

Environmental Protection Agency

§ 141.25

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.24, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

mine compliance with §141.66 (radioactivity) in accordance with the methods in the following table, or their equivalent determined by EPA in accordance with §141.27.

§ 141.25 Analytical methods for radioactivity.

(a) Analysis for the following contaminants shall be conducted to deter-

Contaminant	Methodology	Reference (Method of Page Number)									
		EPA ¹	EPA ²	EPA ³	EPA ⁴	SM ⁵	ASTM ⁶	USGS ⁷	DOE ⁸	Other	
Naturally Occurring: Gross alpha ¹¹ and beta ..	Evaporation	900.0	p. 1 ...	00-01	p. 1	302, 7110 B, 7110 B-00, 7110 C, 7110 C-00.	.....	R-1120-76.		
	Coprecipitation			00-02							
	Radon emanation	903.1	p. 16	Ra-04	p. 19	305, 7500-Ra C, 7500- Ra C-01.	D3454-97	R-1141-76	Ra-04	NY ⁹ ,	
Radium 226	Radiochemical	903.0	p. 13	Ra-03		304, 7500-Ra B, 7500-Ra B-01.	D2460-97	R-1140-76	.....	GA ¹⁴
	Radiochemical	904.0	p. 24	Ra-05	p. 19	7500-Ra D, 7500-Ra D-01.	.....	R-1142-76	.....	NY ⁹ , NJ ¹⁰ , GA ¹⁴
Uranium ¹²	Radiochemical	908.0				7500-U B, 7500-U B- 00.	.....			
	Fluorometric	908.1				7500-U C (17th Ed.),	D2907-97	R-1180-76, R-1181- 76.	U-04.		
Man-Made: Radioactive Cesium	ICP-MS	200.8 ¹³				3125	D5673-03.				
	Alpha Spectrom- etry.			00-07	p. 33	7500-U C (18th, 19th, or 20th Ed.), 7500- U C-00.	D3972- 97, 02.	R-1182-76	U-02.		
Radioactive Iodine	Laser Phosphorimetry.						D5174- 97, 02.				
	Radiochemical	901.0	p. 4 ...			7500-Cs B, 7500-Cs B-00.	D2459-72	R-1111-76.			
	Gamma Ray Spectrometry. Radiochemical	901.1 902.0			p. 92	7120, 7120- 97, 7500-I B, 7500-I B- 00. 7500-I C, 7500-I C- 00.	D3649- 91, 98a.	R-1110-76	4.5.2.3.		

Radioactive Strontium 89, 90.	Gamma Ray Spectrometry. Radiochemical	901.1	p. 92	7500-I D-00. 7120, 7120-97.	D3649-91, 98a. D4785-93, 00a.	4.5.2.3. Sr-01, Sr-02.
Tritium	Liquid Scintillation	905.0 p. 29	Sr-04	303, 7500-Sr B, 7500-Sr B-01.	D4107-91, 98 (Re-aproved 2002). 91, 98a. D4785-93, 00a.	R-1160-76
		906.0 p. 34	H-02 ..	306, 7500-3H B, 7500-3H B-00.		R-1171-76.
Gamma Emitters	Gamma Ray Spectrometry.	901.1	p. 92	7120, 7120-97.	D3649-91, 98a. D4785-93, 00a.	Ga-01-R.
		902.0 .....	.....	7500-Cs B, 7500-Cs B-00.		
		901.0 .....	.....	7500-I B, 7500-I B-00.		

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 and 13 through 14 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 3334, Washington, DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

1- 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.

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

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

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 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-Sr B, and 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. Method 3125 is only in the 20th edition. Methods 7110 B-00, 7110 C-00, 7500-Ra B-01, 7500-Ra C-01, 7500-Ra D-01, 7500-U B-00, 7500-U C-00, 7500-I D-00, 7500-I D-00, 7120-97, 7500-Sr B-01, and 7500-3H B-00 are available online at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

6- Annual Book of ASTM Standards, Vol. 11.01 and 11.02, 2002; ASTM International; any year containing the cited version of the method may be used. Copies of these two volumes and the 2003 version of D 5673-03 may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

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," 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.

9- 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.

10- Determination of Radium 226 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 conversion factor is based on the 1:1 activity ratio of U-234 and U-238 that is characteristic of naturally occurring uranium.

¹³ "Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry," Revision 5.4, which is published in "Methods for the Determination of Metals in Environmental Samples—Supplement 1," EPA 600-R-94-111, May 1994. Available at NTIS, PB 95-125472.

¹⁴ "The Determination of Radium-226 and Radium-228 in Drinking Water by Gamma-ray Spectrometry Using HPGE or Ge(Li) Detectors," Revision 1.2, December 2004. Available from the Environmental Resources Center, Georgia Institute of Technology, 620 Cherry Street, Atlanta, GA 30332-0335, USA, telephone: 404-894-3776. This method may be used to analyze for radium-226 and radium-228 in samples collected after January 1, 2005 to satisfy the radium-226 and radium-228 monitoring requirements specified at 40 CFR 141.26.

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(b) When the identification and measurement of radionuclides other than those listed in paragraph (a) of this section is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with §141.27.

(1) *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions*, H. L. Krieger and S. Gold, EPA-R4-73-014. USEPA, Cincinnati, Ohio, May 1973.

(2) *HASL Procedure Manual*, Edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, NY., 1973.

(c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).

(1) To determine compliance with §141.66(b), (c), and (e) the detection limit shall not exceed the concentrations in Table B to this paragraph.

TABLE B—DETECTION LIMITS FOR GROSS ALPHA PARTICLE ACTIVITY, RADIUM 226, RADIUM 228, AND URANIUM

Contaminant	Detection limit
Gross alpha particle activity	3 pCi/L.
Radium 226	1 pCi/L.
Radium 228	1 pCi/L.
Uranium	1 µg/L.

(2) To determine compliance with §141.66(d) the detection limits shall not exceed the concentrations listed in Table C to this paragraph.

TABLE C—DETECTION LIMITS FOR MAN-MADE BETA PARTICLE AND PHOTON EMITTERS

Radionuclide	Detection limit
Tritium	1,000 pCi/l.
Strontium-89	10 pCi/l.
Strontium-90	2 pCi/l.
Iodine-131	1 pCi/l.
Cesium-134	10 pCi/l.
Gross beta	4 pCi/l.
Other radionuclides	1/10 of the applicable limit.

(d) To judge compliance with the maximum contaminant levels listed in

§141.66, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(e) The State has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

[41 FR 28404, July 9, 1976, as amended at 45 FR 57345, Aug. 27, 1980; 62 FR 10173, Mar. 5, 1997; 65 FR 76745, Dec. 7, 2000; 67 FR 65250, Oct. 23, 2002; 69 FR 38855, June 29, 2004; 69 FR 52180, Aug. 25, 2004; 72 FR 11245, Mar. 12, 2007]

§ 141.26 Monitoring frequency and compliance requirements for radionuclides in community water systems.

(a) *Monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium.* (1) Community water systems (CWSs) must conduct initial monitoring to determine compliance with §141.66(b), (c), and (e) by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, "detection limit" is defined as in §141.25(c).

(i) *Applicability and sampling location for existing community water systems or sources.* All existing CWSs using ground water, surface water or systems using both ground and surface water (for the purpose of this section hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the State has designated a distribution system location, in accordance with paragraph (a)(2)(ii)(C) of this section.

(ii) *Applicability and sampling location for new community water systems or sources.* All new CWSs or CWSs that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after