

**WAC 246-231-010 Definitions, abbreviations, and acronyms.** The definitions, abbreviations, and acronyms in this section and in WAC 246-220-010 apply throughout this chapter unless the context clearly indicates otherwise. To ensure compatibility with international transportation standards, all limits in this chapter are given in terms of dual units: The International System of Units (SI) followed or preceded by U.S. standard or customary units. The U.S. customary units are not exact equivalents, but are rounded to a convenient value, providing a functionally equivalent unit. For the purpose of this chapter, either unit may be used.

(1) "A1" means the maximum activity of special form radioactive material permitted in a Type A package. This value is either listed in WAC 246-231-200, Table A-1 or may be derived in accordance with the procedures prescribed in WAC 246-231-200.

(2) "A2" means the maximum activity of radioactive material, other than special form material, LSA and SCO material, permitted in a Type A package. This value is either listed in WAC 246-231-200, Table A-1, or may be derived in accordance with the procedure prescribed in WAC 246-231-200.

(3) "Carrier" means a person engaged in the transportation of passengers or property by land or water as a common, contract, or private carrier, or by civil aircraft.

(4) "Certificate holder" means a person who has been issued a certificate of compliance or other package approval by NRC.

(5) "Certificate of compliance" means the certificate issued by NRC under 10 C.F.R. 71 Subpart D which approves the design of a package for the transportation of radioactive material.

(6) "Close reflection by water" means immediate contact by water of sufficient thickness for maximum reflection of neutrons.

(7) "Consignment" means each shipment of a package or groups of packages or load of radioactive material offered by a shipper for transport.

(8) "Containment system" means the assembly of components of the packaging intended to retain the radioactive material during transport.

(9) "Contamination" means the presence of a radioactive substance on a surface in quantities in excess of  $0.4 \text{ Bq/cm}^2$  ( $1 \times 10^{-5} \text{ } \mu\text{Ci/cm}^2$ ) for beta and gamma emitters and low toxicity alpha emitters, or  $0.04 \text{ Bq/cm}^2$  ( $1 \times 10^{-6} \text{ } \mu\text{Ci/cm}^2$ ) for all other alpha emitters.

(a) Fixed contamination means contamination that cannot be removed from a surface during normal conditions of transport.

(b) Nonfixed contamination means contamination that can be removed from a surface during normal conditions of transport.

(10) "Conveyance" means:

(a) For transport by public highway or rail any transport vehicle or large freight container;

(b) For transport by water any vessel, or any hold, compartment, or defined deck area of a vessel including any transport vehicle on board the vessel; and

(c) For transport by any aircraft.

(11) "Criticality safety index (CSI)" means the dimensionless number (rounded up to the next tenth) assigned to and placed on the

label of a fissile material package, to designate the degree of control of accumulation of packages, overpacks, or freight containers containing fissile material during transportation. Determination of the criticality safety index is described in WAC 246-231-094, 246-231-096, and 10 C.F.R. 71.22, 71.23, and 71.59. The criticality safety index for an overpack, freight container, consignment, or conveyance containing fissile material packages is the arithmetic sum of the criticality safety indices of all the fissile material packages contained within the overpack, freight container, consignment, or conveyance.

(12) "Deuterium" means, for the purposes of WAC 246-231-040 and 246-231-094, deuterium and any deuterium compounds, including heavy water, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5000.

(13) "DOT" means the United States Department of Transportation. DOT regulations are found in Code of Federal Regulations Title 49 Transportation.

(14) "Exclusive use" means the sole use by a single consignor of a conveyance for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee. The consignor and the carrier must ensure that any loading or unloading is performed by personnel having radiological training and resources appropriate for safe handling of the consignment. The consignor must issue specific instructions, in writing, for maintenance of exclusive use shipment controls, and include them with the shipping paper information provided to the carrier by the consignor.

(15) "Fissile material" means the radionuclides uranium-233, uranium-235, plutonium-239, and plutonium-241, or any combination of these radionuclides. Fissile material means the fissile nuclides themselves, not material containing fissile nuclides. Unirradiated natural uranium and depleted uranium, and natural uranium or depleted uranium that has been irradiated in thermal reactors only are not included in this definition. Certain exclusions from fissile material controls are provided in WAC 246-231-040.

(16) "Graphite" means graphite with a boron equivalent content less than ((5)) five parts per million and density greater than 1.5 grams per cubic centimeter.

(17) "Indian Tribe" means an Indian or Alaskan native Tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian Tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a. A current listing of officially recognized Indian Tribes may be found at: <http://www.bia.gov/cs/groups/mywcsp/documents/text/idc-020733.pdf>.

(18) "Low specific activity (LSA) material" means radioactive material with limited specific activity which is nonfissile or is excepted under WAC 246-231-040 or 10 C.F.R. 71.15 and which satisfies the descriptions and limits set forth below. Shielding materials surrounding the LSA material may not be considered in determining the estimated average specific activity of the package contents. LSA material must be in one of three groups:

(a) LSA-I.

(i) Uranium and thorium ores, concentrates of uranium and thorium ores, and other ores containing naturally occurring radioactive radionuclides which are intended to be processed for the use of these radionuclides;

(ii) Natural uranium, depleted uranium, natural thorium, or their compounds or mixtures, provided they are unirradiated and in solid or liquid form; or

(iii) Radioactive material other than fissile material for which the A2 value is unlimited; or

(iv) Other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the value for exempt material activity concentration determined in accordance with Appendix A.

(b) LSA-II.

(i) Water with tritium concentration up to 0.8 TBq/liter (20.0 Ci/liter); or

(ii) Other radioactive material in which the activity is distributed throughout, and the estimated average specific activity does not exceed  $1 \times 10^{-4}$  A2/g for solids and gases, and  $1 \times 10^{-5}$  A2/g for liquids.

(c) LSA-III. Solids (e.g., consolidated wastes, activated materials), excluding powders, that satisfy the requirements of the 10 C.F.R. 71.77, in which:

(i) The radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.); and

(ii) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that, even under loss of packaging, the loss of radioactive material per package by leaching, when placed in water for seven days, would not exceed 0.1 A2; and

(iii) The estimated average specific activity of the solid, excluding any shielding material, does not exceed  $2 \times 10^{-3}$  A2/g.

(19) "Low toxicity alpha emitters" means natural uranium, depleted uranium, natural thorium; uranium-235, uranium-238, thorium-232, thorium-228 or thorium-230 when contained in ores or physical or chemical concentrates or tailings; or alpha emitters with a half-life of less than (~~ten~~) 10 days.

(20) "Maximum normal operating pressure" means the maximum gauge pressure that would develop in the containment system in a period of one year under the heat condition specified in NRC regulations 10 C.F.R. 71.71 (c)(1), in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

(21) "Natural thorium" means thorium with the naturally occurring distribution of thorium isotopes (essentially 100 weight percent thorium-232).

(22) "Normal form radioactive material" means radioactive material that has not been demonstrated to qualify as "special form radioactive material."

