions of these ASTM, *Standard Methods*, USGS, and DOE methods are not being withdrawn. State, territorial, Tribal, and local governments and public and privately owned public water systems and laboratories performing analyses on behalf of these systems may continue to use the previous versions after the promulgation of today's rule. The final rule merely provides additional options. Any of the testing procedures currently listed at 40 CFR parts 136, 141, or 143 can be used if monitoring is otherwise required for this pollutant under the CWA or SDWA. This rule also makes minor technical corrections and clarifications to the regulations.

### C. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and Tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including Tribal governments, it must

have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

Today's rule contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) for State, local, or Tribal governments or the private sector. This rule imposes no enforceable duty on any State, local or Tribal governments or the private sector. EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. Thus, today's rule is not subject to the requirements of sections 202, 203, and 205 of the UMRA.

This rule provides additional analytical methods with which to conduct analyses for contaminants in wastewater and drinking water, and thus provides operational flexibility to laboratory analysts. Since the rule does not withdraw earlier versions of methods, EPA anticipates no increase in expenditure or burden.

#### *D. Paperwork Reduction Act*

This action does not impose an information collection burden under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* This action merely provides additional options on the selection of testing procedures when monitoring is otherwise required under the CWA or SDWA. Any of the testing procedures approved at 40 CFR parts 136, 141, or 143 can be used if such monitoring is required for a pollutant or contaminant. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purpose of collecting, validating, and verifying information processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR Chapter 15.

#### *E. National Technology Transfer and Advancement Act*

As noted in the proposed rule, Section 12(d) of the National Technology Transfer and Advancement Act of 1995, ("NTTAA"), Public Law 104-113, section 12(d) (15 U.S.C. 272 note), directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., material specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standard bodies. The NTTAA directs EPA to provide Congress, through the Office of Management and Budget (OMB), explanations when the Agency decides not to use available and applicable voluntary consensus standards. In this rulemaking EPA is approving updated versions of previously approved voluntary consensus standards published by ASTM and Standard Methods for many wastewater and drinking water contaminants.

#### *F. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks*

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be "economically significant" as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency. This rule is not subject to Executive Order 13045 because it is neither "economically significant" as defined under Executive Order 12866, nor does it concern an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children.

#### *G. Executive Order 13132: Federalism*

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Today's rule provides governmental and other public and private entities conducting analysis in wastewater and drinking water the option to use additional, updated analytical methods to monitor pollutants under the CWA or SDWA. Such regulated entities may choose any of these additional methods or continue to use the methods listed under 40 CFR parts 136, 141, and 143. Thus, Executive Order 13132 does not apply to this rule.

#### *H. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments*

Executive Order 13175, entitled "Consultation and Coordination with Indian Tribal Governments" (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure "meaningful and timely input by Tribal officials in the development of regulatory policies that have tribal implications." "Policies that have tribal implications" is defined in the Executive Order to include regulations that have "substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and the Indian tribes, or on the distribution of power and responsibilities between the Federal government and the Indian tribes."

This final rule does not have tribal implications. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175.

Today's rule provides Tribes conducting analysis in wastewater and drinking water the option to use additional updated analytical methods to monitor pollutants under the CWA or SDWA. Tribes may choose any of these additional methods or continue to use the methods listed under 40 CFR parts 136, 141, and 143. Thus, Executive Order 13175 does not apply to this rule.

*I. Congressional Review Act*

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), generally provides that before a 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 rule 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). This rule will be effective on November 22, 2002.

*J. Executive Order 13211: Energy Effects*

This rule is not subject to Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 FR 28355, May 22, 2001) because it is not a significant regulatory action under Executive Order 12866.

*K. Plain Language Directive*

Executive Order 12866 requires each agency to write its rules in plain language. Readable regulations help the public find requirements quickly and understand them easily. They increase compliance, strengthen enforcement, and decrease mistakes, frustration, phone calls, appeals, and distrust of government. EPA made every effort to

write this preamble to the final rule in as clear, concise, and unambiguous manner as possible. Today's final rule is mostly in a table format consistent with the format of the CFR sections we are amending.

**List of Subjects**

*40 CFR Part 136*

Environmental protection, Incorporation by reference, Reporting and recordkeeping requirements, Water pollution control.

*40 CFR Part 141*

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

*40 CFR Part 143*

Environmental protection, Chemicals, Indians-lands, Water supply.

Dated: September 12, 2002.

**Christine Todd Whitman,**  
*Administrator.*

For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations, is amended as follows:

**PART 136—GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS**

1. The authority citation for part 136 continues to read as follows:

**Authority:** Secs. 301, 304(h), 307, and 501(a) Pub. L. 95-217, 91 Stat. 1566, *et seq.* (33 U.S.C. 1251, *et seq.*) (The Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977.)

2. Section 136.3 is amended:

a. In paragraph (a) by revising the introductory text and Tables IA, IB, IC, ID, and IE.

b. In paragraph (b) by revising references (6) and (10), and adding references (44) through (51).

**§ 136.3 Identification of test procedures.**

(a) Parameters or pollutants, for which methods are approved, are listed together with test procedure descriptions and references in Tables IA, IB, IC, ID, IE, and IF. The full text of the referenced test procedures are incorporated by reference into Tables IA, IB, IC, ID, IE, and IF. The incorporation by reference of these documents, as specified in paragraph (b) of this section, was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed in paragraph (b) of this section. Information regarding obtaining these documents can be obtained from the EPA Office of Water Statistics and Analytical Support Branch at 202-566-1000. Documents may be inspected at EPA's Water Docket, EPA West, 1301 Constitution Avenue, NW., Room B135, Washington, DC (Telephone: 202-566-2426); or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC. These test procedures are incorporated as they exist on the day of approval and a notice of any change in these test procedures will be published in the **Federal Register**. The discharge parameter values for which reports are required must be determined by one of the standard analytical test procedures incorporated by reference and described in Tables IA, IB, IC, IE, and IF, or by any alternate test procedure which has been approved by the Administrator under the provisions of paragraph (d) of this section and §§ 136.4 and 136.5. Under certain circumstances (paragraph (b) or (c) of this section or 40 CFR 401.13) other test procedures may be more advantageous when such other test procedures have been previously approved by the Regional Administrator of the Region in which the discharge will occur, and providing the Director of the State in which such discharge will occur does not object to the use of such alternate test procedure.

TABLE IA.—LIST OF APPROVED BIOLOGICAL METHODS

Parameter and units	Method <sup>1</sup>	EPA	Standard Methods 18th, 19th, 20th ed.	ASTM	USGS
Bacteria:					
1. Coiform (fecal), number per 100 mL.	Most Probable Number (MPN), 5 tube 3 dilution, or Membrane filter (MF) <sup>2</sup> single step.	p. 132 <sup>3</sup> ..... p. 124 <sup>3</sup> .....	9221C E <sup>4</sup> 9222D <sup>4</sup>	.....	B-0050-85 <sup>5</sup>
2. Coliform (fecal) in presence of choline, number per 100 mL.	MPN, 5 tube, 3 dilution, or MF, single step <sup>6</sup> .....	p. 132 <sup>3</sup> ..... p. 124 <sup>3</sup> .....	9221C E <sup>4</sup> 9221D <sup>4</sup>	.....	
3. Coliform (total), number per 100 mL.	MPN, 5 tube, 3 dilution, or MF <sup>2</sup> single step or two step .....	p. 114 <sup>3</sup> ..... p. 108 <sup>3</sup> .....	9221B <sup>4</sup> 9222B <sup>4</sup>	.....	B-0025-85 <sup>5</sup>



TABLE IA.—LIST OF APPROVED BIOLOGICAL METHODS—Continued

Parameter and units	Method <sup>1</sup>	EPA	Standard Methods 18th, 19th, 20th ed.	ASTM	USGS
4. Coliform (total), in presence of chlorine, number per 100 mL.	MPN, 5 tube, 3 dilution, or ..... MF <sup>2</sup> with enrichment .....	p. 114 <sup>3</sup> ..... p. 111 <sup>3</sup> .....	9221B <sup>4</sup> 9222 (B+B.5c) <sup>4</sup>		
5. Fecal streptococci, number per 100 mL.	MPN, 5 tube, 3 dilution ..... MF <sup>2</sup> or ..... Plate count .....	p. 139 <sup>3</sup> ..... p. 136 <sup>3</sup> ..... p. 143 <sup>3</sup> .....	9230B <sup>4</sup> 9230C <sup>4</sup>	.....	B-0055-85 <sup>5</sup>
Aquatic Toxicity:					
6. Toxicity, acute, fresh water organisms, LC50, percent effluent.	Daphnia, Ceriodaphnia, Fathead Minnow, Rainbow Trout, Brook Trout, or Bannerfish Shiner mortality.	Sec. 9 <sup>7</sup>			
7. Toxicity, acute, estuarine and marine organisms, LC50, percent effluent.	Mysid, Sheepshead Minnow, or Menidia spp. mortality.	Sec. 9 <sup>7</sup>			
8. Toxicity, chronic, fresh water organisms, NOEC or IC25, percent effluent.	Fathead minnow larval survival and growth.  Fathead minnow embryo-larval survival and teratogenicity. Ceriodaphnia survival and reproduction. Selenastrum growth .....	1000.0 <sup>8</sup>  1001.0 <sup>8</sup> 1002.0 <sup>8</sup> 1003.0 <sup>8</sup>			
9. Toxicity, chronic estuarine and marine organisms, NOEC or IC25, percent effluent.	Sheepshead minnow larval survival and growth.  Sheepshead minnow embryo-larval survival and teratogenicity. Menidia beryllina larval and growth .... Mysidopsis bahia, growth, and fecundity. Arbacia punctulata fertilization ..... Champia parvula reproduction .....	1004.0 <sup>9</sup>  1005.0 <sup>9</sup> 1006.0 <sup>9</sup> 1007.0 <sup>9</sup> 1008.0 <sup>9</sup> 1009.0 <sup>9</sup>			

Notes to Table IA:

- <sup>1</sup> The method must be specified when results are reported.
- <sup>2</sup> A 0.45 µm membrane filter (MF) or other pore size certified by the manufacturer to fully retain organisms to be cultivated and to be free of extractables which could interfere with their growth.
- <sup>3</sup> USEPA. 1978. Microbiological Methods for Monitoring the Environment, Water, and Wastes. Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio. EPA/600/8-78/017.
- <sup>4</sup> APHA. 1998, 1995, 1992. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. 20th, 19th, and 18th Editions. Amer. Publ. Hlth. Assoc., Washington, DC.
- <sup>5</sup> USGS. 1989. U.S. Geological Survey Techniques of Water-Resource Investigations, Book 5, Laboratory Analysis, Chapter A4, Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples, U.S. Geological Survey, U.S. Department of the Interior, Reston, Virginia.
- <sup>6</sup> Because the MF technique usually yields low and variable recovery from chlorinated wastewaters, the Most Probable Number method will be required to resolve any controversies.
- <sup>7</sup> USEPA. 1993. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio. August 1993, EPA/600/4-90/027F.
- <sup>8</sup> USEPA. 1994. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Third Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency USEPA. 1994, Cincinnati, Ohio. (July 1994, EPA/600/4-91/002).
- <sup>9</sup> Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. Second Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio (July 1994, EPA/600/4-91/003). These methods do not apply to marine waters of the Pacific Ocean.

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 3, 5</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
1. Acidity, as CaCO <sub>3</sub> , mg/L: Electrometric endpoint or phenolphthalein endpoint.	305.1 .....	2310 B(4a) [18th, 19th, 20th].	D1067-92 .....	I-1020-85  I-2030-85	
2. Alkalinity, as CaCO <sub>3</sub> , mg/L: Electrometric or Colorimetric titration to pH 4.5, manual or automatic.	310.1 .....	2320 B [18th, 19th, 20th].	D1067-92 .....	I-1030-85 .....	973.43 <sup>3</sup>
	310.2 .....	.....	.....	I-2030-85	

