**Section 611.720 Analytical Methods**

a) A certified laboratory must use specific methods or alternative methods the Agency approved under Section 611.480 to determine whether the supplier complies with Section 611.330.

1) Gross Alpha and Beta

A) Evaporation Methods. SM 302 (71); SM 7110 B (85); SM 7110 B (91); SM 7110 B (96); SM 7110 B (00); USEPA 900.0 (80); USEPA 900.0 (18); USEPA 00-01 (84); USEPA IRM (76), pages 1-3; USEPA RCA (79), pages 1-5; or USGS R1120-76.

B) Liquid Scintillation Methods. ASTM D7283-17 or SM 7110 D (17).

2) Gross Alpha. Coprecipitation Methods. SM 7110 C (91), SM 7110 C (96), SM 7110 C (00), or USEPA 00-02 (84).

3) Radium-226

A) Radiochemical Methods. ASTM D2460-97; ASTM D2460-07; Georgia Radium (04); New York Radium (82); SM 304 (71); SM 7500-Ra B (88); SM 7500-Ra B (93); SM 7500-Ra B (01); USEPA 903.0 (80); USEPA 903.0(21); USEPA Ra-03 (84); USEPA IRM (76), pages 13-15; USEPA RCA (79), pages 19-32; or USGS R-1140-76.

B) Radon Emanation Methods. ASTM D3454-97; ASTM D3454-05; ASTM D3454-18; EML (97) Ra-04; EML (90) Ra-05; SM 305 (71); SM 7500-Ra C (88); SM 7500-Ra C (93); SM 7500-Ra C (01); USEPA 903.1 (80); USEPA 903.1 (21); USEPA Ra-04 (84); USEPA IRM (76), pages 16-23; or USGS R-1141-76.

C) Gamma Spectrometry. SM 7500-Ra E (01) or SM 7500-Ra E (07).

4) Radium-228

A) Radiochemical Methods. Georgia Radium (04); New Jersey Radium (90); New York Radium (82); SM 7500-Ra D (88); SM 7500-Ra D (93); SM 7500-Ra D (01); USEPA 904.0 (80); USEPA904.0 (22); USEPA Ra-05 (90); USEPA IRM (76), pages 24-28; USEPA RCA (79), pages 19-32; or USGS R-1142-76.

B) Gamma Spectrometry. SM 7500-Ra E (01) or SM 7500-Ra E (07).

5) Uranium

A) Radiochemical Methods. SM 7500-U B (88), SM 7500-U B (91), SM 7500-U B (96), SM 7500-U B (00), or USEPA 908.0 (80).

B) Fluorometric Methods. ASTM D2907-97, EML (90) U-04, EML (97) U-04, SM 7500-U C (88), SM 7500-U C (91), SM 7500-U C (96), SM 7500-U C (00), USEPA 908.1 (80), USGS R-1180-76, or USGS R-1181-76.

C) ICP-MS Methods. ASTM D5673-03, ASTM D5673-05, ASTM D5673-10, ASTM D5673-16; SM 3125 (97); or USEPA 200.8 (94).

D) Alpha Spectrometry. ASTM D3972-97; ASTM D3972-02; ASTM D3972-09; EML (90) U-02; EML (97) U-02; USEPA 00-07 (84); USEPA RCA (79), pages 33-48; or USGS R-1182-76.

E) Laser Spectrometry. ASTM D5174-97, ASTM D5174-02, or ASTM D5174-07.

F) Alpha Liquid Scintillation Spectrometry. ASTM D6239-09.

BOARD NOTE: If the laboratory determines uranium (U) by mass, it must use a conversion factor of 0.67 pCi/µg U. This conversion factor reflects the characteristic 1:1 activity ratio of 234U and 238U of naturally occurring uranium.

6) Radioactive Cesium

A) Radiochemical Methods. ASTM D2459-72; SM 7500-Cs B (88), SM 7500-Cs B (93); SM 7500-Cs B (00); USEPA 901.0 (80); USEPA IRM (76), pages 4-5; or USGS R-1111-76.

B) Gamma Ray Spectrometry. ASTM D3649-91; ASTM D3649-98a; ASTM D3649-06; EML (90) Ga-01; EML (97) Ga-01-R; SM 7120 (94); SM 7120 (97); USEPA 901.1 (80); USEPA RCA (79), pages 92-95; or USGS R-1110-76.

7) Radioactive Iodine

A) Radiochemical Methods. ASTM D3649-91; ASTM D3649-98a; ASTM D3649-06; SM 7500-I B (88); SM 7500-I B (93); SM 7500-I B (00); SM 7500-I C (88); SM 7500-I C (93); SM 7500-I C (00); SM 7500-I D (88); SM 7500-I D (93); SM 7500-I D (00); USEPA 902.0 (80); USEPA IRM (76), pages 6-8; or USEPA IRM (76), pages 9-12.

B) Gamma Ray Spectrometry. ASTM D4785-93; ASTM D4785-00a; ASTM D4785-08; ASTM D4785-20; EML (90) Ga-01; EML (97) Ga-01-R; SM 7120 (94); SM 7120 (97); USEPA 901.1 (80); or USEPA RCA (79), pages 92-95.

8) Radioactive Strontium-89 and -90. Radiochemical Methods. EML (90) Sr-01; EML (97) Sr-01; EML (90) Sr-02; EML (97) Sr-02; SM 303 (71); SM 7500-Sr B (88); SM 7500-Sr B (93); SM 7500-Sr B (01); USEPA 905.0 (80); USEPA Sr-04 (84); USEPA IRM (76), pages 29-33; USEPA RCA (79), pages 65-73; or USGS R-1160-76.