(23) "Nuclear waste" as used in WAC 246-231-140 means any quantity of radioactive material (not including radiography sources being returned to the manufacturer) required to be in Type B packaging while transported to, through, or across state boundaries to a disposal site, or to a collection point for transport to a disposal site. Nuclear waste, as used in these regulations, is a special classification of radioactive waste.

(24) "Optimum interspersed hydrogenous moderation" means the presence of hydrogenous material between packages to such an extent that the maximum nuclear reactivity results.

(25) "Package" means the packaging together with its radioactive contents as presented for transport.

(a) "Fissile material package" or Type AF package, Type BF package, Type B(U)F package or Type B(M)F package means a fissile material packaging together with its fissile material contents.

(b) "Type A package" means a Type A packaging together with its radioactive contents. A Type A package is defined and must comply with the DOT regulations in 49 C.F.R. 173.

(c) "Type B package" means a Type B packaging together with its radioactive contents. Upon approval by NRC, a Type B package design is designated by NRC as B(U) unless the package has a maximum normal operating pressure of more than 700 kPa (100 lbs/in<sup>2</sup>) gauge or a pressure relief device that would allow the release of radioactive material to the environment under the tests specified in NRC regulations 10 C.F.R. 71.73 (hypothetical accident conditions), in which case it will receive a designation B(M). B(U) refers to the need for unilateral approval of international shipments; B(M) refers to the need for multilateral approval of international shipments. There is no distinction made in how packages with these designations may be used in domestic transportation. To determine their distinction for international transportation, see DOT regulations in 49 C.F.R. 173. A Type B package approved before September 6, 1983, was designated only as Type B. Limitations on its use are specified in 10 C.F.R. 71.19.

(26) "Packaging" means the assembly of components necessary to ensure compliance with the packaging requirements of this chapter. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The vehicle, tie-down system, and auxiliary equipment may be designated as part of the packaging.

(27) "Special form radioactive material" means radioactive material that satisfies the following conditions:

(a) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;

(b) The piece or capsule has at least one dimension not less than ((5)) five mm (0.2 in); and

(c) It satisfies the requirements of 10 C.F.R. 71.75. A special form encapsulation designed in accordance with the requirements of 10 C.F.R. 71.4 in effect on June 30, 1983, (see 10 C.F.R. 71, revised as of January 1, 1983), and constructed before July 1, 1985; a special form encapsulation designed in accordance with the requirements of 10 C.F.R. 71.4 in effect on March 31, 1996 (see 10 C.F.R. 71, revised as of January 1, 1996), and constructed before April 1, 1998; and special form material that was successfully tested before September 10, 2015, in accordance with the requirements of 10 C.F.R. 71.75(d) in effect before September 10, 2015, may continue to be used. Any other special form encapsulation must meet the specifications of this definition.

(28) "Specific activity of a radionuclide" means the radioactivity of the radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the radioactivity per unit mass of the material.

(29) "Spent nuclear fuel" or "spent fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year's decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. Spent fuel includes the spe-

cial nuclear material, by-product material, source material, and other radioactive materials associated with fuel assemblies.

(30) "State" means a state of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

(31) "Surface contaminated object (SCO)" means a solid object that is not itself classed as radioactive material, but which has radioactive material distributed on any of its surfaces. SCO must be in one of two groups with surface activity not exceeding the following limits:

(a) SCO-I: A solid object on which:

(i) The nonfixed contamination on the accessible surface averaged over  $300 \text{ cm}^2$  (or the area of the surface if less than  $300 \text{ cm}^2$ ) does not exceed ((4)) four  $\text{Bq/cm}^2$  ( $1 \times 10^{-4}$  microcurie/ $\text{cm}^2$ ) for beta and gamma and low toxicity alpha emitters, or  $0.4 \text{ Bq/cm}^2$  ( $1 \times 10^{-5}$  microcurie/ $\text{cm}^2$ ) for all other alpha emitters;

(ii) The fixed contamination on the accessible surface averaged over  $300 \text{ cm}^2$  (or the area of the surface if less than  $300 \text{ cm}^2$ ) does not exceed  $4 \times 10^4 \text{ Bq/cm}^2$  (1.0 microcurie/ $\text{cm}^2$ ) for beta and gamma and low toxicity alpha emitters, or  $4 \times 10^3 \text{ Bq/cm}^2$  (0.1 microcurie/ $\text{cm}^2$ ) for all other alpha emitters; and

(iii) The nonfixed contamination plus the fixed contamination on the inaccessible surface averaged over  $300 \text{ cm}^2$  (or the area of the surface if less than  $300 \text{ cm}^2$ ) does not exceed  $4 \times 10^4 \text{ Bq/cm}^2$  ((±)) one microcurie/ $\text{cm}^2$ ) for beta and gamma and low toxicity alpha emitters, or  $4 \times 10^3 \text{ Bq/cm}^2$  (0.1 microcurie/ $\text{cm}^2$ ) for all other alpha emitters.

(b) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:

(i) The nonfixed contamination on the accessible surface averaged over  $300 \text{ cm}^2$  (or the area of the surface if less than  $300 \text{ cm}^2$ ) does not exceed  $400 \text{ Bq/cm}^2$  ( $1 \times 10^{-2}$  microcurie/ $\text{cm}^2$ ) for beta and gamma and low toxicity alpha emitters or  $40 \text{ Bq/cm}^2$  ( $1 \times 10^{-3}$  microcurie/ $\text{cm}^2$ ) for all other alpha emitters;

(ii) The fixed contamination on the accessible surface averaged over  $300 \text{ cm}^2$  (or the area of the surface if less than  $300 \text{ cm}^2$ ) does not exceed  $8 \times 10^5 \text{ Bq/cm}^2$  (20 microcuries/ $\text{cm}^2$ ) for beta and gamma and low toxicity alpha emitters, or  $8 \times 10^4 \text{ Bq/cm}^2$  ((±)) two microcuries/ $\text{cm}^2$ ) for all other alpha emitters; and

(iii) The nonfixed contamination plus the fixed contamination on the inaccessible surface averaged over  $300 \text{ cm}^2$  (or the area of the surface if less than  $300 \text{ cm}^2$ ) does not exceed  $8 \times 10^5 \text{ Bq/cm}^2$  (20 microcuries/ $\text{cm}^2$ ) for beta and gamma and low toxicity alpha emitters, or  $8 \times 10^4 \text{ Bq/cm}^2$  ((±)) two microcuries/ $\text{cm}^2$ ) for all other alpha emitters.

(32) "Transport index (TI)" means the dimensionless number (rounded up to the next tenth) placed on the label of a package, to designate the degree of control to be exercised by the carrier during transportation. The transport index is the number determined by multiplying the maximum radiation level in millisievert (mSv) per hour at ((±)) one meter (3.3 ft) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at ((±)) one meter (3.3 ft)).

(33) "Tribal official" means the highest ranking individual who represents Tribal leadership, such as the chief, president, or Tribal council leadership.

