

**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Part 141**

[WH-FRL-5689-9]

RIN 2040-AC88

**National Primary Drinking Water Regulations: Analytical Methods for Radionuclides**

**AGENCY:** Environmental Protection Agency.

**ACTION:** Final rule.

**SUMMARY:** The Environmental Protection Agency (EPA) is approving the use of 66 additional analytical methods for compliance with current radionuclide drinking water standards and monitoring requirements. The methods are applicable to gross alpha, gross beta, tritium, uranium, radium-226, radium-228, gamma emitters, and radioactive cesium, iodine and strontium. This rule is expected to satisfy public requests for approval of new analytical technologies for measuring contaminants in drinking water. This rule imposes no burden, because it does not withdraw approval of any previously approved method. Today's final rule follows the Proposed Notice of Rulemaking for Radionuclides in Drinking Water published on July 18, 1991. The 1991 rulemaking proposed to approve analytical methods and establish Maximum Contaminant Level Goals (MCLGs) and National Primary Drinking Water Regulations (NPDWRs) for several radionuclides. Today's final rule is limited to the approval of additional analytical methods. In addition, since EPA received comments suggesting approval of additional methods during the comments period, EPA is proceeding with direct final rule making on 12 of the suggested methods. EPA is inviting comments on these 12 methods elsewhere in today's rule.

**DATES:** The effective date for amendment 2 is April 4, 1997. The effective date for amendment 3 is May 5, 1997 unless EPA receives adverse comments by April 4, 1997 requiring a response. If EPA receives adverse comments, EPA will publish a timely withdrawal of amendment 3.

The incorporation by reference of the publications listed in this regulation is approved by the Director of the Federal Register as of April 4, 1997.

This regulation shall be considered final Agency action on May 9, 1997 at 1:00 p.m. Eastern Standard Time for purposes of judicial review in accordance with 40 CFR 23.7.

**ADDRESSES:** Adverse comments on the direct final rule must be submitted to

Chemistry Methods Docket Clerk, MC 4101, 401 M street, S.W., Washington, D.C. 20460. Copies of the public comments received, EPA responses, and all other supporting documents (including references included in this notice) are available for review at the U.S. Environmental Protection Agency, Water Docket, 401 M Street, S.W. Washington, D.C. 20460. For access to the docket materials, call 202-260-3027 on Monday through Friday, excluding Federal holidays, between 9:00 a.m. and 3:30 p.m. Eastern Time for an appointment. Copies of methods published by EPA are available for a nominal cost through the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. NTIS also may be reached at 800-553-6847. All other methods must be obtained from the publisher. Sources (with addresses) for all approved methods are cited at 40 CFR Part 141 and in the References section of today's rule.

**FOR FURTHER INFORMATION CONTACT:**

Dr. Richard Reding, Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency, 26 West Martin Luther King Drive, Cincinnati, OH 45268, 513-569-7961; Dr. Jitendra Saxena, Office of Ground Water and Drinking Water (4603), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, 202-260-9579; or one of the EPA Regional Office contacts listed below. General information may also be obtained from the EPA Drinking Water Hotline. Callers within the United States may reach the Safe Drinking Water Hotline at 800-426-4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding Federal holidays, from 9:00 a.m. to 5:30 p.m. Eastern Time.

For technical information regarding the methods contact Stephen Pia, National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, P.O. Box 93478, Las Vegas, NV 89193-3478, 702-798-2102.

EPA Regional Offices:

- I JFK Federal Bldg., One Congress Street, 11th floor, Boston, MA 02203, Phone: 617-565-3602, Jerry Healey
- II 290 Broadway, 24th Floor, New York, NY 10007, Phone: 212-637-3880, Walter Andrews
- III 841 Chestnut Building, Philadelphia, PA 19107, Phone: 215-597-6511, Victoria Binetti
- IV 345 Courtland Street, N.E., Atlanta, GA 30365, Phone: 404-347-2207, Wayne Aronson

- V 77 West Jackson Boulevard, Chicago, IL 60604, Phone: 312-886-6206, Charlene Denys
- VI 1445 Ross Avenue, Suite 1200, Dallas, TX 75202, Phone: 214-655-7150, Oscar Cabra
- VII 726 Minnesota Avenue, Kansas City, KS 66101, Phone: 913-551-7682, Robert Morby
- VIII One Denver Place, 999 18th Street, Suite 500, Denver, CO 80202, Phone: 303-293-1652, Patrick Crotty
- IX 75 Hawthorne Street, San Francisco, CA 94105, Phone: 415-744-1817, Doris Betuel
- X 1200 Sixth Avenue, Seattle, WA 98101, Phone: 206-553-1893, Larry Worley.