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
3. Aluminium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration <sup>36</sup> ..	202.1 .....	3111 D [18th, 19th]	.....	I-3051-85	
AA furnace .....	202.2 .....	3113 B [18th, 19th].			
Inductively Coupled Plasma/Atomic Emission Spectrometry (ICP/AES) <sup>36</sup> .	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
Direct Current Plasma (DCP) <sup>36</sup> .	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (Eriochrome cyanine R).	.....	3500-Al B [20th] and 3500-Al D [18th, 19th].			
4. Ammonia (as N), mg/L: Manual, distillation (at pH 9.5) <sup>6</sup> followed by.	350.2 .....	4500-NH <sub>3</sub> B [18th, 19th, 20th].	.....		973.49 <sup>3</sup>
Nesslerization .....	350.2 .....	4500-NH <sub>3</sub> C [18th] ..	D1426-98(A) .....	I-3520-85 .....	973.49 <sup>3</sup>
Titration .....	350.2 .....	4500-NH <sub>3</sub> C [19th, 20th] and 4500-NH <sub>3</sub> E [18th].			
Electrode .....	350.3 .....	4500-NH <sub>3</sub> D or E [19th, 20th] and 4500-NH <sub>3</sub> F or G [18th].	D1426-98(B).		
Automated phenate, or	350.1 .....	4500-NH <sub>3</sub> G [19th, 20th] and 4500-NH <sub>3</sub> H [18th].	.....	I-4523-85	
Automated electrode ....	.....	.....	.....	.....	Note 7.
5. Antimony—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration <sup>36</sup> ..	204.1 .....	3111 B [18th, 19th]			
AA furnace .....	204.2 .....	3113 B [18th, 19th]			
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
6. Arsenic—Total <sup>4</sup> mg/L: Digestion <sup>4</sup> followed by					
AA gaseous hydride ....	206.5 .....	3114 B 4.d [18th, 19th].	D2972-97(B)	I-3062-85	
AA furnace .....	206.2 .....	3113 B [18th, 19th]	D2972-97(C)	I-4063-98 <sup>49</sup>	
ICP/AES <sup>36</sup> or .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
Colorimetric (SDDC) ....	206.4 .....	3500-As B [20th] and 3500-As C [18th, 19th].	D2972-97(A)	I-3060-85	
7. Barium—Total, <sup>4</sup> mg/L; Di- gestion <sup>4</sup> followed by:					
AA direct aspiration <sup>14</sup> ..	208.1 .....	3111 D [18th, 19th]	.....	I-3084-85	
AA furnace .....	208.2 .....	3113 B [18th, 19th]	D4382-95		
ICP/AES <sup>14</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
DCP <sup>14</sup> .....	.....	.....	.....	.....	Note 34.
8. Beryllium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration .....	210.1 .....	3111 D [18th, 19th]	D3645-93(88)(A) ....	I-3095-85	
AA furnace .....	210.2 .....	3113 B [18th, 19th]	D3645-93(88)(B)		
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP, or .....	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (aluminon)	.....	3500-Be D [18th, 19th].			
9. Biochemical oxygen demand (BOD <sub>5</sub> ), mg/L: Dissolved Oxygen Depletion.	405.1 .....	5210 B [18th, 19th, 20th].	.....	I-1578-78 <sup>8</sup> .....	973.44, <sup>3</sup> p. 17 <sup>9</sup>
10. Boron <sup>37</sup> —Total, mg/L: Colorimetric (curcumin)	212.3 .....	4500-B B [18th, 19th, 20th].	.....	I-3112-85	
ICP/AES, or .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
DCP .....	.....	.....	D4190-94 .....	.....	Note 34.
11. Bromide, mg/L: Titrimetric .....	320.1 .....	.....	D1246-95(C) .....	I-1125-85 .....	p. S44 <sup>10</sup>
12. Cadmium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration <sup>36</sup> ..	213.1 .....	3111 B or C [18th, 19th].	D3557-95 (A or B) ..	I-3135-85 or I-3136-85.	974.27, <sup>3</sup> p. 37 <sup>9</sup>
AA furnace .....	213.2 .....	3113 B [18th, 19th]	D3557-95(D) .....	I-4138-89 <sup>51</sup>	
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-1472-85 or I-4471-97 <sup>50</sup>	
DCP <sup>36</sup> .....	.....	.....	D4190-94 .....	.....	Note 34.
Voltametry <sup>11</sup> , or .....	.....	.....	D3557-95(C).	.....	
Colorimetric (Dithizone) .....	.....	3500-Cd D [18th, 19th].	.....	.....	
13. Calcium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration .....	215.1 .....	3111 B [18th, 19th]	D511-93(B) .....	I-3152-85	
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP, or .....	.....	.....	.....	.....	Note 34.
Titrimetric (EDTA) .....	215.2 .....	3500-Ca B [20th] and 3500-Ca D [18th, 19th].	D511-93(A).	.....	
14. Carbonaceous biochemical oxygen demand (CBOD <sub>3</sub> ), mg/L <sup>12</sup> : Dissolved Oxygen Depletion with nitrification inhibitor.	.....	5210 B [18th, 19th, 20th].	.....	.....	
15. Chemical oxygen demand (COD), mg/L; Titrimetric .....	410.1 .....	5220 C [18th, 19th, 20th].	D1252-95(A) .....	I-3560-85 .....	973.46, <sup>3</sup> p. 17 <sup>9</sup>
or .....	410.2 .....	.....	.....	I-3562-85	
Spectrophotometric, manual or automatic.	410.3. 410.4. ....	5220 D [18th, 19th, 20th].	D1252-95(B) .....	I-3561-85 .....	Notes 13, 14.
16. Chloride, mg/L: Titrimetric (silver nitrate) or. (Mercuric nitrate) .....	..... 325.3 .....	4500-Cl <sup>-</sup> B [18th, 19th, 20th]. 4500-Cl <sup>-</sup> C [18th, 19th, 20th].	D512-89(B) .....	I-1183-85 I-1184-85 .....	973.51 <sup>3</sup>
Colorimetric, manual or Automated (Ferricyanide).	325.1 or 325.2 .....	4500-Cl <sup>-</sup> E [18th, 19th, 20th].	.....	I-1187-85 I-2187-85	
17. Chlorine—Total residual, mg/L; Titrimetric: Amperometric direct .....	330.1 .....	4500-Cl D [18th, 19th, 20th].	D1253-86(92).	.....	
Iodometric direct .....	330.3 .....	4500-Cl B [18th, 19th, 20th].	.....	.....	
Back titration ether endpoint <sup>15</sup> or. DPD-FAS .....	330.2 .....	4500-Cl C [18th, 19th, 20th].	.....	.....	
DPD-FAS .....	330.4 .....	4500-Cl F [18th, 19th, 20th].	.....	.....	
Spectrophotometric, DPD. Or Electrode .....	330.5 .....	4500-Cl G [18th, 19th, 20th].	.....	.....	Note 16.
18. Chromium VI dissolved, mg/L; 0.45 micron filtration followed by: AA chelation-extraction or. Colorimetric (Diphenylcarbazide).	218.4 .....	3111 C [18th, 19th]	.....	I-1232-85	
.....	.....	3500-Cr B [20th] and 3500-Cr D [18th, 19th].	D1687-92(A) .....	I-1230-85	
19. Chromium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration <sup>36</sup> ..	218.1 .....	3111 B [18th, 19th]	D1687-92(B) .....	I-3236-85 .....	974.27 <sup>3</sup>
AA chelation-extraction .....	218.3 .....	3111 C [18th, 19th].	.....	.....	

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
AA furnace .....	218.2 .....	3113 B [18th, 19th]	D1687-92(C) .....	I-3233-93 <sup>46</sup> .	
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
DCP <sup>36</sup> or .....	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (Diphenylcarbazine).	.....	3500-Cr B [20th] and 3500-Cr D [18th, 19th].			
20. Cobalt—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration .....	219.1 .....	3111 B or C [18th, 19th].	D3558-94(A or B) ...	I-3239-85 .....	p. 37 <sup>9</sup>
AA furnace .....	219.2 .....	3113 B [18th, 19th]	D3558-94(C) .....	I-4243-89 <sup>51</sup> .	
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].		I-4471-97 <sup>50</sup> .	
DCP .....	.....	.....	D4190-94 .....	.....	Note 34.
21. Color platinum cobalt units or dominant wavelength, hue, luminance purity: Colorimetric (ADMI), or. (Platinum cobalt), or .....	110.1 .....	2120 E [18th, 19th, 20th].	.....	.....	Note 18.
Spectrophotometric .....	110.2 .....	2120 B [18th, 19th, 20th].	.....	I-1250-85	
.....	110.3 .....	2120 C [18th, 19th, 20th].	.....	.....	
22. Copper—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration <sup>36</sup> ..	220.1 .....	3111 B or C [18th, 19th].	D1688-95(A or B) ...	I-3270-85 or I-3271-85.	974.27 <sup>3</sup> p. 37 <sup>9</sup>
AA furnace .....	220.2 .....	3113 B [18th, 19th]	D1688-95(C) .....	I-4274-89 <sup>51</sup>	
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].		I-4471-97 <sup>50</sup>	
DCP <sup>36</sup> or .....	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (Neocuproine) or. (Bicinchoninate) .....	.....	3500-Cu B [20th] and 3500-Cu D [18th, 19th].			Note 19.
.....	.....	3500-Cu C [20th] and 3500-As B [18th, 19th].			
23. Cyanide—Total, mg/L: Manual distillation with MgCl <sub>2</sub> followed by.. Titrimetric, or .....	.....	4500-CN C [18th, 19th, 20th].	D2036-98(A)	.....	p. 22 <sup>9</sup>
.....	.....	4500-CN D [18th, 19th, 20th].	.....	.....	
Spectrophotometric, manual or. Automated <sup>20</sup> .....	335.2 <sup>31</sup> .....	4500-CN E [18th, 19th, 20th].	D2036-98(A) .....	I-3300-85	
.....	335.3 <sup>31</sup> .....	.....	.....	I-4302-85	
24. Available Cyanide, mg/L: Manual distillation with MgCl <sub>2</sub> followed by titrimetric or Spectrophotometric. Flow injection and ligand exchange, followed by amperometry.	335.1 .....	4500-CN G [18th, 19th, 20th].	D2036-98(B)	.....	OIA-1677 <sup>44</sup>
.....	.....	.....	.....	.....	
25. Fluoride—Total, mg/L: Manual distillation <sup>6</sup> followed by. Electrode, manual or .... Automated .....	340.2 .....	4500-F B [18th, 19th, 20th].	D1179-93(B)	.....	
.....	.....	4500-F C [18th, 19th, 20th].	.....	I-4327-85	
Colorimetric (SPADNS) .....	340.1 .....	4500-F D [18th, 19th, 20th].	D1179-93(A)	.....	
Or Automated complexone.	340.3 .....	4500-F E [18th, 19th, 20th].	.....	.....	
26. Gold—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:	.....	.....	.....	.....	

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
AA direct aspiration .....	231.1 .....	3111 B [18th, 19th]			
AA furnace, or .....	231.2				
DCP .....					Note 34.
27. Hardness—Total, as CaCO <sub>3</sub> , mg/L:					
Automated colorimetric, Titrimetric (EDTA), or Ca plus Mg as their carbonates, by inductively coupled plasma or AA direct aspiration (See Parameters 13 and 33).	130.1 130.2 .....	2340 B or C [18th, 19th, 20th].	D1126–86(92) .....	I–1338–85 .....	973.52B <sup>3</sup>
28. Hydrogen ion (pH), pH units:					
Electrometric measurement, or.	150.1 .....	4500–H <sup>+</sup> B [18th, 19th, 20th].	D1293–84 (90)(A or B).	I–1586–85 .....	973.41 <sup>3</sup>
Automated electrode ....				I–2587–85 .....	Note 21.
29. Iridium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration or AA furnace .....	235.1 .....	3111 B [18th, 19th]			
30. Iron—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:	235.2				
AA direct aspiration <sup>36</sup> ..	236.1 .....	3111 B or C [18th, 19th].	D1068–96(A or B) ...	I–3381–85 .....	974.27 <sup>3</sup>
AA furnace .....	236.2 .....	3113 B [18th, 19th]	D1068–96(C)		
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].		I–4471–97 <sup>50</sup>	
DCP <sup>36</sup> or .....			D4190–94 .....		Note 34.
Colorimetric (Phenanthroline).		3500–Fe B [20th] and 3500–Fe D [18th, 19th].	D1068–96(D) .....		Note 22.
31. Kjeldahl Nitrogen—Total, (as N), mg/L:					
Digestion and distillation followed by.	351.3 .....	4500–N <sub>org</sub> B or C and 4500–NH <sub>3</sub> B [18th, 19th, 20th].	D3590–89(A)		
Titration .....	351.3 .....		D3590–89(A) .....		973.48 <sup>3</sup>
Nesslerization .....	351.3 .....	4500–NH <sub>3</sub> C [18th] ..	D3590–89(A) .....		
Electrode .....	351.3 .....	4500–NH <sub>3</sub> C [19th, 20th] and 4500–NH <sub>3</sub> E [18th].			
Automated phenate colorimetric.	351.1 .....			I–4551–78 <sup>8</sup>	
Semi-automated block digester colorimetric.	351.2 .....		D3590–89(B) .....	I–4515–91 <sup>45</sup> .	
Manual or block digester potentiometric.	351.4 .....		D3590–89(A)		
Block digester, followed by Auto distillation and Titration, or.					Note 39.
Nesslerization, or .....					Note 40.
Flow injection gas diffusion					Note 41.
32. Lead—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration <sup>36</sup> ..	239.1 .....	3111 B or C [18th, 19th].	D3559–96(A or B) ...	I–3399–85 .....	974.27 <sup>3</sup>
AA furnace .....	239.2 .....	3113 B [18th, 19th]	D3559–96(D) .....	I–4403–89 <sup>51</sup>	
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].		I–4471–97 <sup>50</sup>	
DCP <sup>36</sup> .....			D4190–94 .....		Note 34.
Voltametry <sup>11</sup> or .....			D3559–96(C) .....		
Colorimetric (Dithizone)		3500–Pb B [ 20th] and 3500–Pb D [18th, 19th].			
33. Magnesium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration .....	242.1 .....	3111 B [18th, 19th]	D511–93(B) .....	I–3447–85 .....	974.27 <sup>3</sup>