(34) "Type A quantity" means a quantity of radioactive material, the aggregate radioactivity of which does not exceed A1 for special form radioactive material, or A2 for normal form radioactive material, where A1 and A2 are given in Table A-1 of WAC 246-231-200, or may be determined by procedures described in WAC 246-231-200.

(35) "Type B quantity" means a quantity of radioactive material greater than a Type A quantity.

(36) "Unirradiated uranium" means uranium containing not more than  $2 \times 10^3$  Bq of plutonium per gram of uranium-235, not more than  $9 \times 10^6$  Bq of fission products per gram of uranium-235, and not more than  $5 \times 10^{-3}$  g of uranium-236 per gram of uranium-235.

(37) Uranium-natural, depleted, enriched.

(a) "Natural uranium" means uranium (which may be chemically separated) with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235, and the remainder by weight essentially uranium-238).

(b) "Depleted uranium" means uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes.

(c) "Enriched uranium" means uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.

AMENDATORY SECTION (Amending WSR 17-01-034, filed 12/12/16, effective 1/12/17)

**WAC 246-231-040 Exemptions.** (1) Common and contract carriers, freight forwarders, warehouse workers, and the U.S. Postal Service are exempt from this chapter and chapters 246-232, 246-233, 246-235, 246-237, 246-240, 246-243, and 246-244 WAC to the extent that they transport or store radioactive material in the regular course of their carriage for another or storage incident thereto.

(2) Any licensee who delivers radioactive material to a carrier for transport, where such transport is subject to the regulations of the United States Postal Service, is exempt from the provisions of WAC 246-231-005.

(3) **Exemption of physicians.** Any physician as defined in WAC 246-220-010 who is licensed by the department, NRC or an agreement state, to dispense drugs in the practice of medicine, is exempt from WAC 246-220-030 with respect to transport by the physician of licensed material for use in the practice of medicine. However, any physician operating under this exemption must be licensed under chapter 246-240 WAC, 10 C.F.R. 35, or the equivalent agreement state regulations.

(4) **Exemption for low-level materials.** A licensee is exempt from all requirements of this chapter with respect to shipment or carriage of the following low-level materials:

(a) Natural material and ores containing naturally occurring radionuclides that are either in their natural state, or have only been processed for purposes other than for the extraction of the radionuclides, and which are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed (~~ten~~) 10 times the applicable radionuclide activity

concentration values specified in WAC 246-231-200, Table A-2 or Table A-3.

(b) Materials for which the activity concentration is not greater than the activity concentration values specified in WAC 246-231-200, Table A-2 or Table A-3, or for which the consignment activity is not greater than the limit for an exempt consignment found in WAC 246-231-200, Table A-2 or Table A-3.

(c) Nonradioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the levels cited in the definition of contamination in WAC 246-231-010.

(5) A licensee is exempt from all the requirements of this chapter, other than 10 C.F.R. 71.5 and 71.88, with respect to shipment or carriage of the following packages, provided the packages do not contain any fissile material, or the material is exempt from classification as fissile material in this subsection;

(a) A package that contains no more than a Type A quantity of radioactive material;

(b) A package transported within the United States that contains no more than 0.74 TBq (20 Ci) of special form plutonium-244; or

(c) The package contains only LSA or SCO radioactive material, provided:

(i) That the LSA or SCO material has an external radiation dose of less than or equal to 10 mSv/h ((±)) one rem/h), at a distance of three meters from the unshielded material; or

(ii) That the package contains only LSA-I or SCO-I material.

(6) **Exemption from classification as fissile material.** Fissile material meeting at least one of the requirements in (a) through (f) of this subsection is exempt from classification as fissile material and from the fissile material package standards of 10 C.F.R. 71.55 and 71.59, but are subject to all other requirements of this chapter, except as noted.

(a) Individual package containing ((2)) two grams or less fissile material.

(b) Individual or bulk packaging containing 15 grams or less of fissile material provided the package has at least 200 grams of solid nonfissile material for every gram of fissile material. Lead, beryllium, graphite, and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass for solid nonfissile material.

(c)(i) Low concentrations of solid fissile material commingled with solid nonfissile material, provided that:

(A) There are at least 2000 grams of solid nonfissile material for every gram of fissile material; and

(B) There are no more than 180 grams of fissile material distributed within 360 kg of contiguous nonfissile material.

(ii) Lead, beryllium, graphite, and hydrogenous material enriched in deuterium may be present in the package but must not be included in determining the required mass of solid nonfissile material.

(d) Uranium enriched in uranium-235 to a maximum of ((±)) one percent by weight, and with total plutonium and uranium-233 content of up to ((±)) one percent of the mass of uranium-235, provided that the mass of any beryllium, graphite, and hydrogenous material enriched in deuterium constitutes less than ((5)) five percent of the uranium mass, and that the fissile material is distributed homogeneously and does not form a lattice arrangement within the package.

(e) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of ((2)) two percent by mass, with a total plutonium and

uranium-233 content not exceeding 0.002 percent of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of ((2)) two. The material must be contained in at least a DOT Type A package.

(f) Packages containing, individually, a total plutonium mass of not more than 1000 grams, of which not more than 20 percent by mass may consist of plutonium-239, plutonium-241, or any combination of these radionuclides.

AMENDATORY SECTION (Amending WSR 14-09-017, filed 4/7/14, effective 5/8/14)

**WAC 246-231-094 General license—Fissile material.** (1) A general license is issued to any licensee of the department, NRC, or an agreement state, to transport fissile material, or to deliver fissile material to a carrier for transport, if the material is shipped in accordance with this section. The fissile material need not be contained in a package which meets the standards of 10 C.F.R. 71 Subparts E and F; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 C.F.R. 173.417(a).

(2) The general license applies only to a licensee who has a quality assurance program approved by NRC as satisfying the provisions of 10 C.F.R. 71 Subpart H.

(3) The general license applies only when a package's contents:

(a) Contain no more than a Type A quantity of radioactive material; and

(b) Contain less than 500 total grams of beryllium, graphite, or hydrogenous material enriched in deuterium.

(4) The general license applies only to packages containing fissile material that are labeled with a CSI which:

(a) Has been determined in accordance with subsection (5) of this section;

(b) Has a value less than or equal to 10; and

(c) For a shipment of multiple packages containing fissile material, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).

(5)(a) The value for the CSI must be greater than or equal to the number calculated by the following equation:

$$CSI = 10 \left[ \frac{\text{grams of } ^{235}\text{U}}{X} + \frac{\text{grams of } ^{233}\text{U}}{Y} + \frac{\text{grams of Pu}}{Z} \right];$$

(b) The calculated CSI must be rounded up to the first decimal place;

(c) The values of X, Y, and Z used in the CSI equation must be taken from WAC 246-231-200 Table-1 or Table-2, as appropriate;

(d) If Table-2 is used to obtain the value of X, then the values for the terms in the equation for uranium-233 and plutonium must be assumed to be zero; and

(e) Values from Table-1 for X, Y, and Z must be used to determine the CSI if:

(i) Uranium-233 is present in the package;



- (ii) The mass of plutonium exceeds ((±)) one percent of the mass of uranium-235;
- (iii) The uranium is of unknown uranium-235 enrichment or greater than 24 weight percent enrichment; or
- (iv) Substances having a moderating effectiveness (i.e., an average hydrogen density greater than H<sub>2</sub>O) (e.g., certain hydrocarbon oils or plastics) are present in any form, except as polyethylene used for packing or wrapping.