**SUPPLEMENTARY INFORMATION:**

*Regulated entities:* Entities potentially regulated by this action are listed below:

Category	Example of regulated entities
Public Water Systems	All public water systems that have at least 15 service connections or regularly serve an average of at least 25 individuals daily at least 60 days out of the year.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the type of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your business is regulated by this action, you should carefully examine the applicability of the current radionuclide drinking water standards and monitoring requirements in § 141.15 and 141.16 of title 40 of the Code of Federal Regulations. If you have questions regarding the applicability of this action to a particular entity, consult the persons listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

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**I. Statutory Authority**

The Safe Drinking Water Act (SDWA), as amended in 1996, requires EPA to promulgate national primary drinking water regulations (NPDWRs) which

specify maximum contaminant levels (MCLs) or treatment techniques for drinking water contaminants (42 USC 300g-1). NPDWRs apply to public water systems (42 USC 300f(1)(A)). According to section 1401(1)(D) of the Act, NPDWRs include "criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; including quality control and testing procedures \* \* \*." In addition, Section 1445(a) of the Act authorizes the Administrator to establish regulations for monitoring to assist in determining whether persons are acting in compliance with the requirements of the SDWA. 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 USC 300j-9(a)).

## II. Regulatory Background

EPA has promulgated analytical methods for all currently regulated drinking water contaminants for which MCLs or monitoring requirements have been promulgated. In most cases, the Agency has promulgated regulations specifying (i.e., approving) use of more than one analytical method for measurement of a contaminant, and laboratories may use any approved method for determining compliance with an MCL or monitoring requirement. After any regulation is published, EPA may amend the regulations to approve additional methods, or modifications to approved methods, or withdraw methods that become obsolete.

On July 18, 1991 (56 FR 33050), EPA proposed to increase the number of methods approved for radionuclide monitoring by proposing the use of several new methods. EPA believed that these methods were as good as, or better than, existing approved methods and procedures. EPA also proposed drinking water standards (NPDWRs and MCLGs) and laboratory certification criteria for several radionuclides, including radon. EPA requested public comments on all of these proposed actions. Today's notice takes final action only on the approval of methods for gamma emitters, gross alpha, gross beta, radium-226, radium-228, uranium, tritium and radioactive cesium, iodine, and strontium. For the reasons discussed below, revision of standards for these radionuclides, and standards and analytical methods for radon-222 may be addressed in a separate rule.

In 1995 EPA initiated a dialogue with stakeholders to prioritize EPA drinking water activities in order to maximize

health risk reduction. That dialogue resulted in a draft report, published for comment in November, 1995 (EPA 1995), proposing to reallocate EPA's resources to those projects which have the highest risk reduction potential. Assuring that analytical test methods for determining compliance with existing standards remained "up to date" received significant stakeholder support. Therefore, in today's rule, EPA is approving some of the proposed radionuclide methods. EPA is not taking action on any radon analytical methods or on any of the MCLGs or NPDWRs that were proposed in the 1991 notice. Schedule for rulemaking on radon and other radionuclides is governed by the 1996 SDWA Amendments.

## III. Explanation of Today's Action

Today's action promulgates analytical methods for measurement of radionuclides in drinking water based on the 1991 proposal (54 methods) and on the public comments received on the 1991 proposal (12 methods). This action also corrects method citation and typographical errors made in the 1991 proposal. EPA is not withdrawing any of the 14 previously approved methods in today's action, which means the EPA Methods, the Standard Methods (13th edition) and ASTM methods that were previously cited at 40 CFR 141.25(a) are still approved and included in amendments 2 and 3. Laboratories may continue to use these 14 methods or they may choose from a group of 66 methods approved in today's rule. The effective date for approval of the 54 methods based on the 1991 proposal is April 4, 1997. The effective date for approval of the 12 methods submitted as public comments is May 5, 1997 (see explanation below).