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP or .....	.....	.....	.....	.....	Note 34.
Gravimetric .....	.....	3500-Mg D [18th, 19th].	.....	.....	
34. Manganese-Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration <sup>36</sup> ..	243.1 .....	3111 B [18th, 19th]	D858-95(A or B) .....	I-3454-85 .....	974.27 <sup>3</sup>
AA furnace .....	243.2 .....	3113 B [18th, 19th]	D858-95(C)	.....	
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP <sup>36</sup> , or .....	.....	.....	D4190-94 .....	.....	Note 34
Colorimetric (Persulfate), or.	.....	3500-Mn B [20th] and 3500-Mn D [18th, 19th].	.....	.....	920.203 <sup>3</sup>
(Periodate) .....	.....	.....	.....	.....	Note 23.
35. Mercury—Total <sup>4</sup> , mg/L:					
Cold vapor, manual or Automated .....	245.1 .....	3112 B [18th, 19th]	D3223-91 .....	I-3462-85 .....	977.22 <sup>3</sup>
Oxidation, purge and trap, and cold vapor atomic fluorescence spectrometry (ng/L).	245.2 1631C <sup>43</sup>				
36. Molybdenum—Total <sup>4</sup> , mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration .....	246.1 .....	3111 D [18th, 19th]	.....	I-3490-85	
AA furnace .....	246.2 .....	3113 B [18th, 19th]	.....	I-3492-96 <sup>47</sup>	
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP .....	.....	.....	.....	.....	Note 34.
37. Nickel—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration <sup>36</sup> ..	249.1 .....	3111 B or C [18th, 19th].	D1886-90(A or B) ...	I-3499-85.	
AA furnace .....	249.2 .....	3113 B [18th, 19th]	D1886-90(C) .....	I-4503-89 <sup>51</sup> .	
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup> .	
DCP <sup>36</sup> , or .....	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (heptoxime).	.....	3500-Ni D [17th].	.....	.....	
38. Nitrate (as N), mg/L: Colorimetric (Brucine sulfate), or Nitrate-nitrite N minus Nitrite N (See parameters 39 and 40).	352.1 .....	.....	.....	.....	973.50, <sup>3</sup> 419D, <sup>17</sup> p. 28 <sup>9</sup>
39. Nitrate-nitrite (as N), mg/L:					
Cadmium reduction, Manual or.	353.3 .....	4500-NO <sub>3</sub> <sup>-</sup> E [18th, 19th, 20th].	D3867-99(B).	.....	
Automated, or .....	353.2 .....	4500-NO <sub>3</sub> <sup>-</sup> F [18th, 19th, 20th].	D3867-99(A) .....	I-4545-85.	
Automated hydrazine ...	353.1 .....	4500-NO <sub>3</sub> <sup>-</sup> H [18th, 19th, 20th].	.....	.....	
40. Nitrite (as N), mg/L; Spectrophotometric:					
Manual or .....	354.1 .....	4500-NO <sub>2</sub> <sup>-</sup> B [18th, 19th, 20th].	.....	.....	Note 25.
Automated (Diazotization).	.....	.....	.....	I-4540-85.	
41. Oil and grease—Total recoverable, mg/L: Gravimetric (extraction)	413.1 .....	5520B [18th, 19th, 20th] <sup>38</sup> .	.....	.....	

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
Oil and grease and non-polar material, mg/L: Hexane extractable material (HEM): n-Hexane extraction and gravimetry.	1664A <sup>42</sup> .....	5520B [18th, 19th, 20th] <sup>38</sup> .			
Silica gel treated HEM (SGT-HEM): Silica gel treatment and gravimetry.	1664A <sup>42</sup> .				
42. Organic carbon—Total (TOC), mg/L: Combustion or oxidation.	415.1 .....	5310 B, C, or D [18th, 19th, 20th].	D2579-93 (A or B) ..	.....	973.47, <sup>3</sup> p. 14 <sup>24</sup>
43. Organic nitrogen (as N), mg/L: Total Kjeldahl N (Parameter 31) minus ammonia N (Parameter 4).					
44. Orthophosphate (as P), mg/L; Ascorbic acid method:					
Automated, or .....	365.1 .....	4500-P F [18th, 19th, 20th].	.....	I-4601-85 .....	973.56 <sup>3</sup>
Manual single reagent	365.2 .....	4500-P E [18th, 19th, 20th].	D515-88(A) .....	.....	973.55 <sup>3</sup>
Manual two reagent .....	365.3.				
45. Osmium—Total <sup>4</sup> , mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration, or	252.1 .....	3111 D [18th, 19th].			
AA furnace .....	252.2.				
46. Oxygen, dissolved, mg/L:					
Winkler (Azide modification), or.	360.2 .....	4500-O C [18th, 19th, 20th].	D888-92(A) .....	I-1575-78 <sup>8</sup> .....	973.45B <sup>3</sup>
Electrode .....	360.1 .....	4500-O G [18th, 19th, 20th].	D888-92(B) .....	I-1576-78 <sup>8</sup> .	
47. Palladium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration, or	253.1 .....	3111 B [18th, 19th]	.....	.....	p. S27 <sup>10</sup>
AA furnace .....	253.2 .....				p. S28 <sup>10</sup>
DCP .....					Note 34.
48. Phenols, mg/L:					
Manual distillation <sup>26</sup> ....	420.1 .....				Note 27.
Followed by:					
Colorimetric (4AAP) manual, or.	420.1 .....				Note 27.
Automated <sup>19</sup> .....	420.2.				
49. Phosphorus (elemental), mg/L:					
Gas-liquid chromatography.	.....				Note 28.
50. Phosphorus—Total, mg/L:					
Persulfate digestion followed by.	365.2 .....	4500-P B, 5 [18th, 19th, 20th].	.....	.....	973.55 <sup>3</sup>
Manual or .....	365.2 or 365.3 .....	4500-P E [18th, 19th, 20th].	D515-88(A)		
Automated ascorbic acid reduction.	365.1 .....	4500-P F [18th, 19th, 20th].	.....	I-4600-85 .....	973.56 <sup>3</sup>
Semi-automated block digester.	365.4 .....	.....	D515-88(B) .....	I-4610-91 <sup>48</sup> .	
51. Platinum—Total, <sup>4</sup> mg/L: Digestion <sup>4</sup> followed by:					
AA direct aspiration .....	255.1 .....	3111 B [18th, 19th].			
AA furnace .....	255.2.				

TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
DCP .....	.....	.....	.....	.....	Note 34
52. Potassium—Total, <sup>4</sup> mg/L: Digestion <sup>4</sup> followed by:					
AA direct aspiration .....	258.1 .....	3111 B [18th, 19th]	.....	I-3630-85 .....	973.53 <sup>3</sup>
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
Flame photometric, or ..	.....	3500-K B [20th] and 3500-K D [18th, 19th].			
Colorimetric .....	.....	.....	.....	.....	317 B <sup>17</sup>
53. Residue—Total, mg/L: Gravimetric, 103–105°	160.3 .....	2540 B [18th, 19th, 20th].	.....	I-3750-85.	
54. Residue—filterable, mg/L: Gravimetric, 180° .....	160.1 .....	2540 C [18th, 19th, 20th].	.....	I-1750-85.	
55. Residue—nonfilterable (TSS), mg/L: Gravimetric, 103–105° post washing of residue.	160.2 .....	2540 D [18th, 19th, 20th].	.....	I-3765-85.	
56. Residue—settleable, mg/L: Volumetric, (Imhoff cone), or gravimetric.	160.5 .....	2540 F [18th, 19th, 20th].			
57. Residue—Volatile, mg/L: Gravimetric, 550° .....	160.4 .....	.....	.....	I-3753-85.	
58. Rhodium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration, or	265.1 .....	3111 B [18th, 19th].			
AA furnace .....	265.2.				
59. Ruthenium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration, or	267.1 .....	3111 B [18th, 19th].			
AA furnace .....	267.2.				
60. Selenium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA furnace .....	270.2 .....	3113 B [18th, 19th]	D3859-98(B) .....	I-4668-98 <sup>49</sup> .	
ICP/AES, <sup>36</sup> or .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
AA gaseous hydride .....	.....	3114 B [18th, 19th]	D3859-98(A) .....	I-3667-85.	
61. Silica <sup>37</sup> —Dissolved, mg/L; 0.45 micron filtration followed by:					
Colorimetric, Manual or	370.1 .....	4500-SiO <sub>2</sub> C [20th] and 4500-Si D [18th, 19th].	D859-94 .....	I-1700-85.	
Automated (Molybdosilicate), or	.....	.....	.....	I-2700-85.	
ICP .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup> .	
62. Silver—Total, <sup>4</sup> mg/L: Digestion <sup>4,29</sup> followed by:					
AA direct aspiration .....	272.1 .....	3111 B or C [18th, 19th].	.....	I-3720-85 .....	974.27, <sup>3</sup> p. 37 <sup>9</sup>
AA furnace .....	272.2 .....	3113 B [18th, 19th]	.....	I-4724-89 <sup>51</sup>	
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP .....	.....	.....	.....	.....	Note 34.
63. Sodium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by:					
AA direct aspiration .....	273.1 .....	3111 B [18th, 19th]	.....	I-3735-85 .....	973.54 <sup>3</sup>
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup>	
DCP, or .....	.....	.....	.....	.....	Note 34.
Flame photometric .....	.....	3500 Na B [20th] and 3500 Na D [18th, 19th].	.....	.....	



TABLE 1B.—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method number or page)				
	EPA <sup>1, 35</sup>	Standard Methods [Edition(s)]	ASTM	USGS <sup>2</sup>	Other
64. Specific conductance, micromhos/cm at 25 °C: Wheatstone bridge .....	120.1 .....	2510 B [18th, 19th, 20th].	D1125-95(A) .....	I-2781-85 .....	973.40 <sup>3</sup>
65. Sulfate (as SO <sub>4</sub> ), mg/L: Automated colorimetric (barium chloranilate). Gravimetric .....	375.1. 375.3 .....	4500-SO <sub>4</sub> <sup>-2</sup> C or D [18th, 19th, 20th].	.....	.....	925.54 <sup>3</sup>
Turbidimetric .....	375.4 .....	.....	D516-90 .....	.....	426C <sup>30</sup>
66. Sulfide (as S), mg/L: Titrimetric (iodine), or ...	376.1 .....	4500-S <sup>-2</sup> F [19th, 20th] or 4500-S <sup>-2</sup> E [18th].	.....	I-3840-85.	
Colorimetric (methylene blue).	376.2 .....	4500-S <sup>-2</sup> D [18th, 19th, 20th].			
67. Sulfite (as SO <sub>3</sub> ), mg/L: Titrimetric (iodine-iodate).	377.1 .....	4500-SO <sub>3</sub> <sup>-2</sup> B [18th, 19th, 20th].			
68. Surfactants, mg/L: Colorimetric (methylene blue).	425.1 .....	5540 C [18th, 19th, 20th].	D2330-88.		
69. Temperature, °C: Thermometric .....	170.1 .....	2550 B [18th, 19th, 20th].	.....	.....	Note 32.
70. Thallium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration .....	279.1 .....	3111 B [18th, 19th].			
AA furnace .....	279.2.				
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].			
71. Tin—Total, <sup>4</sup> mg/L; Di- gestion <sup>4</sup> followed by: AA direct aspiration .....	282.1 .....	3111 B [18th, 19th]	.....	I-3850-78 <sup>8</sup> .	
AA furnace, or .....	282.2 .....	3113 B [18th, 19th].			
ICP/AES .....	200.7 <sup>5</sup> .				
72. Titanium—Total, <sup>4</sup> mg/L; Digestion <sup>4</sup> followed by: AA direct aspiration .....	283.1 .....	3111 D [18th, 19th].			
AA furnace .....	283.2.				
DCP .....	.....	.....	.....	.....	Note 34.
73. Turbidity, NTU: Nephelometric .....	180.1 .....	2130 B [18th, 19th, 20th].	D1889-94(A) .....	I-3860-85.	
74. Vanadium—Total, <sup>4</sup> mg/ L; Digestion <sup>4</sup> followed by: AA direct aspiration .....	286.1 .....	3111 D [18th, 19th].	.....	.....	
AA furnace .....	286.2 .....	.....	D3373-93.	.....	
ICP/AES .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup> .	
DCP, or .....	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (Gallic Acid).	.....	3500-V B [20th] and 3500-V D [18th, 19th].			
75. Zinc—Total, <sup>4</sup> mg/L; Di- gestion <sup>4</sup> followed by: AA direct aspiration <sup>36</sup> ..	289.1 .....	3111 B or C [18th, 19th].	D1691-95(A or B) ...	I-3900-85 .....	974.27, <sup>3</sup> p. 37 <sup>9</sup>
AA furnace .....	289.2.				
ICP/AES <sup>36</sup> .....	200.7 <sup>5</sup> .....	3120 B [18th, 19th, 20th].	.....	I-4471-97 <sup>50</sup> .	
DCP, <sup>36</sup> or .....	.....	.....	D4190-94 .....	.....	Note 34.
Colorimetric (Dithizone) or (Zincon) .....	.....	3500-Zn E [18th, 19th]. 3500-Zn B [20th] and 3500-Zn F [18th, 19th].	.....	.....	Note 33.

Table 1B Notes:

<sup>1</sup> "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Environmental Monitoring Systems Laboratory—Cincinnati (EMSL—CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable.

<sup>2</sup> Fishman, M.J., *et al.* "Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments," U.S. Department of the Interior, Technical Methods of Water-Resource Investigations of the U.S. Geological Survey, Denver, CO, Revised 1989, unless otherwise stated.

<sup>3</sup> "Official Methods of Analysis of the Association of Official Analytical Chemists," methods manual, 15th ed. (1990).