**Table-1.**  
**Mass Limits for General License Packages**  
**Containing Mixed Quantities of Fissile Ma-**  
**terial or Uranium-235 of Unknown Enrichment**  
**per WAC 246-231-094 (5)**

<b>Fissile material</b>	<b>Fissile material mass mixed with moderating substances having an average hydrogen density less than or equal to H<sub>2</sub>O (grams)</b>	<b>Fissile material mass mixed with moderating substances having an average hydrogen density greater than H<sub>2</sub>O<sup>a</sup> (grams)</b>
<sup>235</sup> U (X)	60	38
<sup>233</sup> U (Y)	43	27
<sup>239</sup> Pu or <sup>241</sup> Pu (Z)	37	24

<sup>a</sup> When mixtures of moderating substances are present, the lower mass limits shall be used if more than 15 percent of the moderating substance has an average hydrogen density greater than H<sub>2</sub>O.

**Table-2.**  
**Mass Limits for General License Packages**  
**Containing Uranium-235 of Known Enrichment**  
**per WAC 246-231-094 (5)**

<b>Uranium enrichment in weight percent of <sup>235</sup>U not exceeding</b>	<b>Fissile material mass of <sup>235</sup>U (X) (grams)</b>
24	60
20	63
15	67
11	72
10	76
9.5	78
9	81
8.5	82
8	85
7.5	88
7	90
6.5	93
6	97
5.5	102
5	108
4.5	114

Uranium enrichment in weight percent of <sup>235</sup> U not exceeding	Fissile material mass of <sup>235</sup> U (X) (grams)
4	120
3.5	132
3	150
2.5	180
2	246
1.5	408
1.35	480
1	1,020
0.92	1,800

AMENDATORY SECTION (Amending WSR 14-09-017, filed 4/7/14, effective 5/8/14)

**WAC 246-231-098 External radiation standards for all packages.**

(1) Except as provided in subsection (2) of this section, each package of radioactive materials offered for transportation must be designed and prepared for shipment so that under conditions normally incident to transportation the radiation level does not exceed ((2)) two mSv/hour (200 mrem/hour) at any point on the external surface of the package, and the transport index does not exceed 10.

(2) A package that exceeds the radiation level limits specified in subsection (1) of this section must be transported by exclusive use shipment only, and the radiation levels for such shipment must not exceed the following during transportation:

(a) ((2)) Two mSv/hour (200 mrem/hour) on the external surface of the package, unless the following conditions are met, in which case the limit is 10 mSv/hour (1000 mrem/hour):

(i) The shipment is made in a closed transport vehicle;

(ii) The package is secured within the vehicle so that its position remains fixed during transportation; and

(iii) There are no loading or unloading operations between the beginning and end of the transportation;

(b) ((2)) Two mSv/hour (200 mrem/hour) at any point on the outer surface of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load or enclosure, if used, and on the lower external surface of the vehicle; and

(c) 0.1 mSv/hour (10 mrem/hour) at any point ((2)) two meters (80 in) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point ((2)) two meters (6.6 feet) from the vertical planes projected by the outer edges of the vehicle (excluding the top and underside of the vehicle); and

(d) 0.02 mSv/hour ((2)) two mrem/hour) in any normally occupied space, except that this provision does not apply to private carriers, if exposed personnel under their control wear radiation dosimetry devices in conformance with WAC 246-221-090 and 246-221-100.

(3) For shipments made under the provisions of subsection (2) of this section, the shipper shall provide specific written instructions to the carrier for maintenance of the exclusive use shipment controls. The instructions must be included with the shipping paper information.

(4) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions that will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

AMENDATORY SECTION (Amending WSR 17-01-034, filed 12/12/16, effective 1/12/17)

**WAC 246-231-106 Preliminary determinations.** Before the first use of any packaging for the shipment of licensed material:

(1) The licensee shall ascertain that there are no cracks, pinholes, uncontrolled voids, or other defects that could significantly reduce the effectiveness of the packaging;

(2) Where the maximum normal operating pressure will exceed 35 kPa (~~((5))~~ five lbs/in<sup>2</sup>) gauge, the licensee shall test the containment system at an internal pressure at least (~~((fifty))~~ 50 percent higher than the maximum normal operating pressure, to verify the capability of that system to maintain its structural integrity at that pressure;

(3) The licensee shall conspicuously and durably mark the packaging with its model number, serial number, gross weight, and a package identification number assigned by NRC. Before applying the model number, the licensee shall determine that the packaging has been fabricated in accordance with the design approved by NRC; and

(4) The licensee shall ascertain that the determinations in subsections (1) through (3) of this section have been made.

AMENDATORY SECTION (Amending WSR 22-11-063, filed 5/16/22, effective 6/16/22)

**WAC 246-231-140 Advance notification of shipment of irradiated reactor fuel and nuclear waste.** (1)(a) As specified in subsections (2), (3), and (4) of this section, each licensee shall provide advance notification to the governor of a state, or the governor's designee, of the shipment of licensed material, within or across the boundary of the state, before the transport, or delivery to a carrier, for transport, of licensed material outside the confines of the licensee's plant or other place of use or storage.

(b) As specified in subsections (2), (3), and (4) of this section, after June 11, 2013, each licensee shall provide advance notification to the Tribal official of participating tribes referenced in subsection (3)(c)(iii) of this section, or the official's designee, of the shipment of licensed material within or across the boundary of the Tribe's reservation before the transport, or delivery to a carrier for

transport, of licensed material outside the confines of the licensee's plant or other place of use or storage.

(2) Advance notification is required under this section for shipments of irradiated reactor fuel in quantities less than that subject to advance notification requirements of NRC regulations 10 C.F.R. 73.37(f). Advance notification is also required under this section for shipment of licensed material, other than irradiated fuel, meeting the following three conditions:

(a) The licensed material is required by this section to be in Type B packaging for transportation;

(b) The licensed material is being transported to or across a state boundary (~~en route~~) enroute to a disposal facility or to a collection point for transport to a disposal facility; and

(c) The quantity of licensed material in a single package exceeds the least of the following:

(i) Three thousand times the A1 value of the radionuclides as specified in WAC 246-231-200, Table A-1 for special form radioactive material;

(ii) Three thousand times the A2 value of the radionuclides as specified in WAC 246-231-200, Table A-1 for normal form radioactive material; or

(iii) One thousand TBq (27,000 Ci).

(3) Procedures for submitting advance notification.

