**Section 611.TABLE R Radionuclide Conversion Factors**

Derived Concentrations (pCi•L‑1) of Beta and Photon Emitters in Drinking Water Yielding a Dose of 4 mrem•y‑1 to the Total Body or to Any Critical Organ as Defined in NBS Handbook 69

Conversion Factor

Radionuclide (Isotopic Symbol) (pCi•L‑1/4 mrem•y‑1)

Antimony-122 90

Antimony-124 60

Antimony-125 300

Arsenic-73 1,000

Arsenic-74 100

Arsenic-76 60

Arsenic-77 200

Barium-131 600

Barium-140 90

Berkelium-249 2,000

Beryllium-7 6,000

Bismuth-206 100

Bismuth-207 200

Bromine-82 100

Cadmium-109 600

Cadmium-115 90

Cadmium-115m 90

Calcium-45 10

Calcium-47 80

Carbon-14 (14C) 2,000

Cerium-141 300

Cerium-143 100

Cerium-144 30

Cesium-131 20,000

Cesium-134 80

Cesium-134m 20,000

Cesium-135 900

Cesium-136 800

Cesium-137 200

Chlorine-36 700

Chlorine-38 1,000

Chromium-51 6,000

Cobalt-57 1,000

Cobalt-58 300

Cobalt-58m 9,000

Cobalt-60 100

Copper-64 900

Dysprosium-165 1,000

Dysprosium-166 100

Erbium-169 300

Erbium-171 300

Europium-152 200

Europium-154 60

Europium-155 600

Fluorine-18 2,000

Gadolinium-153 600

Gadolinium-159 200

Gallium-72 100

Germanium-71 6,000

Gold-196 (196Au) 600

Gold-198 (198Au) 100

Gold-199 (199Au) 600

Hafmium-181 200

Holmium-166 90

Hydrogen-3 (Tritium) 20,000

Indium-113m 3,000

Indium-114m 60

Indium-115 300

Indium-115 m 1,000

Iodine-126 3

Iodine-129 1

Iodine-131 3

Iodine-132 90

Iodine-133 10

Iodine-134 100

Iodine-135 30

Iridium-190 600

Iridium-192 100

Iridium-194 90

Iron-55 2,000

Iron-59 200

Lanthanum-140 60

Lead-203 1,000

Lutetium-177 300

Manganese-52 90

Manganese-54 300

Manganese-56 300

Mercury-197 900

Mercury-197m 600

Mercury-203 60

Molybdenum-99 600

Neodymium-147 200

Neodymium-149 900

Neptunium-239 300

Nickel-59 300

Nickel-63 50

Nickel-65 300

Niobium-93m 1,000

Niobium-95 300

Niobium-97 3,000

Osmium-185 200

Osmium-191 600

Osmium-191m 9,000

Osmium-193 200

Palladium-103 900

Palladium-109 300

Phosphorus-32 30

Platinum-191 300

Platinum-193 3,000

Platinum-193m 3,000

Platinum-197 300

Platinum-197m 3,000

Plutonium-241 300

Potassium-42 900

Praseodymium-142 90

Praseodymium-143 100

Promethium-147 600

Promethium-149 100

Protactinium-230 600

Protactinium-233 300

Rhenium-186 300

Rhenium-187 9,000

Rhenium-188 200

Rhodium-103m 30,000

Rhodium-105 300

Rubidium-86 600

Rubidium-87 300

Ruthenium-97 1,000

Ruthenium-103 200

Ruthenium-105 200

Ruthenium-106 30

Samarium-151 1,000

Samarium-153 200

Scandium-46 100

Scandium-47 300

Scandium-48 80

Selenium-75 900

Silicon-31 3,000

Silver-105 300

Silver-110m 90

Silver-111 100

Sodium-22 400

Sodium-24 600

Strontium-85 900

Strontium-85m 20,000

Strontium-89 20

Strontium-90 8

Strontium-91 200

Strontium-92 200

Sulfur-35 (inorganic) 500

Tantalum-182 100

Technetium-96 300

Technetium-96m 30,000

Technetium-97 6,000

Technetium-97m 1,000

Technetium-99 900

Technetium-99m 20,000

Tellurium-125m 600

Tellurium-127 900

Tellurium-127m 200

Tellurium-129 2,000

Tellurium-129m 90

Tellurium-131m 200

Tellurium-132 90

Terbium-160 100

Thallium-200 1,000

Thallium-201 900

Thallium-202 300

Thallium-204 300

Thulium-170 100

Thulium-171 1,000

Tin-113 300

Tin-125 60

Tungsten-181 1,000

Tungsten-185 300

Tungsten-187 200

Vanadium-48 90

Ytterbium-175 300

Yttrium-90 60

Yttrium-91 90

Yttrium-91m 9,000

Yttrium-92 200

Yttrium-93 90

Zinc-65 300

Zinc-69 6,000

Zinc-69m 200

Zirconium-93 2,000

Zirconium-95 200

Zirconium-97 60

BOARD NOTE: This Table R derives from Table VI-2 (Annual Average Concentrations Yielding 4 Millirem per Year for a Two Liter Daily Intake), Statement of Basis and Purpose for the National Primary Drinking Water Regulations − Radionuclides, USEPA, Office of Radiation Protection (July 9, 1976), at 87-94, and Appendix I (Comparison of Derived Values of Beta and Photon Emitters), Implementation Guidance for Radionuclides, USEPA, Office of Ground Water and Drinking Water, EPA 816-F-00-002 (March 2002). USEPA based these values on NBS Handbook 69 (63), incorporated by reference in Section 611.102.

Calculating compliance with Section 611.330(d) under Section 611.742 requires dividing the measured concentration for each radionuclide by the appropriate conversion factor to determine its calculated fractional contribution to the total annual exposure limit of 4 mrem/yr:

The supplier then sums the fractional contributions for all radionuclides to determine the total fraction of the maximum exposure limit:

A sum of fractions result exceeding 1.00 exceeds the 4 mrem/yr standard in Section 611.330(d).

The total exposure is this sum of fractions (i.e., the total fraction of maximum exposure limit) times 4 mrem•yr‑1.

See Statement of Basis and Purpose for the National Primary Drinking Water Regulations − Radionuclides, USEPA, Office of Radiation Protection (July 9, 1976), at 80-86, and Implementation Guidance for Radionuclides, USEPA, Office of Ground Water and Drinking Water, EPA 816-F-00-002 (March 2002), pp. II-5 and II-6.

(Source: Added at 47 Ill. Reg. 16486, effective November 2, 2023)