9) Tritium. Liquid Scintillation. ASTM D4107-91; ASTM D4107-98; ASTM D4107-08; ASTM D4107-20; SM 306 (71); SM 7500-3H B (88); SM 7500-3H B (93); SM 7500-3H B (00); USEPA 906.0 (80); USEPA H-02 (84); USEPA IRM (76), pages 34-37; USEPA RCA (79), pages 87-91; or USGS R-1171-76.

10) Gamma Emitters. Gamma Ray Spectrometry. ASTM D3649-91; ASTM D3649-98a; ASTM D3649-06; ASTM D4785-93; ASTM D4785-00a; ASTM D4785-08; ASTM D4785-20; EML (90) Ga-01; EML (97) Ga-01-R; SM 7120 (94); SM 7120 (97); SM 7500-Cs B (88); SM 7500-Cs B (93); SM 7500-Cs B (00); SM 7500-I B (88); SM 7500-I B (93); SM 7500-I B (00); USEPA 901.0 (80); USEPA 901.1 (80); USEPA 902.0 (80); USEPA RCA (79), pages 92-95; or USGS R-1110-76.

b) When the laboratory must identify and measure radionuclides other than those in subsection (a), it must use methods from either of two sources, incorporated by reference in Section 611.102, except if the Agency approves alternative methods under Section 611.480:

1) USEPA ARP (73).

2) EML (90) or EML (97).

c) For monitoring radioactivity concentrations in drinking water, a detection limit defines the required sensitivity of the radio analysis. The detection limit is the concentration a laboratory can measure 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) When determining compliance with Section 611.330(b), (c), and (e), the detection limit must not exceed certain concentrations:

|  |  |
| --- | --- |
| Contaminant | Detection Limit |
| Gross alpha particle activity | 3 pCi/L |
| Radium-226 | 1 pCi/L |
| Radium-228 | 1 pCi/L |
| Uranium | 1 µg/L |

BOARD NOTE: This subsection (c)(1) derives from 40 CFR 141.25(c) Table B.

2) When determining compliance with Section 611.330(d), the detection limits must not exceed certain concentrations:

|  |  |
| --- | --- |
| 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 applicable limit |

BOARD NOTE: This subsection (c)(2) derives from 40 CFR 141.25(c) Table C.

d) When determining compliance with the MCLs in Section 611.330, the laboratory must use averages of data and round results to the same number of significant figures as the MCL.

BOARD NOTE: This Section derives from 40 CFR 141.25 and appendix A to subpart C of 40 CFR 141. The Board did not separately list approved alternative methods from Standard Methods Online that are the same version as a method appearing in a printed edition of Standard Methods. Using the Standard Methods Online copy is acceptable.

Standard Methods Online, Methods 7110 B-91 and 7110 C-91 appear in the 18th and 19th editions as Methods 7110 B and 7110 C. These appear in this Section as SM 7110 B (91) and SM 7110 C (91).

Standard Methods Online, Methods 7110 B-00 and 7110 C-00 appear in the 21st, 22nd, and 23rd editions as Methods 7110 B and 7110 C. These appear in this Section as SM 7110 B (00) and SM 7110 C (00).

Standard Methods Online, Method 7120-97 appears in the 20th, 21st, 22nd, and 23rd editions as Method 7120. This appears in this Section as SM 7120 (97).

Standard Methods Online, Method 7500-Cs B-00 appears in the 21st, 22nd, and 23rd editions as Method 7500-Cs B. In this Section, thus appears as SM 7500-Cs B (00).

Standard Methods Online, Methods 7500-I B-00, 7500-I C-00, and 7500-I D-00 appear in the 21st, 22nd, and 23rd editions as Methods 7500-I B, 7500-I C, and 7500-I D. These appear in this Section as SM 7500-I B (00), SM 7500-I C (00), and SM 7500-I D (00).

Standard Methods Online, Methods 7500-Ra B-01, 7500-Ra C-01, and 7500-Ra D-01 appears in the 21st and 22nd editions as Methods 7500-Ra B, 7500-Ra C, and 7500-Ra D. These appear in this Section as SM 7500-Ra B (01), SM 7500-Ra C (01), and SM 7500-Ra D (01).

Standard Methods Online, Methods 7500-Ra B-07, 7500-Ra C-07, 7500-Ra D-07, and 7500-Ra E-07 appears in the 23rd edition as Methods 7500-Ra B, 7500-Ra C, 7500-Ra D, and 7500-Ra E. These appear in this Section as SM 7500-Ra B (07), SM 7500-Ra C (07), SM 7500-Ra D (07), and SM 7500-Ra E (07).

Standard Methods Online, Method 7500-Sr B-01 appears in the 21st, 22nd, and 23rd editions as Method 7500-Sr B. This appears in this Section as SM 7500-Sr B (01).

Standard Methods Online, Method 7500-3H B-00 appears in the 21st, 22nd, and 23rd editions as Method 7500-3H B. This appears in this Section as SM 7500-3H B (00)

Standard Methods Online, Methods 7500-U B and 7500-U C-00 appear in the 21st, 22nd, and 23rd editions as Methods 7500-U B and 7500-U C. These appear in this Section as SM 7500-U B (00) and SM 7500-U C (00).

(Source: Amended at 47 Ill. Reg. 18996, effective December 7, 2023)