In the 1991 notice the Agency proposed 56 new methods for measuring radionuclides in drinking water. The Agency is approving all but two of these methods. The analytical methods proposed were considered to be economically and technologically feasible for compliance monitoring. EPA analyzed the most recent available information and considered public comments on the proposal in arriving at the final selection of methods in the table at 40 CFR 141.25(a). Method D-1943-81 was proposed but is not approved today for gross alpha determinations because EPA realized that the 500 pCi/L lower limit of the method is too high to be of use for drinking water analysis. A precipitation method (Cs-01) for cesium was also proposed but is not approved because the method is no longer supported by its

developer, the U.S. Department of Energy.

Twelve of the methods approved in today's rule using direct final rulemaking, are based on the public comments received on the 1991 proposal. Commenters submitted several methods or techniques for consideration for approval. EPA evaluated and compared the sensitivity, accuracy, precision and selectivity of the suggested methods to the method performance requirements at 40 CFR 141.25 and to the data in previously approved methods. EPA also determined whether the performance data submitted by the commenter would insure compliance with the radionuclide MCLs and monitoring requirements at 40 CFR 141.15, 141.16, 141.25 and 141.26. Based on this evaluation EPA is approving twelve of these methods all of which are published, supported and extensively peer reviewed by highly respected method organizations. Of the twelve methods, six are published by the Standard Methods Committee, two by the American Society for Testing and Materials (ASTM), two by the U.S. Geological Survey (USGS) and two by the Department of Energy (DOE). Eleven of these methods use technologies that underlie methods that were proposed. Only one method uses a technology that was not proposed in the 1991 rule. This new cost-saving technology, pulsed laser phosphorimetry, was not proposed because no validated method was available at the time of proposal. Approving these additional methods will cause no burden because their use, like use of all of the methods approved in this rule, is optional.

The Agency is publishing the twelve methods suggested by public comment on the 1991 proposed rule as a "direct final" rule. A direct final rule is not an "interim final" rule (i.e. a rule which provides for public comment after it has gone into effect); rather it is a rule which is published with a delayed effective date allowing for the receipt of and response to public comment before the rule goes into effect. If EPA receives comments requiring response, then EPA will take additional action necessary to respond to those comments prior to the effective date (i.e. either withdraw the direct final rule or promulgate today's companion proposal). This rule thus complies with notice-and-comment requirements under the Administrative Procedure Act (APA). EPA has chosen to use the direct final approach for these twelve methods because the Agency does not expect to receive adverse public comment and to allow for the most expeditious implementation

possible consistent with the APA. Elsewhere in today's Federal Register, EPA is proposing these twelve methods. If EPA decides to withdraw any or all of these methods based on public comment, EPA will proceed with a revised rule based on this proposal. There will not be an additional comment period, so parties interested in commenting on the proposed rule should do so at this time.

The methods approved based on public comments and their analytes are: a co-precipitation method for gross alpha (7110C), two radon emanation and two radiochemical methods for radium-226 (7500-Ra C, Ra-05, D 2460-90 and R-1140-76), an alpha spectrometry and a laser phosphorimetry method for uranium (7500-U C and D 5174-91), one radiochemical and one gamma spectrometry method for cesium (R-1111-76 and 7120), one radiochemical and one gamma spectrometry method for iodine (7500-I C and 7500-I D) and a radiochemical method for strontium (SR-02). EPA evaluated and selected these methods using the same criteria (sensitivity, accuracy, precision and selectivity) that were used to select methods for the 1991 proposal (56 FR 33092-33093). In the proposal EPA stated that the "reliability of these [proposed] methods has been demonstrated by a history of many years' use by state, federal and private laboratories". Most of the methods approved in today's rule have been collaboratively validated in multi laboratory studies and the remainder in single laboratory studies.

Today's rule also corrects method citations and typographical errors made in the 1991 proposal. EPA has clarified the status of method 7500-U C to reflect a change made by the publisher. In the 18th edition of Standard Methods (1992), the fluorometric method 7500-U C for determination of uranium was dropped and the method number, 7500-U C, was assigned to an alpha spectrometry method for uranium. If the Standard Methods version of the alpha spectrometry method had been published earlier, EPA would have proposed it along with the four alpha spectrometry and five fluorometric methods for uranium that were proposed in the 1991 rule (56 FR 33124). As EPA is interested in approving both fluorometric and alpha spectrometric methods for uranium, this final rule approves method 7500-U C as a fluorometric method in the 17th edition of Standard Methods and as an alpha spectrometry method in the 18th and 19th editions of Standard Methods.