<sup>4</sup> For the determination of total metals the sample is not filtered before processing. A digestion procedure is required to solubilize suspended material and to destroy possible organic-metal complexes. Two digestion procedures are given in "Methods for Chemical Analysis of Water and Wastes, 1979 and 1983". One (Section 4.1.3), is a vigorous digestion using nitric acid. A less vigorous digestion using nitric and hydrochloric acids (Section 4.1.4) is preferred; however, the analyst should be cautioned that this mild digestion may not suffice for all samples types. Particularly, if a colorimetric procedure is to be employed, it is necessary to ensure that all organo-metallic bonds be broken so that the metal is in a reactive state. In those situations, the vigorous digestion is to be preferred making certain that at no time does the sample go to dryness. Samples containing large amounts of organic materials may also benefit by this vigorous digestion, however, vigorous digestion with concentrated nitric acid will convert antimony and tin to insoluble oxides and render them unavailable for analysis. Use of ICP/AES as well as determinations for certain elements such as antimony, arsenic, the noble metals, mercury, selenium, silver, tin, and titanium require a modified sample digestion procedure and in all cases the method write-up should be consulted for specific instructions and/or cautions.

**Note to Table 1B Note 4:** If the digestion procedure for direct aspiration AA included in one of the other approved references is different than the above, the EPA procedure must be used. Dissolved metals are defined as those constituents which will pass through a 0.45 micron membrane filter. Following filtration of the sample, the referenced procedure for total metals must be followed. Sample digestion of the filtrate for dissolved metals (or digestion of the original sample solution for total metals) may be omitted for AA (direct aspiration or graphite furnace) and ICP analyses, provided the sample solution to be analyzed meets the following criteria:

- has a low COD (<20)
- is visibly transparent with a turbidity measurement of 1 NTU or less
- is colorless with no perceptible odor, and
- is of one liquid phase and free of particulate or suspended matter following acidification.

<sup>5</sup> The full text of Method 200.7, "Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes," is given at Appendix C of this Part 136.

<sup>6</sup> Manual distillation is not required if comparability data on representative effluent samples are on company file to show that this preliminary distillation step is not necessary; however, manual distillation will be required to resolve any controversies.

<sup>7</sup> Ammonia, Automated Electrode Method, Industrial Method Number 379-75 WE, dated February 19, 1976, Bran & Luebbe (Technicon) Auto Analyzer II, Bran & Luebbe Analyzing Technologies, Inc., Elmsford, NY 10523.

<sup>8</sup> The approved method is that cited in "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments", USGS TWRI, Book 5, Chapter A1 (1979).

<sup>9</sup> American National Standard on Photographic Processing Effluents, Apr. 2, 1975. Available from ANSI, 25 West 43rd Street, New York, NY 10036.

<sup>10</sup> "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency", Supplement to the Fifteenth Edition of Standard Methods for the Examination of Water and Wastewater (1981).

<sup>11</sup> The use of normal and differential pulse voltage ramps to increase sensitivity and resolution is acceptable.

<sup>12</sup> Carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>) must not be confused with the traditional BOD<sub>5</sub> test method which measures "total BOD". The addition of the nitrification inhibitor is not a procedural option, but must be included to report the CBOD<sub>5</sub> parameter. A discharger whose permit requires reporting the traditional BOD<sub>5</sub> may not use a nitrification inhibitor in the procedure for reporting the results. Only when a discharger's permit specifically states CBOD<sub>5</sub> is required can the permittee report data using a nitrification inhibitor.

<sup>13</sup> OIC Chemical Oxygen Demand Method, Oceanography International Corporation, 1978, 512 West Loop, PO Box 2980, College Station, TX 77840.

<sup>14</sup> Chemical Oxygen Demand, Method 8000, Hach Handbook of Water Analysis, 1979, Hach Chemical Company, PO Box 389, Loveland, CO 80537.

<sup>15</sup> The back titration method will be used to resolve controversy.

<sup>16</sup> Orion Research Instruction Manual, Residual Chlorine Electrode Model 97-70, 1977, Orion Research Incorporated, 840 Memorial Drive, Cambridge, MA 02138. The calibration graph for the Orion residual chlorine method must be derived using a reagent blank and three standard solutions, containing 0.2, 1.0, and 5.0 mL 0.00281 N potassium iodate/100 mL solution, respectively.

<sup>17</sup> The approved method is that cited in Standard Methods for the Examination of Water and Wastewater, 14th Edition, 1976.

<sup>18</sup> National Council of the Paper Industry for Air and Stream Improvement, Inc. Technical Bulletin 253, December 1971.

<sup>19</sup> Copper, Bicinchonate Method, Method 8506, Hach Handbook of Water Analysis, 1979, Hach Chemical Company, PO Box 389, Loveland, CO 80537.

<sup>20</sup> After the manual distillation is completed, the autoanalyzer manifolds in EPA Methods 335.3 (cyanide) or 420.2 (phenols) are simplified by connecting the re-sample line directly to the sampler. When using the manifold setup shown in Method 335.3, the buffer 6.2 should be replaced with the buffer 7.6 found in Method 335.2.

<sup>21</sup> Hydrogen ion (pH) Automated Electrode Method, Industrial Method Number 378-75WA, October 1976, Bran & Luebbe (Technicon) Autoanalyzer II, Bran & Luebbe Analyzing Technologies, Inc., Elmsford, NY 10523.

<sup>22</sup> Iron, 1,10-Phenanthroline Method, Method 8008, 1980, Hach Chemical Company, PO Box 389, Loveland, CO 80537.

<sup>23</sup> Manganese, Periodate Oxidation Method, Method 8034, Hach Handbook of Wastewater Analysis, 1979, pages 2-113 and 2-117, Hach Chemical Company, Loveland, CO 80537.

<sup>24</sup> Wershaw, R.L., *et al.* "Methods for Analysis of Organic Substances in Water," Techniques of Water-Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A3, (1972 Revised 1987) p. 14.

<sup>25</sup> Nitrogen, Nitrite, Method 8507, Hach Chemical Company, PO Box 389, Loveland, CO 80537.

<sup>26</sup> Just prior to distillation, adjust the sulfuric-acid-preserved sample to pH 4 with 1 + 9 NaOH.

<sup>27</sup> The approved method is cited in Standard Methods for the Examination of Water and Wastewater, 14th Edition. The colorimetric reaction is conducted at a pH of 10.0±0.2. The approved methods are given on pp 576-81 of the 14th Edition: Method 510A for distillation, Method 510B for the manual colorimetric procedure, or Method 510C for the manual spectrometric procedure.

<sup>28</sup> R.F. Addison and R.G. Ackman, "Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatography," Journal of Chromatography, Vol. 47, No. 3, pp. 421-426, 1970.

<sup>29</sup> Approved methods for the analysis of silver in industrial wastewaters at concentrations of 1 mg/L and above are inadequate where silver exists as an inorganic halide. Silver halides such as the bromide and chloride are relatively insoluble in reagents such as nitric acid but are readily soluble in an aqueous buffer of sodium thiosulfate and sodium hydroxide to pH of 12. Therefore, for levels of silver above 1 mg/L, 20 mL of sample should be diluted to 100 mL by adding 40 mL each of 2 M Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> and NaOH. Standards should be prepared in the same manner. For levels of silver below 1 mg/L the approved method is satisfactory.

<sup>30</sup> The approved method is that cited in Standard Methods for the Examination of Water and Wastewater, 15th Edition.

<sup>31</sup> EPA Methods 335.2 and 335.3 require the NaOH absorber solution final concentration to be adjusted to 0.25 N before colorimetric determination of total cyanide.

<sup>32</sup> Stevens, H.H., Ficke, J.F., and Smoot, G.F., "Water Temperature—Influential Factors, Field Measurement and Data Presentation," Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 1, Chapter D1, 1975.

<sup>33</sup> Zinc, Zincon Method, Method 8009, Hach Handbook of Water Analysis, 1979, pages 2-231 and 2-333, Hach Chemical Company, Loveland, CO 80537.

<sup>34</sup> "Direct Current Plasma (DCP) Optical Emission Spectrometric Method for Trace Elemental Analysis of Water and Wastes, Method AES0029," 1986—Revised 1991, Thermo Jarrell Ash Corporation, 27 Forge Parkway, Franklin, MA 02038.

<sup>35</sup> Precision and recovery statements for the atomic absorption direct aspiration and graphite furnace methods, and for the spectrophotometric SDDC method for arsenic are provided in Appendix D of this part titled, "Precision and Recovery Statements for Methods for Measuring Metals".

<sup>36</sup> "Closed Vessel Microwave Digestion of Wastewater Samples for Determination of Metals", CEM Corporation, PO Box 200, Matthews, NC 28106-0200, April 16, 1992. Available from the CEM Corporation.

<sup>37</sup> When determining boron and silica, only plastic, PTFE, or quartz laboratory ware may be used from start until completion of analysis.

<sup>38</sup> Only use Trichlorotrifluoroethane (1,1,2-trichloro-1,2,2-trifluoroethane; CFC-113) extraction solvent when determining Total Recoverable Oil and Grease (analogous to EPA Method 413.1). Only use *n*-hexane extraction solvent when determining Hexane Extractable Material (analogous to EPA Method 1664A). Use of other extraction solvents is strictly prohibited.

<sup>39</sup> Nitrogen, Total Kjeldahl, Method PAI-DK01 (Block Digestion, Steam Distillation, Titrimetric Detection), revised 12/22/94, OI Analytical/ALPKEM, PO Box 9010, College Station, TX 77842.

<sup>40</sup> Nitrogen, Total Kjeldahl, Method PAI-DK02 (Block Digestion, Steam Distillation, Colorimetric Detection), revised 12/22/94, OI Analytical/ALPKEM, PO Box 9010, College Station, TX 77842.

<sup>41</sup> Nitrogen, Total Kjeldahl, Method PAI-DK03 (Block Digestion, Automated FIA Gas Diffusion), revised 12/22/94, OI Analytical/ALPKEM, PO Box 9010, College Station, TX 77842.

<sup>42</sup> Method 1664, Revision A "n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry" EPA-821-R-98-002, February 1999. Available at NTIS, PB-121949, U.S. Department of Commerce, 5285 Port Royal, Springfield, Virginia 22161.

<sup>43</sup> USEPA. 2001. Method 1631, Revision C, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry." March 2001. Office of Water, U.S. Environmental Protection Agency (EPA-821-R-01-024). The application of clean techniques described in EPA's draft Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (EPA-821-R-96-011) are recommended to preclude contamination at low-level, trace metal determinations.

<sup>44</sup> Available Cyanide, Method OIA-1677 (Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry), ALPKEM, A Division of OI Analytical, PO Box 9010, College Station, TX 77842-9010.

<sup>45</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Ammonia Plus Organic Nitrogen by a Kjeldahl Digestion Method", Open File Report (OFR) 00-170.

<sup>46</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Chromium in Water by Graphite Furnace Atomic Absorption Spectrophotometry", Open File Report (OFR) 93-449.

<sup>47</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Molybdenum by Graphite Furnace Atomic Absorption Spectrophotometry", Open File Report (OFR) 97-198.

<sup>48</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Total Phosphorus by Kjeldahl Digestion Method and an Automated Colorimetric Finish That Includes Dialysis" Open File Report (OFR) 92-146.

<sup>49</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Arsenic and Selenium in Water and Sediment by Graphite Furnace-Atomic Absorption Spectrometry" Open File Report (OFR) 98-639.

<sup>50</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Elements in Whole-water Digests Using Inductively Coupled Plasma-Optical Emission Spectrometry and Inductively Coupled Plasma-Mass Spectrometry", Open File Report (OFR) 98-165.

<sup>51</sup> "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediment", Open File Report (OFR) 93-125.

TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
1. Acenaphthene .....	610 .....	625, 1625B ..	610 .....	6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p.27.
2. Acenaphthylene .....	610 .....	625, 1625B ..	610 .....	6440 B, 6410 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p.27.
3. Acrolein .....	603 .....	624 <sup>4</sup> , 1624B				
4. Acrylonitrile .....	603 .....	624 <sup>4</sup> , 1624B				
5. Anthracene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
6. Benzene .....	602 .....	624, 1624B ..		6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6220 B [18th, 19th].		
7. Benzidine .....		625 <sup>5</sup> , 1625B	605 .....			Note 3, p.1.
8. Benzo(a)anthracene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
9. Benzo(a)pyrene .....	610, .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
10. Benzo(b)fluoranthene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
11. Benzo(g, h, i)perylene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
12. Benzo(k)fluoranthene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
13. Benzyl chloride .....						Note 3, p 130: Note 6, p. S102.

TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
14. Benzyl butyl phthalate .....	606 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
15. Bis(2-chloroethoxy) methane ....	611 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
16. Bis(2-chloroethyl) ether .....	611 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
17. Bis(2-ethylhexyl) phthalate .....	606 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
18. Bromodichloromethane .....	601 .....	624, 1624B ..	.....	6200 C [20th] and 6230 B [18th, 19th], 6200 B [20th] and 6210 B [18th, 19th].	.....	
19. Bromoform .....	601 .....	624, 1624B ..	.....	6200 C [20th] and 6230 B [18th, 19th], 6200 B [20th] and 6210 B [18th, 19th].	.....	
20. Bromomethane .....	601 .....	624, 1624B ..	.....	6200 C [20th] and 6230 B [18th, 19th], 6200 B [20th] and 6210 B [18th, 19th].	.....	
21. 4-Bromophenylphenyl ether .....	611 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
22. Carbon tetrachloride .....	601 .....	624, 1624B ..	.....	6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130.
23. 4-Chloro-3-methylphenol .....	604 .....	625,1625B ....	.....	6410 B, 6420 B [18th, 19th, 20th].	.....	Note 9, p. 27.
24. Chlorobenzene .....	601, 602 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6220 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130.
25. Chloroethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	
26. 2-Chloroethylvinyl ether .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	
27. Chloroform: .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130.
28. Chloromethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200C [20th] and 6230 B [18th, 19th].	.....	
29. 2-Chloronaphthalene .....	612 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.

TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
30. 2-Chlorophenol .....	604 .....	625, 1625B ..	.....	6410 B, 6420 B [18th, 19th, 20th].	.....	Note 9, p. 27.
31. 4-Chlorophenylphenyl ether .....	611 .....	625, 1625B ..	.....	6410 B, [18th, 19th, 20th].	.....	Note 9, p. 27.
32. Chrysene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
33. Dibenzo(a,h)anthracene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
34. Dibromochloromethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th] 6200 C [20th] and 6230 B [18th, 19th].	.....	.....
35. 1,2-Dichlorobenzene .....	601, 602, 612	624, 625, 1625B.	.....	6200 C [20th] and 6220 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th], 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
36. 1,3-Dichlorobenzene .....	601, 602, 612	624, 625, 1625B.	.....	6200 C [20th] and 6220 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th], 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
37. 1,4-Dichlorobenzene .....	601, 602, 612	624, 625, 1625B.	.....	6200 C [20th] and 6220 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th], 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
38. 3,3-Dichlorobenzidine .....	.....	625, 1625B ..	605 .....	6410 B [18th, 19th, 20th].	.....	.....
39. Dichlorodifluoromethane .....	601 .....	.....	.....	6200 C [20th] and 6230 B [18th, 19th].	.....	.....
40. 1,1-Dichloroethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	.....
41. 1,2-Dichloroethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	.....
42. 1,1-Dichloroethene .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	.....

TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
43. trans-1,2-Dichloroethene .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].		
44. 2,4-Dichlorophenol .....	604 .....	625, 1625B ..	.....	6410 B, 6420 B [18th, 19th, 20th].		Note 9, p. 27.
45. 1,2-Dichloropropane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].		
46. cis-1,3-Dichloropropene .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].		
47. trans-1,3-Dichloropropene .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].		
48. Diethyl phthalate .....	606 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.
49. 2,4-Dimethylphenol .....	604 .....	625, 1625B ..	.....	6410 B, 6420 B [18th, 19th, 20th].		Note 9, p. 27.
50. Dimethyl phthalate .....	606 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.
51. Di-n-butyl phthalate .....	606 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.
52. Di-n-octyl phthalate .....	606 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.
53. 2,3-Dinitrophenol .....	604 .....	625, 1625B ..	.....	6410 B, 6420 B [18th, 19th, 20th].		
54. 2,4-Dinitrotoluene .....	609 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.
55. 2,6-Dinitrotoluene .....	609 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.
56. Epichlorohydrin .....	.....	.....	.....	.....		Note 3, p. 130; Note 6, p. S102.
57. Ethylbenzene .....	602 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6220 B [18th, 19th].		
58. Fluoranthene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
59. Fluorene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
60. 1,2,3,4,6,7,8-Heptachloro-dibenzofuran.	.....	1613B	.....	.....		
61. 1,2,3,4,7,8,9-Heptachloro-dibenzofuran.	.....	1613B	.....	.....		
62. 1,2,3,4,6,7,8-Heptachloro-dibenzo-p-dioxin.	.....	1613B	.....	.....		
63. Hexachlorobenzene .....	612 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].		Note 9, p. 27.

TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
64. Hexachlorobutadiene .....	612 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
65. Hexachlorocyclopentadiene .....	612 .....	<sup>5</sup> 625, 1625B	.....	6410 [18th, 19th, 20th].	.....	Note 9, p. 27.
66. 1,2,3,4,7,8-Hexachlorodibenzofuran.	.....	1613B.	.....	.....	.....	.....
67. 1,2,3,6,7,8-Hexachlorodibenzofuran.	.....	1613B.	.....	.....	.....	.....
68. 1,2,3,7,8,9-Hexachlorodibenzofuran.	.....	1613B.	.....	.....	.....	.....
69. 2,3,4,6,7,8-Hexachlorodibenzofuran.	.....	1613B.	.....	.....	.....	.....
70. 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin.	.....	1613B.	.....	.....	.....	.....
71. 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin.	.....	1613B.	.....	.....	.....	.....
72. 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin.	.....	1613B.	.....	.....	.....	.....
73. Hexachloroethane .....	616 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
74. Ideno(1,2,3-cd) pyrene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
75. Isophorone .....	609 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
76. Methylene chloride .....	601 .....	624, 1624B ..	.....	6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130.
77. 2-Methyl-4,6-dinitrophenol .....	604 .....	625, 1625B ..	.....	6420 B, 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
78. Naphthalene .....	610 .....	625, 1625B ..	610 .....	6440 B, 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
79. Nitrobenzene .....	609 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27.
80. 2-Nitrophenol .....	604 .....	625, 1625B ..	.....	6410 B, 6420 B [18th, 19th, 20th].	.....	Note 9, p. 27.
81. 4-Nitrophenol .....	604 .....	625, 1625B ..	.....	6410 B, 6420 B [18th, 19th, 20th].	.....	Note 9, p. 27.
82. N-Nitrosodimethylamine .....	607 .....	625 <sup>5</sup> , 1625B	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
83. N-Nitrosodi-n-propylamine .....	607 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
84. N-Nitrosodiphenylamine .....	607 .....	625 <sup>5</sup> , 1625B	.....	6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.
85. Octachlorodibenzofuran .....	.....	1613B.	.....	.....	.....	.....
86. Octachlorodibenzo-p-dioxin .....	.....	1613B.	.....	.....	.....	.....
87. 2,2'-Oxybis(2-chloropropane) [also known as bis(2-chloroisopropyl) ether].	611 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	.....
88. PCB-1016 .....	608 .....	625 .....	.....	6410 B [18th, 19th, 20th].	.....	Note 3, p. 43.
89. PCB-1221 .....	608 .....	625 .....	.....	6410 B [18th, 19th, 20th].	.....	Note 3, p. 43.
90. PCB-1232 .....	608 .....	625 .....	.....	6410 B [18th, 19th, 20th].	.....	Note 3, p. 43.
91. PCB-1242 .....	608 .....	625 .....	.....	6410 B [18th, 19th, 20th].	.....	Note 3, p. 43.
92. PCB-1248 .....	608 .....	625.	.....	.....	.....	.....
93. PCB-1254 .....	608 .....	625 .....	.....	6410 B [18th, 19th, 20th].	.....	Note 3, p. 43.
94. PCB-1260 .....	608 .....	625 .....	.....	6410 B, 6630 B [18th, 19th, 20th].	.....	Note 3, p. 43.
95. 1,2,3,7,8-Pentachlorodibenzofuran.	.....	1613B.	.....	.....	.....	.....

TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
96. 2,3,4,7,8-Pentachlorodibenzofuran.	.....	1613B.				
97. 1,2,3,7,8-Pentachlorodibenzo-p-dioxin.	.....	1613B.				
98. Pentachlorophenol .....	604 .....	625, 1625B ..	.....	6410 B, 6630 B [18th, 19th, 20th].	.....	Note 3, p. 140; Note 9, p. 27
99. Phenanthrene .....	610 .....	625, 1625B ..	610 .....	6410 B, 6440 B [18th, 19th, 20th].	D4657-92 .....	Note 9, p. 27
100. Phenol .....	604 .....	625, 1625B ..	.....	6420 B, 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27
101. Pyrene .....	610 .....	625, 1625B ..	610 .....	6440 B, 6410 B D4675-92 [18th, 19th, 20th].	D4675-92 .....	Note 9, p. 27
102. 2,3,7,8-Tetrachlorodibenzofuran.	.....	1613B.				
103. 2,3,7,8-Tetrachlorodibenzo-p-dioxin.	.....	613, 1613B.				
104. 1,1,2,2-Tetrachloroethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130
105. Tetrachloroethene .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130
106. Toluene .....	602 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6220 B [18th, 19th].	.....	
107. 1,2,4-Trichlorobenzene .....	612 .....	625, 1625B ..	.....	6410 B [18th, 19th, 20th].	.....	Note 3, p. 130; Note 9, p. 27.
108. 1,1,1-Trichloroethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	
109. 1,1,2-Trichloroethane .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	Note 3, p. 130
110. Trichloroethene .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	
111. Trichlorofluoromethane .....	601 .....	624 .....	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].	.....	
112. 2,4,6-Trichlorophenol .....	604 .....	625, 1625B ..	.....	6420 B, 6410 B [18th, 19th, 20th].	.....	Note 9, p. 27.



TABLE 1C.—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter <sup>1</sup>	EPA method number <sup>2,7</sup>			Other approved methods		
	GC	GC/MS	HPLC	Standard Methods [Edition(s)]	ASTM	Other
113. Vinyl chloride .....	601 .....	624, 1624B ..	.....	6200 B [20th] and 6210 B [18th, 19th], 6200 C [20th] and 6230 B [18th, 19th].		

Table IC notes:

<sup>1</sup> All parameters are expressed in micrograms per liter (µg/L) except for Method 1613B in which the parameters are expressed in picograms per liter (pg/L).

<sup>2</sup> The full text of Methods 601–613, 624, 625, 1624B, and 1625B, are given at Appendix A, “Test Procedures for Analysis of Organic Pollutants,” of this Part 136. The full text of Method 1613B is incorporated by reference into this Part 136 and is available from the National Technical Information Services as stock number PB95–104774. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, “Definition and Procedure for the Determination of the Method Detection Limit,” of this Part 136.

<sup>3</sup> “Methods for Benzidine: Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater,” U.S. Environmental Protection Agency, September, 1978.

<sup>4</sup> Method 624 may be extended to screen samples for Acrolein and Acrylonitrile. However, when they are known to be present, the preferred method for these two compounds is Method 603 or Method 1624B.

<sup>5</sup> Method 625 may be extended to include benzidine, hexachlorocyclopentadiene, N-nitrosodimethylamine, and N-nitrosodiphenylamine. However, when they are known to be present, Methods 605, 607, and 612, or Method 1625B, are preferred methods for these compounds.

<sup>6</sup> “Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency,” Supplement to the Fifteenth Edition of Standard Methods for the Examination of Water and Wastewater (1981).

<sup>7</sup> Each Analyst must make an initial, one-time demonstration of their ability to generate acceptable precision and accuracy with Methods 601–603, 624, 625, 1624B, and 1625B (See Appendix A of this Part 136) in accordance with procedures each in Section 8.2 of each of these Methods. Additionally, each laboratory, on an on-going basis must spike and analyze 10% (5% for Methods 624 and 625 and 100% for methods 1624B and 1625B) of all samples to monitor and evaluate laboratory data quality in accordance with Sections 8.3 and 8.4 of these Methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect and cannot be reported to demonstrate regulatory compliance.

NOTE: These warning limits are promulgated as an “interim final action with a request for comments.”

<sup>8</sup> “Organochlorine Pesticides and PCBs in Wastewater Using Empore TM Disk” 3M Corporation Revised 10/28/94.

<sup>9</sup> USGS Method 0–3116–87 from “Methods of Analysis by U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediments” U.S. Geological Survey, Open File Report 93–125.

TABLE 1D.—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES<sup>1</sup>

Parameter	Method	EPA <sup>2,7</sup>	Standard Methods 18th, 19th, 20th Ed.	ASTM	Other
1. Aldrin .....	GC .....	608 .....	6630 B & C ..	D3086–90 ....	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS .....	625 .....	6410 B		
2. Ametryn .....	GC .....				Note 3, p. 83; Note 6, p. S68.
3. Aminocarb .....	TLC .....				Note 3, p. 94; Note 6, p. S16.
4. Atraton .....	GC .....				Note 3, p. 83; Note 6, p. S68.
5. Atrazine .....	GC .....				Note 3, p. 83; Note 6, p. S68; Note 9.
6. Azinphos methyl .....	GC .....				Note 3, p. 25; Note 6, p. S51.
7. Barban .....	TLC .....				Note 3, p. 104; Note 6, p. S64.
8. α-BHC .....	GC .....	608 .....	6630 B & C ..	D3086–90 ....	Note 3, p. 7; Note 8.
	GC/MS .....	625 <sup>5</sup> .....	6410 B.		
9. β-BHC .....	GC .....	608 .....	6630 C .....	D3086–90 ....	Note 8.
	GC/MS .....	625 <sup>5</sup> .....	6410 B.		
10. δ-BHC .....	GC .....	608 .....	6630 C .....	D3086–90 ....	Note 8.
	GC/MS .....	625 <sup>5</sup> .....	6410 B.		
11. γ-BHC (Lindane) .....	GC .....	608 .....	6630 B & C ..	D3086–90 ....	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS .....	625 .....	6410 B.		
12. Captan .....	GC .....		6630 B .....	D3086–90 ....	Note 3, p. 7.
13. Carbaryl .....	TLC .....				Note 3, p. 94, Note 6, p. S60.
14. Carbophenothion .....	GC .....				Note 4, p. 27; Note 6, p. S73.
15. Chlordane .....	GC .....	608 .....	6630 B & C ..	D3086–90 ....	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS .....	625 .....	6410 B.		
16. Chlorpropham .....	TLC .....				Note 3, p. 104; Note 6, p. S64.
17. 2,4-D .....	GC .....		6640 B .....		Note 3, p. 115; Note 4, p. 40.
18. 4,4'-DDD .....	GC .....	608 .....	6630 B & C ..	D3086–90 ....	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS .....	625 .....	6410 B.		