(a) The notification must be made in writing to the office of each appropriate governor or governor's designee, to the office of each appropriate Tribal official or Tribal official's designee, and to the Director, Office of Nuclear Security and Incident Response.

(b) A notification delivered by mail must be postmarked at least seven days before the beginning of the seven-day period during which departure of the shipment is estimated to occur.

(c) A notification delivered by any other means than mail must reach the office of the governor or the governor's designee, or of the Tribal official or the Tribal official's designee, at least four days before the beginning of the seven-day period during which departure of the shipment is estimated to occur.

(i) (~~A list of the names and mailing addresses of the governors' designees receiving advance notification of transportation of nuclear waste was published in the Federal Register on June 30, 1995, (60 FR 34306).~~) Reserved.

(ii) Contact information for each state, including telephone and mailing addresses of governors and governors' designees, and participating Tribes, including telephone and mailing addresses of Tribal officials and Tribal official's designees, is available on the NRC web-site at <https://scp.nrc.gov/special/designee.pdf>.

(iii) A list of the names and mailing addresses of the governors' designees and Tribal officials' designees of participating Tribes is available on request from the Director, Division of Materials Safety, Security, State, and Tribal Programs, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

(d) The licensee shall retain a copy of the notification as a record for three years.

(4) Information to be furnished in advance notification of shipment. Each advance notification of shipment of irradiated reactor fuel or nuclear waste must contain the following information:

(a) The name, address, and telephone number of the shipper, carrier, and receiver of the irradiated reactor fuel or nuclear waste shipment;

(b) A description of the irradiated reactor fuel or nuclear waste contained in the shipment, as specified in the regulations of DOT in 49 C.F.R. 172.202 and 172.203(d);

(c) The point of origin of the shipment and the seven-day period during which departure of the shipment is estimated to occur;

(d) The seven-day period during which arrival of the shipment at state boundaries or Tribal reservation boundaries is estimated to occur;

(e) The destination of the shipment, and the seven-day period during which arrival of the shipment is estimated to occur; and

(f) A point of contact, with a telephone number, for current shipment information.

(5) Revision notice. A licensee who finds that schedule information previously furnished to a governor or governor's designee, or a Tribal official or Tribal official's designee, in accordance with this section, will not be met, shall telephone a responsible individual in the office of the governor of the state or of the governor's designee or the Tribal official or the Tribal official's designee, and inform that individual of the extent of the delay beyond the schedule originally reported. The licensee shall maintain a record of the name of the individual contacted for three years.

(6) Cancellation notice.

(a) Each licensee who cancels an irradiated reactor fuel or nuclear waste shipment for which advance notification has been sent shall send a cancellation notice to the governor of each state or to the governor's designee previously notified, to each Tribal official or to the Tribal official's designee previously notified, and to the Director, Office of Nuclear Security and Incident Response.

(b) The licensee shall state in the notice that it is a cancellation and identify the advance notification that is being canceled. The licensee shall retain a copy of the notice as a record for three years.

AMENDATORY SECTION (Amending WSR 17-01-034, filed 12/12/16, effective 1/12/17)

**WAC 246-231-174 Changes to quality assurance program.** (1) Each quality assurance program approval holder shall submit, in accordance with 10 C.F.R. 71.1(a), a description of a proposed change to its NRC-approved quality assurance program that will reduce commitments in the program description as approved by the NRC. The quality assurance program approval holder shall not implement the change before receiving NRC approval.

(a) The description of a proposed change to the NRC-approved quality assurance program must identify the change, the reason for the change, the basis for concluding that the revised program incorporating the change continues to satisfy the applicable requirements of 10 C.F.R. Subpart H.

(b) (Reserved.)

(2) Each quality assurance program approval holder may change a previously approved quality assurance program without prior NRC approval.

val, if the change does not reduce the commitments in the quality assurance program previously approved by the NRC. Changes to the quality assurance program that do not reduce the commitments shall be submitted to the NRC every (~~twenty-four~~) 24 months, in accordance with 10 C.F.R. 71.1(a). In addition to quality assurance program changes involving administrative improvements and clarifications, spelling corrections, and nonsubstantive changes to punctuation or editorial items, the following changes are not considered reductions in commitment:

(a) The use of a quality assurance standard approved by the NRC that is more recent than the quality assurance standard in the certificate holder's or applicant's current quality assurance program at the time of the change;

(b) The use of generic organizational position titles that clearly denote the position function, supplemented as necessary by descriptive text, rather than specific titles, provided that there is no substantive change to either the functions of the position or reporting responsibilities;

(c) The use of generic organization charts to indicate functional relationships, authorities, and responsibilities, or alternatively, the use of descriptive text, provided that there is no substantive change to the functional relationships, authorities, or responsibilities;

(d) The elimination of quality assurance program information that duplicates language in quality assurance regulatory guides and quality assurance standards to which the quality assurance program approval holder has committed to on record; and

(e) Organizational revisions that ensure that persons and organizations performing quality assurance functions continue to have the requisite authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations.

(3) Each quality assurance program approval holder shall maintain records of quality assurance program changes.

AMENDATORY SECTION (Amending WSR 17-01-034, filed 12/12/16, effective 1/12/17)

**WAC 246-231-200 Appendix A—Determination of A1 and A2.** (1) Values of A1 and A2 for individual radionuclides, which are the basis for many activity limits elsewhere in these regulations, are given in this section, Table A-1. The curie (Ci) values specified are obtained by converting from the Terabecquerel (TBq) value. The Terabecquerel values are the regulatory standard. The curie values are for information only and are not intended to be the regulatory standard. Where values of A1 or A2 are unlimited, it is for radiation control purposes only. For nuclear criticality safety, some materials are subject to controls placed on fissile material.

(2)(a) For individual radionuclides whose identities are known, but which are not listed in this section, Table A-1, the A1 and A2 values contained in this section, Table A-3 may be used. Otherwise, the licensee shall obtain prior NRC approval of the A1 and A2 values

for radionuclides not listed in this section, Table A-1, before shipping the material.

(b) For individual radionuclides whose identities are known, but which are not listed in this section, Table A-2, the exempt material activity concentration and exempt consignment activity values contained in this section, Table A-3 may be used. Otherwise, the licensee shall obtain prior NRC approval of the exempt material activity concentration and exempt consignment activity values for radionuclides not listed in this section, Table A-2, before shipping the material.

(c) The licensee shall submit requests for prior approval, described under (a) and (b) of this subsection, to NRC in accordance with 10 C.F.R. 71.1.

(3) In the calculations of A1 and A2 for a radionuclide not in this section, Table A-1, a single radioactive decay chain, in which radionuclides are present in their naturally occurring proportions, and in which no daughter radionuclide has a half-life either longer than ~~((ten))~~ 10 days, or longer than that of the parent radionuclide, shall be considered as a single radionuclide, and the activity to be taken into account, and the A1 or A2 value to be applied shall be those corresponding to the parent radionuclide of that chain. In the case of radioactive decay chains in which any daughter radionuclide has a half-life either longer than ~~((ten))~~ 10 days, or greater than that of the parent radionuclide, the parent and those daughter radionuclides shall be considered as mixtures of different radionuclides.