The method numbers in the 1991 proposal for a radiochemical iodine method and a liquid scintillation method were incorrect. These methods are approved and correctly listed in today's rule as methods D 4785-93 and D 4107-91. Other errors, which include page number references in the "Interim Radiochemical Methodology for Drinking Water" manual (EPA 1976), method numbers in the "EML Procedures Manual" (DOE 1990) and in the "Radiochemical Procedures Manual" (EPA 1987), and the publication date of the U.S. Geological Survey (USGS) book, are also corrected in today's rule.

#### IV. Response to Comments Received on the Proposed Rule

EPA received 160 analytical method related comments on the 1991 proposed rule. Commenters represented analytical laboratories, water utilities, instrument manufacturers, State and local governments, and trade associations. The majority of these comments dealt with radon methods, laboratory certification criteria and questions about the applicability of the methods to the proposed regulations. Only 27 comments were related to the methods covered by today's rule. Overall, public comments strongly supported approval of new and innovative methods for compliance with current radionuclide drinking water standards and monitoring requirements. A summary of major comments and the Agency's response to the issues raised are presented in this section. The Agency's detailed response to these comments is available in the public docket for this rule (EPA 1996).

Several commenters submitted radiochemical analytical methods or techniques to EPA for consideration for approval. EPA has approved 12 of the suggested methods because EPA believes they are as good as or better than existing methods and procedures, and have been extensively validated and peer reviewed. EPA has not approved 7 methods because these methods were not accompanied with the supporting data that the Agency believes is necessary for their evaluation.

Commenters recommended approval of pulsed laser phosphorimetry for analysis of uranium because it uses modern technology that is easier to use than the currently approved fluorometric methods. EPA agrees with this suggestion and as noted above, is approving laser phosphorimetry method D-5174-91. This method was published by ASTM in 1992 and has been validated to show that laser phosphorimetry is as good as or better

than previously approved techniques, such as fluorometry, for the analysis of uranium in drinking water samples. EPA believes that laboratories may adopt the laser phosphorimetry method because this technology can increase hourly sample production to 15-20 samples as compared to 2-5 samples using current fluorometric and alpha spectrometric technologies.

EPA was asked to withdraw approval of the fluorometric methods for determination of uranium because the methods are old and somewhat cumbersome compared to laser phosphorimetry. EPA disagrees that fluorometric methods should be withdrawn. Although these methods were approved about twenty years ago, they are not obsolete. These methods provide acceptable results and they are still used by many laboratories. It would be costly, burdensome and unnecessary to require laboratories to adopt to another technique. The commenter did not provide (and EPA does not have) data to show that these methods have become unacceptable for compliance determinations of uranium.

In the 1991 notice EPA proposed to replace americium-241 (Am-241) with thorium-230 (Th-230) as the calibration standard in gross alpha activity methods because Am-241 "tended to bias analytic results" (56 FR 33094). Commenters agreed with EPA's proposal but recommended that EPA also allow use of natural uranium (Unat) as a calibration standard. They stated that the alpha energies of both Unat and Th-230 better approximate the alpha energies of uranium and radium-226, and both isotopes also better approximate the attenuation of the alpha particles caused by drinking water dissolved solids. EPA agrees with the comment and a footnote in the table of approved methods at 40 CFR 141.25(a) now approves use of either Unat or Th-230 as calibration standards for gross alpha analyses with co-precipitation and evaporation methods. EPA believes that Am-241 is only suitable for use with co-precipitation methods. Therefore, future revisions of the evaporation methods may specify use of only Unat and Th-230 as calibration standards. One commenter asked where to obtain standards of Th-230 for use with the gross alpha methods. Th-230 is readily available in a concentrated form from commercial vendors.

In the 1991 proposal EPA solicited comment on what conversion factor to use with the approved methods that measure uranium in mass units (micrograms) rather than in activity units (picocuries) (56 FR 33095). Uranium is measured in activity units

with radiochemical and alpha spectrometry methods and in mass units with fluorometric and laser phosphorimetry methods. All of these techniques are acceptable provided a conversion factor is used to convert the fluorometric or laser phosphorimetric uranium result from micrograms to picocuries. The factor is required because the uranium contribution to the gross alpha activity MCL of 15 pCi/L must be evaluated in picocuries not micrograms (40 CFR 141.15(b)).