TABLE 1D.—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES<sup>1</sup>—Continued

Parameter	Method	EPA <sup>2,7</sup>	Standard Methods 18th, 19th, 20th Ed.	ASTM	Other
19. 4,4'-DDE	GC	608	6630 B & C ..	D3086-90	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS	625	6410 B.		
20. 4,4'-DDT	GC	608	6630 B & C ..	D3086-90	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS	625	6410 B.		
21. Demeton-O	GC				Note 3, p. 25; Note 6, p. S51.
22. Demeton-S	GC				Note 3, p. 25; Note 6, p. S51.
23. Diazinon	GC				Note 3, p. 25; Note 4, p. 27; Note 6, p. S51.
24. Dicamba	GC				Note 3, p. 115.
25. Dichlofenthion	GC				Note 4, p. 27; Note 6, p. S73.
26. Dichloran	GC		6630 B & C ..		Note 3, p. 7.
27. Dicofol	GC			D3086-90.	
28. Dieldrin	GC	608	6630 B & C ..		Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS	625	6410 B.		
29. Dioxathion	GC				Note 4, p. 27; Note 6, p. S73.
30. Disulfoton	GC				Note 3, p. 25; Note 6 p. S51.
31. Diuron	TLC				Note 3, p. 104; Note 6, p. S64.
32. Endosulfan I	GC	608	6630 B & C ..	D3086-90	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS	625 <sup>5</sup>	6410 B.		
33. Endosulfan II	GC	608	6630 B & C ..	D3086-90	Note 3, p. 7; Note 8.
	GC/MS	625 <sup>5</sup>	6410 B.		
34. Endosulfan Sulfate	GC	608	6630 C		Note 8.
	GC/MS	625	6410 B.		
35. Endrin	GC	608	6630 B & C ..	D3086-90	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS	625 <sup>5</sup>	6410 B.		
36. Endrin aldehyde	GC	608			Note 8.
	GC/MS	625.			
37. Ethion	GC				Note 4, p. 27; Note 6, p. S73.
38. Fenuron	TLC				Note 3, p. 104; Note 6, p. S64.
39. Fenuron-TCA	TLC				Note 3, p. 104; Note 6, p. S64.
40. Heptachlor	GC	608	6630 B & C ..	3086-90	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS	625	6410 B.		
41. Heptachlor epoxide	GC	608	6630 B & C ..	D3086-90	Note 3, p. 7; Note 4, p. 27; Note 6, p. S73; Note 8.
	GC/MS	625	6410 B.		
42. Isodrin	GC				Note 4, p. 27; Note 6, p. S73.
43. Linuron	GC				Note 3, p. 104; Note 6, p. S64.
44. Malathion	GC		6630 C		Note 3, p. 25; Note 4, p. 27; Note 6, p. S51
45. Methiocarb	TLC				Note 3, p. 94; Note 6, p. S60.
46. Methoxychlor	GC		6630 B & C ..	D3086-90	Note 3, p. 7; Note 4, p. 27; Note 8.
47. Mexacarbate	TLC				Note 3, p. 94; Note 6, p. S60.
48. Mirex	GC		6630 B & C ..		Note 3, p. 7; Note 4, p. 27.
49. Monuron	TLC				Note 3, p. 104; Note 6, p. S64.
50. Monuron	TLC				Note 3, p. 104; Note 6, p. S64.
51. Nuburon	TLC				Note 3, p. 104; Note 6, p. S64.
52. Parathion methyl	GC		6630 C		Note 3, p. 25; Note 4, p. 27.
53. Parathion ethyl	GC		6630 C		Note 3, p. 25; Note 4, p. 27.
54. PCNB	GC		6630 B & C ..		Note 3, p. 7.
55. Perthane	GC			D3086-90	Note 4, p. 27.
56. Prometron	GC				Note 3, p. 83; Note 6, p. S68; Note 9.
57. Prometryn	GC				Note 3, p. 83; Note 6, p. S68; Note 9.
58. Propazine	GC				Note 3, p. 83; Note 6, p. S68; Note 9.
59. Proptham	TLC				Note 3, p. 104; Note 6, p. S64.
60. Propoxur	TLC				Note 3, p. 94; Note 6, p. S60.
61. Secbumeton	TLC				Note 3, p. 83; Note 6, p. S68.
62. Siduron	TLC				Note 3, p. 104; Note 6, p. S64.
63. Simazine	GC				Note 3, p. 83; Note 6, p. S68; Note 9.

TABLE 1D.—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES <sup>1</sup>—Continued

Parameter	Method	EPA <sup>2,7</sup>	Standard Methods 18th, 19th, 20th Ed.	ASTM	Other
64. Strobane .....	GC .....	.....	6630 B & C ..	.....	Note 3, p. 7.
65. Sweb .....	TLC .....	.....	.....	.....	Note 3, p. 104; Note 6, p. S64.
66. 2,4,5-T .....	GC .....	.....	6640 B .....	.....	Note 3, p. 115; Note 4, p. 40.
67. 2,4,5-TP (Silvex) .....	GC .....	.....	6640 B .....	.....	Note 3, p. 115; Note 4, p. 40.
68. Terbutylazine .....	GC .....	.....	.....	.....	Note 3, p. 83; Note 6, p. S68.
69. Toxaphene .....	GC .....	608 .....	6630 B & C ..	D3086—90 ...	Note 3, p. 7; Note 4, p. 27; Note 8.
	GC/MS .....	625 .....	6410B.		
70. Trifluralin .....	GC .....	.....	6630 B .....	.....	Note 3, p. 7; Note 9.

Table ID notes:

<sup>1</sup> Pesticides are listed in this table by common name for the convenience of the reader. Additional pesticides may be found under Table 1C, where entries are listed by chemical name.

<sup>2</sup> The full text of Methods 608 and 625 are given at Appendix A. "Test Procedures for Analysis of Organic Pollutants," of this Part 136. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit," of this Part 136.

<sup>3</sup> "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater," U.S. Environmental Protection Agency, September 1978. This EPA publication includes thin-layer chromatography (TLC) methods.

<sup>4</sup> "Methods for Analysis of Organic Substances in Water and Fluvial Sediments," Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A3 (1987).

<sup>5</sup> The method may be extended to include  $\alpha$ -BHC,  $\gamma$ -BHC, endosulfan I, endosulfan II, and endrin. However, when they are known to exist, Method 608 is the preferred method.

<sup>6</sup> "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency." Supplement to the Fifteenth Edition of Standard Methods for the Examination of Water and Wastewater (1981).

<sup>7</sup> Each analyst must make an initial, one-time, demonstration of their ability to generate acceptable precision and accuracy with Methods 608 and 625 (See Appendix A of this Part 136) in accordance with procedures given in Section 8.2 of each of these methods. Additionally, each laboratory, on an on-going basis, must spike and analyze 10% of all samples analyzed with Method 608 or 5% of all samples analyzed with Method 625 to monitor and evaluate laboratory data quality in accordance with Sections 8.3 and 8.4 of these methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect and cannot be reported to demonstrate regulatory compliance. These quality control requirements also apply to the Standard Methods, ASTM Methods, and other Methods cited.

**Note:** These warning limits are promulgated as an "Interim final action with a request for comments."

<sup>8</sup> "Organochlorine Pesticides and PCBs in Wastewater Using Empore™ Disk", 3M Corporation, Revised 10/28/94.

<sup>9</sup> USGS Method 0-3106-93 from "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Triazine and Other Nitrogen-containing Compounds by Gas Chromatography with Nitrogen Phosphorus Detectors" U.S. Geological Survey Open File Report 94-37.

TABLE 1E.—LIST OF APPROVED RADIOLOGIC TEST PROCEDURES

Parameter and units	Method	Reference (method number or page)			
		EPA <sup>1</sup>	Standard Methods 18th, 19th, 20th Ed.	ASTM	USGS <sup>2</sup>
1. Alpha-Total, pCi per liter .....	Proportional or scintillation counter.	900	7110 B	D1943-90	pp. 75 and 78 <sup>3</sup>
2. Alpha-Counting error, pCi per liter.	Proportional or scintillation counter.	Appendix B	7110 B	D1943-90	p. 79
3. Beta-Total, pCi per liter .....	Proportional counter .....	900.0	7110 B	D1890-90	pp. 75 and 78 <sup>3</sup>
4. Beta-Counting error, pCi .....	Proportional counter .....	Appendix B	7110 B	D1890-90	p. 79
5. (a) Radium Total pCi per liter	Proportional counter .....	903.0	7500Ra B	D2460-90	
(b) Ra, pCi per liter .....	Scintillation counter .....	903.1	7500Ra C	D3454-91	p. 81

Table 1E notes:

<sup>1</sup> "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032 (1980), U.S. Environmental Protection Agency, August 1980.

<sup>2</sup> Fishman, M.J. and Brown, Eugene, "Selected Methods of the U.S. Geological Survey of Analysis of Wastewaters," U.S. Geological Survey, Open-File Report 76-177 (1976).

<sup>3</sup> The method found on p. 75 measures only the dissolved portion while the method on p. 78 measures only the suspended portion. Therefore, the two results must be added to obtain the "total".

\* \* \* \* \*

(b) \* \* \*

References, Sources, Costs, and Table Citations:

\* \* \* \* \*

(6) American Public Health Association. 1992, 1995, and 1998. Standard Methods for the Examination of Water and Wastewater. 18th, 19th,

and 20th Edition (respectively). Available from: Amer. Publ. Hlth. Assoc., 1015 15th Street, NW., Washington, DC 20005. Table IA, Note 4. Tables IB, IC, ID, IE.

\* \* \* \* \*  
(10) Annual Book of ASTM Standards, Water, and Environmental Technology, Section 11, Volumes 11.01

and 11.02, 1994, 1996, and 1999. Available from: ASTM International, 100 Barr Harbor Drive, P.O. Box C-700, West Conshohocken, PA 19428-2959. Tables IB, IC, ID, and IE.

\* \* \* \* \*  
(44) "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory Determination of

Ammonium Plus Organic Nitrogen by a Kjeldahl Digestion Method and an Automated Photometric Finish that Includes Digest Cleanup by Gas Diffusion”, Open File Report (OFR) 00-170. Available from: U.S. Geological Survey, Denver Federal Center, Box 25425, Denver, CO 80225. Table IB, Note 45.

(45) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Chromium in Water by Graphite Furnace Atomic Absorption Spectrophotometry”, Open File Report (OFR) 93-449. Available from: U.S. Geological Survey, Denver Federal Center, Box 25425, Denver, CO 80225. Table IB, Note 46.

(46) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Molybdenum in Water by Graphite Furnace Atomic Absorption Spectrophotometry”, Open File Report (OFR) 97-198. Available from: U.S. Geological Survey, Denver Federal Center, Box 25425, Denver, CO 80225. Table IB, Note 47.

(47) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Total Phosphorus by Kjeldahl Digestion Method and an Automated Colorimetric Finish That Includes Dialysis” Open File Report (OFR) 92-146. Available from: U.S. Geological Survey, Denver Federal Center, Box 25425, Denver, CO 80225. Table IB, Note 48.

(48) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Arsenic and Selenium in Water and Sediment by Graphite Furnace—Atomic Absorption Spectrometry” Open File Report (OFR) 98-639. Table IB, Note 49.

(49) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Elements in Whole-Water Digests Using Inductively Coupled Plasma-Optical Emission Spectrometry and Inductively Coupled Plasma-Mass Spectrometry”, Open File Report (OFR) 98-165. Available from: U.S. Geological Survey, Denver Federal Center, Box 25425, Denver, CO 80225. Table IB, Note 50.

(50) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Triazine and Other Nitrogen-containing Compounds by Gas Chromatography with Nitrogen Phosphorus Detectors” U.S. Geological Survey Open File Report 94-37. Available from: U.S. Geological Survey, Denver Federal Center, Box

25425, Denver, CO 80225. Table ID, Note 9.

(51) “Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediments”, Open File Report (OFR) 93-125. Available from: U.S. Geological Survey, Denver Federal Center, Box 25425, Denver, CO 80225. Table IB, Note 51; Table IC, Note 9.

\* \* \* \* \*

**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. Section 141.21 is amended:
  - a. By revising footnote 1 to the table in paragraph (f)(3).
  - b. By revising the 6th sentence in paragraph (f)(5).
  - c. By revising paragraphs (f)(6)(i) and (f)(6)(ii).
  - d. By removing the third sentence in paragraph (f)(8), and by removing the second sentence and adding two sentences in its place.

**§ 141.21 Coliform sampling.**

\* \* \* \* \*  
 (f) \* \* \* \* \*  
 (3) \* \* \*

<sup>1</sup> Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. The cited methods published in any of these three editions may be used.

(5) \* \* \* The preparation of EC medium is described in Method 9221E (paragraph 1a) in Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), and 20th edition (1998); the cited method in any one of these three editions may be used. \* \* \*

(6) \* \* \*  
 (i) EC medium supplemented with 50 µg/mL of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 mL of EC medium, as described in paragraph (f)(5) of this section, is supplemented with 50 µg/mL of MUG before autoclaving. The

inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in paragraph (f)(5) of this section for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at 44.5 ± 0.2°C for 24 ± 2 hours, and then observe fluorescence with an ultraviolet light (366 nm) in the dark. If fluorescence is visible, E. coli are present.