(4) For mixtures of radionuclides whose identities and respective activities are known, the following conditions apply:

(a) For special form radioactive material, the maximum quantity transported in a Type A package is as follows:

$$\sum_i \frac{B(i)}{A_1(i)} \leq 1$$

Where B(i) is the activity of radionuclide i in special form, and A<sub>1</sub>(i) is the A<sub>1</sub> value for radionuclide i.

(b) For normal form radioactive material, the maximum quantity transported in a Type A package:

$$\sum_i \frac{B(i)}{A_2(i)} \leq 1$$

Where B(i) is the activity of radionuclide i in normal form, and A<sub>2</sub>(i) is the A<sub>2</sub> value for radionuclide i.

(c) If the package contains both special and normal form radioactive material, the activity that may be transported in a Type A package is as follows:

$$\sum_i \frac{B(i)}{A_1(i)} + \sum_j \frac{C(j)}{A_2(j)} \leq 1$$

Where B(i) is the activity of radionuclide i as special form radioactive material, A<sub>1</sub>(i) is the A<sub>1</sub> value for radionuclide i, C(j) is the activity of radionuclide j as normal form radioactive material, and A<sub>2</sub>(j) is the A<sub>2</sub> value for radionuclide j.

(d) Alternatively, the A1 value for mixtures of special form material may be determined as follows:

$$A_1 \text{ for mixture} = \frac{1}{\sum_i \frac{f(i)}{A_1(i)}}$$

Where f(i) is the fraction of activity for radionuclide i in the mixture and A1(i) is the appropriate A1 value for radionuclide i.

(e) Alternatively, the A2 value for mixtures of normal form material may be determined as follows:

$$A_2 \text{ for mixture} = \frac{1}{\sum_i \frac{f(i)}{A_2(i)}}$$

Where f(i) is the fraction of activity for radionuclide i in the mixture and A2(i) is the appropriate A2 value for radionuclide i.

(f) The exempt activity concentration for mixtures of nuclides may be determined as follows:

$$\text{Exempt activity concentration for mixture} = \frac{1}{\sum_i \frac{f(i)}{[A](i)}}$$

Where f(i) is the fraction of activity concentration of radionuclide i in the mixture, and [A](i) is the activity concentration for exempt material containing radionuclide i.

(g) The activity limit for an exempt consignment for mixtures of radionuclides may be determined as follows:

$$\text{Exempt consignment activity limit for mixture} = \frac{1}{\sum_i \frac{f(i)}{A(i)}}$$

Where f(i) is the fraction of activity of radionuclide i in the mixture and A(i) is the activity limit for exempt consignments for radionuclide i.

(5) (a) When the identity of each radionuclide is known, but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest A1 or A2 value, as appropriate, for the radionuclides in each group may be used in applying the formulas in subsection (4) of this section. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest A1 or A2 values for the alpha emitters and beta/gamma emitters.

(b) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest [A] (activity concentration for exempt material) or A (activity limit for exempt consignment) value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paragraph IV of this appendix. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest [A] or A values for the alpha emitters and beta/gamma emitters, respectively.