This conversion factor is not specified in the instructions in the approved mass-type methods for uranium determinations. In the 1991 proposal EPA solicited comment on use of a conversion factor of 1.38 pCi/μg or 0.67 pCi/μg. No public comments were received with respect to what factor to use to determine the activity contribution of uranium to the current gross alpha activity 15 pCi/L MCL. In today's rule the Agency is selecting the lower conversion factor, 0.67 pCi/μg, because it is a conservative factor that is based on the 1:1 activity ratio of U-234 to U-238 characteristic of naturally occurring uranium.

Several commenters expressed confusion and wanted clarification about the approval status of methods appearing in multiple editions of the ASTM and Standard Methods publications. As ASTM annually reprints all of the methods contained in the Annual Book of ASTM Methods, even methods that have not been editorially or technically revised, EPA permits the use of any edition of the ASTM book that contains the EPA-approved version of the compliance method. EPA is also approving at this time versions of the radionuclide methods in Standard Methods for the Examination of Water and Wastewater that are in the 13th, 17th, 18th and 19th editions of this publication. In the 1994 methods rule which covered chemistry and microbiology methods (59 FR 62456), EPA approved only one version of each compliance method that was published in Standard Methods. EPA approved only one version because later versions generally contained improvements in safety, quality assurance or performance. EPA feels that changes in the recent versions of radionuclide methods have not been significant enough to warrant withdrawing the previous versions.

## V. Regulation Assessment Requirements

### A. Executive Order 12866

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 entitlement, 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

Pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Administrator certifies that this rule will not have a significant economic impact on a substantial number of small entities. This rule specifies additional analytical methods that laboratories may choose to use in lieu of existing approved methods for compliance measurement of radionuclides in drinking water. The rule does not impose any new requirements on small entities. Monitoring requirements were promulgated in earlier notices and are unaffected by this rule. This rule merely increases operational flexibility under these existing monitoring requirements. The rule may actually reduce the cost of compliance monitoring for radionuclides by allowing laboratories to use equipment and procedures that they may already own or have developed. Therefore, the Agency believes that this notice would have no adverse effect on any number of small entities.

### 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. Today's rule approves use of optional analytical methods and thus provides operational flexibility to laboratories conducting analysis for radionuclides in drinking water. The rule does not withdraw approval of any previously approved methods. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA.

EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. The rule is highly technical and narrow in scope, and the sole objective of the rule is to increase the number of methods approved for measurement of radionuclides in drinking water. Thus, the rule actually provides regulatory relief in the form of increased operational flexibility for laboratory analysts.

**D. Paperwork Reduction Act**

The rule contains no reporting or record keeping requirements and consequently not subject to the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

**E. Science Advisory Board and National Drinking Water Advisory Council, and Secretary of Health and Human Services**

In accordance with Section 1412(d) and (e) of the SDWA, the Agency consulted with the Science Advisory Board, the National Drinking Water Advisory Council, and the Secretary of Health and Human Services for this action. They had no comments..

**F. Submission to Congress and the General Accounting Office**

Under 5 U.S.C. 801(a)(1)(A) as added by the Small Business Regulatory Enforcement Fairness Act of 1996, EPA submitted 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 General Accounting Office prior to publication of the rule in today's Federal Register. This rule is not a "major rule" as defined by 5 U.S.C. 804(2).

**VI. References**

APHA. Thirteenth, seventeenth, eighteenth and nineteenth editions of Standard Methods for the Examination of Water and Wastewater, 1971, 1989, 1992, 1995, American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005.  
 ASTM. Annual Book of ASTM Methods, Vol. 11.02, 1994. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