(ii) Nutrient agar supplemented with 100 µg/mL of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used for determining if a total coliform-positive sample, as determined by a membrane filter technique, contains E. coli. Alternatively, the 18th edition (1992) may be used if the membrane filter containing a total coliform-positive colony(ies) is transferred to nutrient agar, as described in Method 9221B (paragraph 3) of Standard Methods (18th edition), supplemented with 100 µg/mL of MUG. If the 18th edition is used, incubate the agar plate at 35°C for 4 hours and then observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, E. coli are present.

\* \* \* \* \*

(8) \* \* \* Copies of the analytical methods cited in Standard Methods for the Examination of Water and Wastewater (18th, 19th, and 20th editions) may be obtained from the American Public Health Association *et al.*; 1015 Fifteenth Street, NW., Washington, DC 20005-2605. Copies of the MMO-MUG Test, as set forth in the article “National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and Escherichia coli from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method” (Edberg *et al.*) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. \* \* \*

\* \* \* \* \*

3. Section 141.23 is amended by revising the table and the footnotes in paragraph (k)(1) to read as follows:

**§ 141.23 Inorganic chemical sampling and analytical requirements.**

\* \* \* \* \*  
 (k) \* \* \* \* \*  
 (l) \* \* \*

Contaminant and methodology <sup>13</sup>	EPA	ASTM <sup>3</sup>	SM <sup>4</sup> (18th, 19th ed.)	SM <sup>4</sup> (20th ed.)	Other
1. Alkalinity:					
Titrimetric .....		D1067—92B .....	2320 B .....	2320 B	
Electrometric titration ...					I-1030-85 <sup>5</sup>
2. Antimony:					
Inductively Coupled Plasma (ICP)—Mass Spectrometry.	200.8 <sup>2</sup> .				
Hydride-Atomic Absorption.		D3697-92			
Atomic Absorption; Platform.	200.9 <sup>2</sup>				
Atomic Absorption; Furnace.			3113 B		
3. Arsenic: <sup>14</sup>					
Inductively Coupled Plasma <sup>15</sup> .	200.7 <sup>2</sup> .....		3120 B .....	3120 B	
ICP-Mass Spectrometry	200.8 <sup>2</sup> .				
Atomic Absorption; Platform.	200.9 <sup>2</sup> .				
Atomic Absorption; Furnace.		D2972-97C .....	3113 B		
Hydride Atomic Absorption.		D2972-97B .....	3114 B		
4. Asbestos:					
Transmission Electron Microscopy.	100.1 <sup>9</sup> .				
Transmission Electron Microscopy.	100.2 <sup>10</sup> .				
5. Barium:					
Inductively Coupled Plasma.	200.7 <sup>2</sup> .....		3120 B .....	3120 B	
ICP-Mass Spectrometry	200.8 <sup>2</sup> .				
Atomic Absorption; Direct.			3111 D		
Atomic Absorption; Furnace.			3113 B		
6. Beryllium:					
Inductively Coupled Plasma.	200.7 <sup>2</sup> .....		3120 B .....	3120 B	
ICP-Mass Spectrometry	200.8 <sup>2</sup> .				
Atomic Absorption; Platform.	200.9 <sup>2</sup> .				
Atomic Absorption; Furnace.		D3645-97B .....	3113 B		
7. Cadmium:					
Inductively Coupled Plasma.	200.7 <sup>2</sup>				
ICP-Mass Spectrometry	200.8 <sup>2</sup>				
Atomic Absorption; Platform.	200.9 <sup>2</sup>				
Atomic Absorption; Furnace.			3113 B.		
8. Calcium:					
EDTA titrimetric .....		D511-93A .....	3500-Ca D .....	3500-Ca B.	
Atomic Absorption; Direct Aspiration.		D511-93B .....	3111 B.		
Inductively Coupled Plasma.	200.7 <sup>2</sup> .....		3120 B .....	3120 B.	
9. Chromium:					
Inductively Coupled Plasma.	200.7 <sup>2</sup> .....		3120 B .....	3120 B.	
ICP-Mass Spectrometry	200.8 <sup>2</sup> .				
Atomic Absorption; Platform.	200.9 <sup>2</sup> .				
Atomic Absorption; Furnace.			3113 B.		
10. Copper:					
Atomic Absorption; Furnace.		D1688-95C .....	3113 B.		
Atomic Absorption; Direct Aspiration.		D1688-95A .....	3111 B.		
Inductively Coupled Plasma.	200.7 <sup>2</sup> .....		3120 B .....	3120 B.	

Contaminant and methodology <sup>13</sup>	EPA	ASTM <sup>3</sup>	SM <sup>4</sup> (18th, 19th ed.)	SM <sup>4</sup> (20th ed.)	Other
ICP-Mass spectrometry Atomic Absorption; Plat- form.	200.8 <sup>2</sup> . 200.9 <sup>2</sup> .				
11. Conductivity: Conductance .....		D1125-95A .....	2510 B .....	2510 B.	
12. Cyanide: Manual Distillation fol- lowed by.		D2036-98A .....	4500-CN <sup>-</sup> C .....	4500-CN <sup>-</sup> C.	
Spectrophotometri- c, Amenable.		D2036-98B .....	4500-CN <sup>-</sup> G .....	4500-CN <sup>-</sup> G.	
Spectrophotometric Manual.		D2036-98A .....	4500-CN <sup>-</sup> E .....	4500-CN <sup>-</sup> E .....	I-3300-85 <sup>5</sup>
Spectrophotometric Semi-automated.	335.4 <sup>6</sup> .				
Selective Electrode .....			4500-CN <sup>-</sup> F .....	4500-CN <sup>-</sup> F.	
13. Fluoride: Ion Chromatography ....	300.0 <sup>6</sup> .....	D4327-97 .....	4110 B .....	4110 B.	
Manual Distill.; Color. SPADNS.			4500-F <sup>-</sup> B,D .....	4500-F <sup>-</sup> B,D .....	
Manual Electrode .....		D1179-93B .....	4500-F <sup>-</sup> C .....	4500-F <sup>-</sup> C .....	
Automated Electrode ...					380-75WE <sup>11</sup>
Automated Alizarin .....			4500-F <sup>-</sup> E .....	4500-F <sup>-</sup> E .....	29-71W <sup>11</sup>
14. Lead: Atomic Absorption; Fur- nace.		D3559-96D .....	3113 B.		
ICP-Mass spectrometry Atomic Absorption; Plat- form.	200.8 <sup>2</sup> . 200.9 <sup>2</sup> .				
Differential Pulse An- odic Stripping Voltammetry.					Method 1001 <sup>16</sup>
15. Magnesium: Atomic Absorption .....		D511-93 B .....	3111 B.		
ICP .....	200.7 <sup>2</sup> .....		3120 B .....	3120 B.	
Complexation Titrimetric Methods.		D511-93 A .....	3500-Mg E .....	3500-Mg B.	
16. Mercury: Manual, Cold Vapor ....	245.1 <sup>2</sup> .....	D3223-97 .....	3112 B.		
Automated, Cold Vapor	245.2 <sup>1</sup> .				
ICP-Mass Spectrometry	200.8 <sup>2</sup> .				
17. Nickel: Inductively Coupled Plasma.	200.7 <sup>2</sup> .....		3120 B .....	3120 B.	
ICP-Mass Spectrometry Atomic Absorption; Plat- form.	200.8 <sup>2</sup> . 200.9 <sup>2</sup> .				
Atomic Absorption; Di- rect.			3111 B.		
Atomic Absorption; Fur- nace.			3113 B.		
18. Nitrate: Ion Chromatography ....	300.0 <sup>6</sup> .....	D4327-97 .....	4110 B .....	4110 B .....	B-1011 <sup>8</sup>
Automated Cadmium Reduction.	353.2 <sup>6</sup> .....	D3867-90A .....	4500-NO <sub>3</sub> <sup>-</sup> F .....	4500-NO <sub>3</sub> <sup>-</sup> F.	
Ion Selective Electrode			4500-NO <sub>3</sub> <sup>-</sup> D .....	4500-NO <sub>3</sub> <sup>-</sup> D .....	601 <sup>7</sup>
Manual Cadmium Re- duction.		D3867-90B .....	4500-NO <sub>3</sub> <sup>-</sup> E .....	4500-NO <sub>3</sub> <sup>-</sup> E.	
19. Nitrite: Ion Chromatography ....	300.0 <sup>6</sup> .....	D4327-97 .....	4110 B .....	4110 B .....	B-1011 <sup>8</sup>
Automated Cadmium Reduction.	353.2 <sup>6</sup> .....	D3867-90A .....	4500-NO <sub>3</sub> <sup>-</sup> .....	4500-NO <sub>3</sub> <sup>-</sup> F.	
Manual Cadmium Re- duction.		D3867-90B .....	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.	
20. Ortho-phosphate: <sup>12</sup> Colorimetric, Auto- mated, Ascorbic Acid.	365.1 <sup>6</sup> .....		4500-P F .....	4500-P F.	
Colorimetric, ascorbic acid, single reagent.		D515-88A .....	4500-P E .....	4500-P E.	
Colorimetric					I-1601-85 <sup>5</sup>
Phosphomolybdate; Automated-seg- mented Flow;					I-2601-90 <sup>5</sup>

Contaminant and methodology <sup>13</sup>	EPA	ASTM <sup>3</sup>	SM <sup>4</sup> (18th, 19th ed.)	SM <sup>4</sup> (20th ed.)	Other
Automated Discrete Ion Chromatography	300.0 <sup>6</sup>	D4327-97	4110 B	4110 B.	I-2598-85 <sup>5</sup>
21. pH: Electrometric	150.1 <sup>1</sup> 150.2 <sup>1</sup>	D1293-95	4500-H <sup>+</sup> B	4500-H <sup>+</sup> B.	
22. Selenium: Hydride-Atomic Absorption.		D3859-98A	3114 B.		
ICP-Mass Spectrometry Atomic Absorption; Platform.	200.8 <sup>2</sup> 200.9 <sup>2</sup>				
Atomic Absorption; Furnace.		D3859-98B	3113 B.		
23. Silica: Colorimetric, Molybdate Blue;					I-1700-85 <sup>5</sup>
Automated-segmented Flow.					I-2700-85 <sup>5</sup>
Colorimetric		D859-95.			
Molybdosilicate			4500-Si D	4500-SiO <sub>2</sub> C.	
Heteropoly Blue			4500-Si E	4500-SiO <sub>2</sub> D.	
Automated for Molybdate-reactive Silica.			4500-Si F	4500-SiO <sub>2</sub> E.	
Inductively Coupled Plasma.	200.7 <sup>2</sup>		3120 B	3120 B.	
24. Sodium: Inductively Coupled Plasma.	200.7 <sup>2</sup>				
Atomic Absorption; Direct Aspiration.			3111 B.		
25. Temperature: Thermometric			2550	2550.	
26. Thallium: ICP-Mass Spectrometry Atomic Absorption; Platform.	200.8 <sup>2</sup> 200.9 <sup>2</sup>				

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1-11 and 16 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW, Room B135, Washington, DC (Telephone: 202-566-2426); or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

<sup>1</sup> "Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79/020, March 1983. Available at NTIS, PB84-128677.

<sup>2</sup> "Methods for the Determination of Metals in Environmental Samples—Supplement I", EPA/600/R-94/111, May 1994. Available at NTIS, PB95-125472.

<sup>3</sup> *Annual Book of ASTM Standards*, 1994, 1996, or 1999, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. The previous versions of D1688-95A, D1688-95C (copper), D3559-95D (lead), D1293-95 (pH), D1125-91A (conductivity) and D859-94 (silica) are also approved. These previous versions D1688-90A, C; D3559-90D, D1293-84, D1125-91A and D859-88, respectively are located in the *Annual Book of ASTM Standards*, 1994, Vol. 11.01. Copies may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

<sup>4</sup> Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. The cited methods published in any of these three editions may be used, except that the versions of 3111 B, 3111 D, 3113 B and 3114 B in the 20th edition may not be used.

<sup>5</sup> Method I-2601-90, Methods for Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediment, Open File Report 93-125, 1993; For Methods I-1030-85; I-1601-85; I-1700-85; I-2598-85; I-2700-85; and I-3300-85 See Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd ed., 1989; Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425.

<sup>6</sup> "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA/600/R-93/100, August 1993. Available at NTIS, PB94-120821.

<sup>7</sup> The procedure shall be done in accordance with the Technical Bulletin 601 "Standard Method of Test for Nitrate in Drinking Water", July 1994, PN 221890-001, Analytical Technology, Inc. Copies may be obtained from ATI Orion, 529 Main Street, Boston, MA 02129.

<sup>8</sup> Method B-1011, "Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography," August 1987. Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Milford, MA 01757.

<sup>9</sup> Method 100.1, "Analytical Method For Determination of Asbestos Fibers in Water", EPA/600/4-83/043, EPA, September 1983. Available at NTIS, PB83-260471.

<sup>10</sup> Method 100.2, "Determination of Asbestos Structure Over 10µm In Length In Drinking Water", EPA/600/R-94/134, June 1994. Available at NTIS, PB94-201902.