Table A-1.—A1 and A2 Values for Radionuclides



Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Ac-225 (a)	Actinium (89)	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	6.0X10 <sup>-3</sup>	1.6X10 <sup>-1</sup>	2.1X10 <sup>3</sup>	5.8X10 <sup>4</sup>
Ac-227 (a)		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	9.0X10 <sup>-5</sup>	2.4X10 <sup>-3</sup>	2.7	7.2X10 <sup>1</sup>
Ac-228		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	8.4X10 <sup>4</sup>	2.2X10 <sup>6</sup>
Ag-105	Silver (47)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>4</sup>
Ag-108m (a)		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	9.7X10 <sup>-1</sup>	2.6X10 <sup>1</sup>
Ag-110m (a)		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.8X10 <sup>2</sup>	4.7X10 <sup>3</sup>
Ag-111		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	5.8X10 <sup>3</sup>	1.6X10 <sup>5</sup>
Al-26	Aluminum (13)	1.0X10 <sup>-1</sup>	2.7	1.0X10 <sup>-1</sup>	2.7	7.0X10 <sup>-4</sup>	1.9X10 <sup>-2</sup>
Am-241	Americium (95)	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	1.3X10 <sup>-1</sup>	3.4
Am-242m (a)		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	3.6X10 <sup>-1</sup>	1.0X10 <sup>1</sup>
Am-243 (a)		5.0	1.4X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	7.4X10 <sup>-3</sup>	2.0X10 <sup>-1</sup>
Ar-37	Argon (18)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.7X10 <sup>3</sup>	9.9X10 <sup>4</sup>
Ar-39		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.3	3.4X10 <sup>1</sup>
Ar-41		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.5X10 <sup>6</sup>	4.2X10 <sup>7</sup>
As-72	Arsenic (33)	3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	6.2X10 <sup>4</sup>	1.7X10 <sup>6</sup>
As-73		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	8.2X10 <sup>2</sup>	2.2X10 <sup>4</sup>
As-74		1.0	2.7X10 <sup>1</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	3.7X10 <sup>3</sup>	9.9X10 <sup>4</sup>
As-76		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	5.8X10 <sup>4</sup>	1.6X10 <sup>6</sup>
As-77		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	3.9X10 <sup>4</sup>	1.0X10 <sup>6</sup>
At-211 (a)	Astatine (85)	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	7.6X10 <sup>4</sup>	2.1X10 <sup>6</sup>
Au-193	Gold (79)	7.0	1.9X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	3.4X10 <sup>4</sup>	9.2X10 <sup>5</sup>
Au-194		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.5X10 <sup>4</sup>	4.1X10 <sup>5</sup>
Au-195		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	6.0	1.6X10 <sup>2</sup>	1.4X10 <sup>2</sup>	3.7X10 <sup>3</sup>
Au-198		1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	9.0X10 <sup>3</sup>	2.4X10 <sup>5</sup>
Au-199		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	7.7X10 <sup>3</sup>	2.1X10 <sup>5</sup>
Ba-131 (a)	Barium (56)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	3.1X10 <sup>3</sup>	8.4X10 <sup>4</sup>
Ba-133		3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	9.4	2.6X10 <sup>2</sup>
Ba-133m		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.2X10 <sup>4</sup>	6.1X10 <sup>5</sup>
Ba-140 (a)		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	3.0X10 <sup>-1</sup>	8.1	2.7X10 <sup>3</sup>	7.3X10 <sup>4</sup>
Be-7	Beryllium (4)	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.3X10 <sup>4</sup>	3.5X10 <sup>5</sup>
Be-10		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	8.3X10 <sup>-4</sup>	2.2X10 <sup>-2</sup>
Bi-205	Bismuth (83)	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	1.5X10 <sup>3</sup>	4.2X10 <sup>4</sup>
Bi-206		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	3.8X10 <sup>3</sup>	1.0X10 <sup>5</sup>
Bi-207		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	1.9	5.2X10 <sup>1</sup>
Bi-210		1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	4.6X10 <sup>3</sup>	1.2X10 <sup>5</sup>
Bi-210m (a)		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	2.1X10 <sup>-5</sup>	5.7X10 <sup>-4</sup>
Bi-212 (a)		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	5.4X10 <sup>5</sup>	1.5X10 <sup>7</sup>
Bk-247	Berkelium (97)	8.0	2.2X10 <sup>2</sup>	8.0X10 <sup>-4</sup>	2.2X10 <sup>-2</sup>	3.8X10 <sup>-2</sup>	1.0
Bk-249 (a)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>-1</sup>	8.1	6.1X10 <sup>1</sup>	1.6X10 <sup>3</sup>
Br-76	Bromine (35)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	9.4X10 <sup>4</sup>	2.5X10 <sup>6</sup>
Br-77		3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	2.6X10 <sup>4</sup>	7.1X10 <sup>5</sup>
Br-82		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>4</sup>	1.1X10 <sup>6</sup>
C-11	Carbon (6)	1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.1X10 <sup>7</sup>	8.4X10 <sup>8</sup>
C-14		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0	8.1X10 <sup>1</sup>	1.6X10 <sup>-1</sup>	4.5
Ca-41	Calcium (20)	Unlimited	Unlimited	Unlimited	Unlimited	3.1X10 <sup>-3</sup>	8.5X10 <sup>-2</sup>
Ca-45		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0	2.7X10 <sup>1</sup>	6.6X10 <sup>2</sup>	1.8X10 <sup>4</sup>
Ca-47 (a)		3.0	8.1X10 <sup>1</sup>	3.0X10 <sup>-1</sup>	8.1	2.3X10 <sup>4</sup>	6.1X10 <sup>5</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Cd-109	Cadmium (48)	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	9.6X10 <sup>1</sup>	2.6X10 <sup>3</sup>
Cd-113m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	8.3	2.2X10 <sup>2</sup>
Cd-115 (a)		3.0	8.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.9X10 <sup>4</sup>	5.1X10 <sup>5</sup>
Cd-115m		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	9.4X10 <sup>2</sup>	2.5X10 <sup>4</sup>
Ce-139	Cerium (58)	7.0	1.9X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	2.5X10 <sup>2</sup>	6.8X10 <sup>3</sup>
Ce-141		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.8X10 <sup>4</sup>
Ce-143		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.5X10 <sup>4</sup>	6.6X10 <sup>5</sup>
Ce-144 (a)		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	1.2X10 <sup>2</sup>	3.2X10 <sup>3</sup>
Cf-248	Californium (98)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-3</sup>	1.6X10 <sup>-1</sup>	5.8X10 <sup>1</sup>	1.6X10 <sup>3</sup>
Cf-249		3.0	8.1X10 <sup>1</sup>	8.0X10 <sup>-4</sup>	2.2X10 <sup>-2</sup>	1.5X10 <sup>-1</sup>	4.1
Cf-250		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>-3</sup>	5.4X10 <sup>-2</sup>	4.0	1.1X10 <sup>2</sup>
Cf-251		7.0	1.9X10 <sup>2</sup>	7.0X10 <sup>-4</sup>	1.9X10 <sup>-2</sup>	5.9X10 <sup>-2</sup>	1.6
Cf-252		1.0X10 <sup>-1</sup>	2.7	3.0X10 <sup>-3</sup>	8.1X10 <sup>-2</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>
Cf-253 (a)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>-2</sup>	1.1	1.1X10 <sup>3</sup>	2.9X10 <sup>4</sup>
Cf-254		1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	3.1X10 <sup>2</sup>	8.5X10 <sup>3</sup>
Cl-36	Chlorine (17)	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.2X10 <sup>-3</sup>	3.3X10 <sup>-2</sup>
Cl-38		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	4.9X10 <sup>6</sup>	1.3X10 <sup>8</sup>
Cm-240	Curium (96)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	7.5X10 <sup>2</sup>	2.0X10 <sup>4</sup>
Cm-241		2.0	5.4X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	6.1X10 <sup>2</sup>	1.7X10 <sup>4</sup>
Cm-242		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0X10 <sup>-2</sup>	2.7X10 <sup>-1</sup>	1.2X10 <sup>2</sup>	3.3X10 <sup>3</sup>
Cm-243		9.0	2.4X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	1.9X10 <sup>-3</sup>	5.2X10 <sup>1</sup>
Cm-244		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>-3</sup>	5.4X10 <sup>-2</sup>	3.0	8.1X10 <sup>1</sup>
Cm-245		9.0	2.4X10 <sup>2</sup>	9.0X10 <sup>-4</sup>	2.4X10 <sup>-2</sup>	6.4X10 <sup>-3</sup>	1.7X10 <sup>-1</sup>
Cm-246		9.0	2.4X10 <sup>2</sup>	9.0X10 <sup>-4</sup>	2.4X10 <sup>-2</sup>	1.1X10 <sup>-2</sup>	3.1X10 <sup>-1</sup>
Cm-247 (a)		3.0	8.1X10 <sup>1</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	3.4X10 <sup>-6</sup>	9.3X10 <sup>-5</sup>