DOE. "EML Procedures Manual", 27th Edition, Volume 1,1990. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.  
 EPA. 1976. "Interim Radiochemical Methodology for Drinking Water", EPA 600/4-75-008 (revised), March 1976. Available at U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847), PB 253258  
 EPA. 1979. "Radiochemical Analytical Procedures for Analysis of Environmental Samples", March 1979, NTIS EMSL LV 053917.  
 EPA. 1980. "Prescribed Procedures for Measurement of Radioactivity in Water", EPA 600/4-80-032, August 1980, NTIS PB 80-224744.  
 EPA. 1987. "Radiochemistry Procedures Manual", EPA 520/5-84-006, December 1987, NTIS PB 84-215581.  
 EPA. 1995. Drinking Water Program Redirection Proposal, November 1995, pages 8-11, U.S. Environmental Protection Agency, Office of Water Resource Center (RC-4100), 401 M. Street S.W., Washington, D.C. 20460, EPA 810 D-95-001.  
 EPA. 1996. "Response to Comments on Radionuclide Methods on the July 18, 1991 (56 FR 33050) Radionuclides Proposed Rule", Office of Water Docket (MC 4101), 401 M. St. S.W., Washington, D.C. 20460, July 1996.  
 NJ. "Determination of Radium-228 in Drinking Water", August 1990, New Jersey Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analytical Services, 9 Ewing Street, Trenton, NJ 08625.  
 NY. "Determination of Ra-226 and Ra-228 (Ra-02)", January 1980, Revised June 1982, Radiological Institute Center for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

USGS. "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.

**List of Subjects in 40 CFR Part 141**

Environmental protection, Analytical Methods, Incorporation by reference, Intergovernmental relations, Monitoring, National Primary Drinking water regulations, Radionuclides, Water supply.

Dated: February 10, 1997  
 Carol M. Browner,  
*Administrator.*

For the reasons set out in the preamble, part 141 of title 40, Code of Federal Regulations, are amended as follows:

**PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS**

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

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

2. Section 141.25 is amended by revising paragraph (a) effective April 4, 1997 to read as follows:

**§ 141.25 Analytical methods for radioactivity.**

(a) Analysis for the following contaminants shall be conducted to determine compliance with §§ 141.15 and 141.16 (radioactivity) in accordance with the methods in the following Table, or their equivalent as determined by EPA in accordance with § 141.27.

Contaminant	Methodology	Reference (method or page number)								
		EPA 1	EPA 2	EPA 3	EPA 4	SM 5	ASTM 6	USGS 7	DOE 8	Other
Naturally occurring:										
Gross alpha <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		.....	.....	.....	.....	
Radium 226 ...	Radon emanation, Radiochemical.	903.1 903.0	p 16 p 13	Ra-04 Ra-03	p 19	..... 304, 305, 7500- Ra B.	D 3454 -91	R-1141-76	.....	N.Y. <sup>9</sup>
Radium 228 ...	Radiochemical.	904.0	p 24	Ra-05	p 19	304, 7500- Ra D. 7500-U B 7500-U C (17th Ed.).	.....	R-1142 -76	.....	N.Y. <sup>9</sup> N. J. <sup>10</sup>
Uranium <sup>12</sup> ..	Radiochemical. Fluorometric.	908.0 908.1					D 2907-91	R-1180-76 R-1181-76 R-1182-76		U-04 U-2

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
Man-made: Radioactive cesium. Radioactive iodine. Radioactive Strontium 89, 90. Tritium ..... Gamma emitters.	Alpha spectrometry.	.....		00-07	p 33	.....	D 3972-90	.....	.....	
	Radiochemical.	901.0	p 4			7500-Cs B	D 2459-72	.....	.....	
	Gamma ray spectrometry.	901.1			p 92	.....	D 3649-91	R-1110 -76	4.5.2.3	
	Radiochemical.	902.0	p 6 p 9			7500-I B ..	.....	.....	.....	
	Gamma ray spectrometry.	901.1			p 92	7120 (19th Ed.).	D 3649-91 D 4785-88	.....	4.5.2.3	
	Radiochemical.	905.0	p 29	Sr-04	p. 65	303, 7500-Sr B.	.....	R-1160 -76	Sr-01	
	Liquid scintillation.	906.0	p 34	H-02	p. 87	306, 7500-3H B.	D 4107 -91	R-1171 -76	.....	
	Gamma ray.	901.1			p 92	7120 (19th Ed.).	D 3649 -91	R-1110 -76	4.5.2.3	
	Spectrometry.	902.0 901.0				7500-Cs B 7500-I B ..	D 4785 -88	.....	.....	

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 was approved by the Director of the FEDERAL REGISTER in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460 (Telephone: 202-260-3027); or at the Office of the FEDERAL REGISTER, 800 North Capitol Street, NW., Suite 700, Washington, DC.