<sup>11</sup> Industrial Method No. 129-71W, "Fluoride in Water and Wastewater", December 1972, and Method No. 380-75WE, "Fluoride in Water and Wastewater", February 1976, Technicon Industrial Systems. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.

<sup>12</sup> Unfiltered, no digestion or hydrolysis.

<sup>13</sup> Because MDLs reported in EPA Methods 200.7 and 200.9 were determined using a 2X preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (i.e., no sample digestion) will be higher. For direct analysis of cadmium and arsenic by Method 200.7, and arsenic by Method 3120 B sample preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis of antimony, lead, and thallium by Method 200.9; antimony and lead by Method 3113 B; and lead by Method D3559-90D unless multiple in-furnace depositions are made.

<sup>14</sup>If ultrasonic nebulization is used in the determination of arsenic by Methods 200.7, 200.8, or SM 3120 B, the arsenic must be in the pentavalent state to provide uniform signal response. For methods 200.7 and 3120 B, both samples and standards must be diluted in the same mixed acid matrix concentration of nitric and hydrochloric acid with the addition of 100 µL of 30% hydrogen peroxide per 100ml of solution. For direct analysis of arsenic with method 200.8 using ultrasonic nebulization, samples and standards must contain one mg/L of sodium hypochlorite.

<sup>15</sup>After January 23, 2006 analytical methods using the ICP–AES technology, may not be used because the detection limits for these methods are 0.008 mg/L or higher. This restriction means that the two ICP–AES methods (EPA Method 200.7 and SM 3120 B) approved for use for the MCL of 0.05 mg/L may not be used for compliance determinations for the revised MCL of 0.01 mg/L. However, prior to 2005 systems may have compliance samples analyzed with these less sensitive methods.

<sup>16</sup>The description for Method Number 1001 for lead is available from Palintest, LTD, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018. Or from the Hach Company, P.O. Box 389, Loveland, CO 80539.

\* \* \* \* \*

4. Section 141.24 is amended by revising the 11th, 12th and last sentences in paragraph (e)(1), before the Table, to read as follows:

**§ 141.24 Organic chemicals, sampling and analytical requirements.**

\* \* \* \* \*

(e) \* \* \*

(1) \* \* \* Method 6651 shall be followed in accordance with Standard Methods for the Examination of Water and Wastewater, 18th edition (1992),

19th edition (1995), or 20th edition (1998), American Public Health Association (APHA); any of these three editions may be used. Method 6610 shall be followed in accordance with Standard Methods for the Examination of Water and Wastewater, (18th Edition Supplement) (1994), or with the 19th edition (1995) or 20th edition (1998) of Standard Methods for the Examination of Water and Wastewater; any of these three editions may be used. \* \* \* ASTM Method D 5317–93 is available in

the *Annual Book of ASTM Standards* (1999), Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, or in any edition published after 1993.

\* \* \* \* \*

5. Section 141.25 is amended by revising the Table and footnotes in paragraph (a) to read as follows:

**§ 141.25 Analytical methods for radioactivity.**

(a) \* \* \*



Contaminant	Methodology	Reference (method or page number)								
		EPA <sup>1</sup>	EPA <sup>2</sup>	EPA <sup>3</sup>	EPA <sup>4</sup>	SM <sup>5</sup>	ASTM <sup>6</sup>	USGS <sup>7</sup>	DOE <sup>8</sup>	Other
Naturally occurring:										
Gross alpha <sup>11</sup> and beta.	Evaporation ..	900.0 ...	p 1 .....	00-01 ..	p 1 .....	302, 7110 B .....	.....	R-1120-76.		
Gross alpha <sup>11</sup> .	Co-precipitation.	.....	.....	00-02 ..	.....	7110 C .....				
Radium 226.	Radon emanation.	903.1 ...	p 16 .....	Ra-04	p 19 .....	305,7500-Ra C .....	D 3454-97	R-1141-76.	Ra-04	N.Y. <sup>9</sup>
	Radiochemical.	903.0 ...	p 13 .....	Ra-03	.....	304,7500-Ra B .....	D 2460-97	R-1140-76.		
Radium 228.	Radiochemical.	904.0 ...	p 24 .....	Ra-05	p 19 .....	7500-Ra D .....	.....	R-1142-76.	.....	N.Y. <sup>9</sup> , N.J. <sup>10</sup>
Uranium <sup>12</sup> .	Radiochemical.	908.0 ...	.....	.....	.....	7500-U B				
	Fluorometric	908.1 ...	.....	.....	.....	7500-U C (17th Ed.).	D2907-97	R-1180-76, R-1181-76.	U-04	
	Alpha spectrometry.	.....	.....	00-07 ..	p 33 .....	7500-U C (18th, 19th or 20th Ed.).	D 3972-97	R-1182-76.	U-02	
	Laser Phosphorimetry.	.....	.....	.....	.....	.....	D 5174-97			
Man-made:										
Radioactive cesium.	Radiochemical .....	901.0 ...	p 4 .....	.....	.....	7500-CsB .....	D 2459-72	R-1111-76.		
	Gamma ray spectrometry.	901.1 ...	.....	.....	p 92 .....	7120 .....	D 3649-91	R- 1110-76.	4.5.2.3	
Radioactive iodine	Radiochemical .....	902.0 ...	p 6, p 9	.....	.....	7500-I B, 7500-I C, 7500-I D.	D 3649-91			
	Gamma ray spectrometry.	901.1 ...	.....	.....	p 92 .....	7120 .....	D 4785-93	.....	4.5.2.3	
Radioactive Strontium 89, 90.	Radiochemical .....	905.0 ...	p 29 .....	Sr-04 ..	p 65 .....	303, 7500-Sr B .....	.....	R-1160-76.	Sr-01, Sr-02	
Tritium ....	Liquid scintillation.	906.0 ...	p 34 .....	H-02 ...	p 87 .....	306, 7500-3H B ....	D 4107-91	R-1171-76.		
Gamma emitters.	Gamma ray ..	901.1 ...	.....	.....	p 92 .....	7120 .....	D 3649-91	R-1110-76.	Ga-01-R.	
	Spectrometry	902.0, 901.0.	.....	.....	.....	7500-Cs B, 7500-I B.	D 4785-93			

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., Room B135, Washington, DC (Telephone: 202-566-2426); or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

<sup>1</sup> "Prescribed Procedures for the Measurement of Radioactivity in Drinking Water", EPA 600/4-80-032, August 1980. Available at the U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847), PB 80-224744.

<sup>2</sup> "Interim Radiochemical Methodology for Drinking Water", EPA 600/4-75-008(revised), March 1976. Available NTIS, ibid. PB 253258.

<sup>3</sup> "Radiochemistry Procedures Manual", EPA 520/5-84-006, December, 1987. Available NTIS, ibid. PB 84-215581.

<sup>4</sup> "Radiochemical Analytical Procedures for Analysis of Environmental Samples", March 1979. Available at NTIS, ibid. EMSL LV 053917.

<sup>5</sup> "Standard Methods for the Examination of Water and Wastewater", 13th, 17th, 18th, 19th Editions, or 20th edition, 1971, 1989, 1992, 1995, 1998. Available at American Public Health Association, 1015 Fifteenth Street NW., Washington, DC 20005. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Methods 7110B, 7500-Ra B, 7500-Ra C, 7500-Ra D, 7500-U B, 7500-Cs B, 7500-I B, 7500-I C, 7500-I D, 7500-Sr B, 7500-3H B are in the 17th, 18th, 19th and 20th editions. Method 7110 C is in the 18th, 19th and 20th editions. Method 7500-U C Fluorometric Uranium is only in the 17th Edition, and 7500-U C Alpha spectrometry is only in the 18th, 19th and 20th editions. Method 7120 is only in the 19th and 20th editions. Methods 302, 303, 304, 305 and 306 are only in the 13th edition.

<sup>6</sup> Annual Book of ASTM Standards, Vol. 11.01 and 11.02, 1999; ASTM International any year containing the cited version of the method may be used. Copies may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

<sup>7</sup> "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments", Chapter A5 in Book 5 of Techniques of Water-Resources Investigations of the United States Geological Survey, 1977. Available at U.S. Geological Survey (USGS) Information Services, Box 25286, Federal Center, Denver, CO 80225-0425.

<sup>8</sup> "EML Procedures Manual", 28th (1997) or 27th (1990) Editions, Volumes 1 and 2; either edition may be used. In the 27th Edition Method Ra-04 is listed as Ra-05 and Method Ga-01-R is listed as Sect. 4.5.2.3. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.

<sup>9</sup> "Determination of Ra-226 and Ra-228 (Ra-02)", January 1980, Revised June 1982. Available at Radiological Sciences Institute for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

<sup>10</sup>“Determination of Radium 228 in Drinking Water”, August 1980. Available at State of New Jersey, Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analytical Services, 9 Ewing Street, Trenton, NJ 08625.

<sup>11</sup>Natural uranium and thorium-230 are approved as gross alpha calibration standards for gross alpha with co-precipitation and evaporation methods; americium-241 is approved with co-precipitation methods.

<sup>12</sup>In uranium (U) is determined by mass, a 0.67 pCi/μg of uranium conversion factor must be used. This conversion factor is based on the 1:1 activity ration of U-234 and U-238 that is characteristic of naturally occurring uranium.

\* \* \* \* \*

6. Section 141.74 is amended by revising the footnote 1 to the Table in paragraph (a)(1) and by revising the first three sentences of paragraph (a)(2) to read as follows:

**§ 141.74 Analytical and monitoring requirements.**

(a) \* \* \*

(1) \* \* \*

<sup>1</sup> Except where noted, all methods refer to Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C.

20005. The cited methods published in any of these three editions may be used.

\* \* \* \* \*

(2) Public water systems must measure residual disinfectant concentrations with one of the analytical methods in the following table. Except for the method for ozone residuals, the disinfectant residual methods are contained in the 18th, 19th, and 20th editions of Standard Methods for the Examination of Water and Wastewater, 1992, 1995, and 1998; the cited methods published in any of these three editions may be used. The ozone method, 4500-O<sub>3</sub> B, is contained in both the 18th and 19th editions of Standard Methods for the Examination of Water

and Wastewater, 1992, 1995; either edition may be used. \* \* \*

\* \* \* \* \*

**PART 143—NATIONAL SECONDARY DRINKING WATER REGULATIONS**

1. The authority citation for Part 143 continues to read as follows:

**Authority:** 42 U.S.C. 300f *et seq.*

2. Section 143.4 is amended by revising the Table and footnotes in paragraph (b) to read as follows:

**§ 143.4 Monitoring.**

\* \* \* \* \*

(b) \* \* \*

Contaminant	EPA	ASTM <sup>3</sup>	SM <sup>4</sup> 18th and 19th ed.	SM <sup>4</sup> 20th ed.	Other
1. Aluminum	200.7 <sup>2</sup> 200.8 <sup>2</sup> 200.9 <sup>2</sup>		3120 B 3113 B. 3111 D.	3120 B.	
2. Chloride	300.0 <sup>1</sup>	D4327-97 D512-89B	4110 B 4500-Cl <sup>-</sup> D 4500-Cl <sup>-</sup> B	4110 B. 4500-Cl <sup>-</sup> D. 4500-Cl <sup>-</sup> B.	
3. Color			2120 B	2120 B.	
4. Foaming Agents			5540 C	5540 C.	
5. Iron	200.7 <sup>2</sup> 200.9 <sup>2</sup>		3120 B 3111 B. 3113 B.	3120 B.	
6. Manganese	200.7 <sup>2</sup> 200.8 <sup>2</sup> 200.9 <sup>2</sup>		3120 B 3111 B. 3113 B.	3120 B.	
7. Odor			2150 B	2150 B.	
8. Silver	200.7 <sup>2</sup> 200.8 <sup>2</sup> 200.9 <sup>2</sup>		3120 B 3111 B. 3113 B.	3120 B	I-3720-85 <sup>5</sup>
9. Sulfate	300.0 <sup>1</sup> 375.2 <sup>1</sup>	D4327-97 D516-90	4110 B 4500-SO <sub>4</sub> <sup>2-</sup> F 4500-SO <sub>4</sub> <sup>2-</sup> C, D 4500-SO <sub>4</sub> <sup>2-</sup> E	4110 B. 4500-SO <sub>4</sub> <sup>2-</sup> F. 4500-SO <sub>4</sub> <sup>2-</sup> C, D. 4500-SO <sub>4</sub> <sup>2-</sup> E.	
10. Total Dissolved Solids			2540 C	2540 C.	
11. Zinc	200.7 <sup>2</sup> 200.8 <sup>2</sup>		3120 B 3111 B.	3120 B.	

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW, Room B135, Washington, DC (Telephone: 202-566-2426); or at the Office of Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC 20408.

<sup>1</sup>“Methods for the Determination of Inorganic Substances in Environmental Samples”, EPA/600/R-93-100, August 1993. Available at NTIS, PB94-120821.

<sup>2</sup>“Methods for the Determination of Metals in Environmental Samples—Supplement I”, EPA/600/R-94-111, May 1994. Available at NTIS, PB 95-125472.

<sup>3</sup>Annual Book of ASTM Standards, 1994, 1996, or 1999, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. Copies may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

<sup>4</sup>Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. The cited methods published in any of these three editions may be used, except that the versions of 3111 B, 3111 D, and 3113 B in the 20th edition may not be used.

<sup>5</sup>Method I-3720-85, *Techniques of Water Resources Investigation of the U.S. Geological Survey*, Book 5, Chapter A-1, 3rd ed., 1989; Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425.

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