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

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

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

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

5. "Standard Methods for the Examination of Water and Wastewater", 13th, 17th, 18th, 19th Editions, 1971, 1989, 1992, 1995. Available at American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005. All methods are in the 17th, 18th and 19th editions except 7500-U C Fluorometric Uranium was discontinued after the 17th Edition, and 302, 303, 304, 305 and 306 are only in the 13th Edition.

6. *Annual Book of ASTM Standards*, Vol. 11.02, 1994. Available at American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

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

8. "EML Procedures Manual", 27th Edition, Volume 1, 1990. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.

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

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

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

12. If uranium (U) is determined by mass, a 0.67 pCi/μg of uranium conversion factor must be used. This conservative factor is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally occurring uranium.

3. Section 141.25 is amended by revising paragraph (a) effective May 5, 1997 to read as follows:

**§ 141.25 Analytical Methods for Radioactivity.**

(a) Analysis for the following contaminants shall be conducted to determine compliance with §§ 141.15

and 141.16 (radioactivity) in accordance with the methods in the following Table, or their equivalent determined by EPA in accordance with § 141.27.

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. Gross alpha <sup>11</sup> ..	Evaporation	900.0	p 1	00-01	p 1	302, 7110 B .....			R-1120-76	
	Co-precipitation.	.....		00-02		7110 C .....				

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
Radium 226 ..	Radon emanation,	903.1	p 16	Ra-04	p 19	7500-Ra C .....	D 3454-91	R-1141-76	Ra-05	N.Y. <sup>9</sup>
	Radio chemical.	903.0	p 13	Ra-03		304, 305, ..... 7500-Ra B .....	D 2460-90	R-1140-76		
Radium 228 ..	Radio chemical.	904.0	p 24	Ra-05	p 19	304, 7500-Ra D		R-1142-76		N.Y. <sup>9</sup> N.J. <sup>10</sup>
Uranium <sup>12</sup> .....	Radio chemical.	908.0				7500-U B .....				
	Fluorometric	908.1				7500-U C (17th Ed.).	D2907-91	R-1180-76 R-1181-76	U-04	
	Alpha spectrometry.	.....		00-07	p33	7500-U C (18th or 19th Ed.).	D 3972-90	R-1182-76	U-02	
Man-made: Radioactive cesium.	Laser Phosphorimetry.	.....				.....	D 5174-91			
	Radio chemical.	901.0	p 4			7500-Cs B .....	D 2459-72	R-1111-76		
Radioactive iodine.	Gamma ray spectrometry.	901.1			p 92	7120 (19th Ed.)	D 3649-91	R-1110-76	4.5.2.3	
	Radio chemical.	902.0	p 6 p 9			7500-I B ..... 7500-I C ..... 7500-I D .....	D3649-91		4.5.2.3	
Radioactive Strontium 89, 90.	Gamma ray spectrometry.	901.1			p 92	7120 (19th Ed.)	D 4785-88		4.5.2.3	
	Radio chemical.	905.0	p 29	Sr-04	p. 65	303, 7500-Sr B		R-1160-76	Sr-01 Sr-02	
Tritium .....	Liquid scintillation.	906.0	p 34	H-02	p. 87	306, 7500-3H B.	D 4107-91	R-1171-76		
Gamma emitters	Gamma ray	901.1			p92	7120 (19th Ed.)	D 3649-91	R-1110-76	4.5.2.3	
	Spectrometry .....	902.0 901.0				7500-Cs B ..... 7500-I B .....	D 4785-88			

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460 (Telephone: 202-260-3027); or at the Office of Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

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

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

<sup>3</sup>"Radiochemistry Procedures Manual", EPA 520/5-84-006, December 1987. Available at 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, 1971, 1989, 1992, 1995. Available at American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005. All methods are in the 17th, 18th and 19th editions except 7500-U C Fluorometric Uranium was discontinued after the 17th Edition, 7120 Gamma Emitters is only in the 19th Edition, and 302, 303, 304, 305 and 306 are only in the 13th Edition.

<sup>6</sup>Annual Book of ASTM Standards, Vol. 11.02, 1994. Available at American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

<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", 27th Edition, Volume 1, 1990. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.

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

<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>If uranium (U) is determined by mass, a 0.67 pCi/g of uranium conversion factor must be used. This conservative factor is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally occurring uranium.

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