Cm-248		2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	3.0X10 <sup>-4</sup>	8.1X10 <sup>-3</sup>	1.6X10 <sup>-4</sup>	4.2X10 <sup>-3</sup>
Co-55	Cobalt (27)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	1.1X10 <sup>5</sup>	3.1X10 <sup>6</sup>
Co-56		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.1X10 <sup>3</sup>	3.0X10 <sup>4</sup>
Co-57		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	3.1X10 <sup>2</sup>	8.4X10 <sup>3</sup>
Co-58		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.2X10 <sup>3</sup>	3.2X10 <sup>4</sup>
Co-58m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.2X10 <sup>5</sup>	5.9X10 <sup>6</sup>
Co-60		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.2X10 <sup>1</sup>	1.1X10 <sup>3</sup>
Cr-51	Chromium (24)	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.4X10 <sup>3</sup>	9.2X10 <sup>4</sup>
Cs-129	Cesium (55)	4.0	1.1X10 <sup>2</sup>	4.0	1.1X10 <sup>2</sup>	2.8X10 <sup>4</sup>	7.6X10 <sup>5</sup>
Cs-131		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.8X10 <sup>3</sup>	1.0X10 <sup>5</sup>
Cs-132		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	5.7X10 <sup>3</sup>	1.5X10 <sup>5</sup>
Cs-134		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	4.8X10 <sup>1</sup>	1.3X10 <sup>3</sup>
Cs-134m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.0X10 <sup>5</sup>	8.0X10 <sup>6</sup>
Cs-135		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0	2.7X10 <sup>1</sup>	4.3X10 <sup>-5</sup>	1.2X10 <sup>-3</sup>
Cs-136		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	2.7X10 <sup>3</sup>	7.3X10 <sup>4</sup>
Cs-137 (a)		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.2	8.7X10 <sup>1</sup>
Cu-64	Copper (29)	6.0	1.6X10 <sup>2</sup>	1.0	2.7X10 <sup>1</sup>	1.4X10 <sup>5</sup>	3.9X10 <sup>6</sup>
Cu-67		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	2.8X10 <sup>4</sup>	7.6X10 <sup>5</sup>
Dy-159	Dysprosium (66)	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.1X10 <sup>2</sup>	5.7X10 <sup>3</sup>
Dy-165		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.0X10 <sup>5</sup>	8.2X10 <sup>6</sup>
Dy-166 (a)		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	3.0X10 <sup>-1</sup>	8.1	8.6X10 <sup>3</sup>	2.3X10 <sup>5</sup>
Er-169	Erbium (68)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0	2.7X10 <sup>1</sup>	3.1X10 <sup>3</sup>	8.3X10 <sup>4</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Er-171		8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	9.0X10 <sup>4</sup>	2.4X10 <sup>6</sup>
Eu-147	Europium (63)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	1.4X10 <sup>3</sup>	3.7X10 <sup>4</sup>
Eu-148		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	6.0X10 <sup>2</sup>	1.6X10 <sup>4</sup>
Eu-149		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	3.5X10 <sup>2</sup>	9.4X10 <sup>3</sup>
Eu-150 (short lived)		2.0	5.4X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.1X10 <sup>4</sup>	1.6X10 <sup>6</sup>
Eu-150 (long lived)		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.1X10 <sup>4</sup>	1.6X10 <sup>6</sup>
Eu-152		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	6.5	1.8X10 <sup>2</sup>
Eu-152m		8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	8.2X10 <sup>4</sup>	2.2X10 <sup>6</sup>
Eu-154		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	9.8	2.6X10 <sup>2</sup>
Eu-155		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	1.8X10 <sup>1</sup>	4.9X10 <sup>2</sup>
Eu-156		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	2.0X10 <sup>3</sup>	5.5X10 <sup>4</sup>
F-18	Fluorine (9)	1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.5X10 <sup>6</sup>	9.5X10 <sup>7</sup>
Fe-52 (a)	Iron (26)	3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	2.7X10 <sup>5</sup>	7.3X10 <sup>6</sup>
Fe-55		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	8.8X10 <sup>1</sup>	2.4X10 <sup>3</sup>
Fe-59		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	1.8X10 <sup>3</sup>	5.0X10 <sup>4</sup>
Fe-60 (a)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-1</sup>	5.4	7.4X10 <sup>-4</sup>	2.0X10 <sup>-2</sup>
Ga-67	Gallium (31)	7.0	1.9X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	2.2X10 <sup>4</sup>	6.0X10 <sup>5</sup>
Ga-68		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	1.5X10 <sup>6</sup>	4.1X10 <sup>7</sup>
Ga-72		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.1X10 <sup>5</sup>	3.1X10 <sup>6</sup>
Gd-146 (a)	Gadolinium (64)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	6.9X10 <sup>2</sup>	1.9X10 <sup>4</sup>
Gd-148		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>-3</sup>	5.4X10 <sup>-2</sup>	1.2	3.2X10 <sup>1</sup>
Gd-153		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	9.0	2.4X10 <sup>2</sup>	1.3X10 <sup>2</sup>	3.5X10 <sup>3</sup>
Gd-159		3.0	8.1X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.9X10 <sup>4</sup>	1.1X10 <sup>6</sup>
Ge-68 (a)	Germanium (32)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	2.6X10 <sup>2</sup>	7.1X10 <sup>3</sup>
Ge-71		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	5.8X10 <sup>3</sup>	1.6X10 <sup>5</sup>
Ge-77		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.3X10 <sup>5</sup>	3.6X10 <sup>6</sup>
Hf-172 (a)	Hafnium (72)	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	4.1X10 <sup>1</sup>	1.1X10 <sup>3</sup>
Hf-175		3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	3.9X10 <sup>2</sup>	1.1X10 <sup>4</sup>
Hf-181		2.0	5.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	6.3X10 <sup>2</sup>	1.7X10 <sup>4</sup>
Hf-182		Unlimited	Unlimited	Unlimited	Unlimited	8.1X10 <sup>-6</sup>	2.2X10 <sup>-4</sup>
Hg-194 (a)	Mercury (80)	1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.3X10 <sup>-1</sup>	3.5
Hg-195m (a)		3.0	8.1X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	1.5X10 <sup>4</sup>	4.0X10 <sup>5</sup>
Hg-197		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	9.2X10 <sup>3</sup>	2.5X10 <sup>5</sup>
Hg-197m		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	2.5X10 <sup>4</sup>	6.7X10 <sup>5</sup>
Hg-203		5.0	1.4X10 <sup>2</sup>	1.0	2.7X10 <sup>1</sup>	5.1X10 <sup>2</sup>	1.4X10 <sup>4</sup>
Ho-166	Holmium (67)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	2.6X10 <sup>4</sup>	7.0X10 <sup>5</sup>
Ho-166m		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	6.6X10 <sup>-2</sup>	1.8
I-123	Iodine (53)	6.0	1.6X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	7.1X10 <sup>4</sup>	1.9X10 <sup>6</sup>
I-124		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	9.3X10 <sup>3</sup>	2.5X10 <sup>5</sup>
I-125		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	6.4X10 <sup>2</sup>	1.7X10 <sup>4</sup>
I-126		2.0	5.4X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	2.9X10 <sup>3</sup>	8.0X10 <sup>4</sup>
I-129		Unlimited	Unlimited	Unlimited	Unlimited	6.5X10 <sup>-6</sup>	1.8X10 <sup>-4</sup>
I-131		3.0	8.1X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	4.6X10 <sup>3</sup>	1.2X10 <sup>5</sup>
I-132		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	3.8X10 <sup>5</sup>	1.0X10 <sup>7</sup>
I-133		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	4.2X10 <sup>4</sup>	1.1X10 <sup>6</sup>
I-134		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	9.9X10 <sup>5</sup>	2.7X10 <sup>7</sup>
I-135 (a)		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.3X10 <sup>5</sup>	3.5X10 <sup>6</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
In-111	Indium (49)	3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	1.5X10 <sup>4</sup>	4.2X10 <sup>5</sup>
In-113m		4.0	1.1X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	6.2X10 <sup>5</sup>	1.7X10 <sup>7</sup>
In-114m (a)		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	8.6X10 <sup>2</sup>	2.3X10 <sup>4</sup>
In-115m		7.0	1.9X10 <sup>2</sup>	1.0	2.7X10 <sup>1</sup>	2.2X10 <sup>5</sup>	6.1X10 <sup>6</sup>
Ir-189 (a)	Iridium (77)	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.9X10 <sup>3</sup>	5.2X10 <sup>4</sup>
Ir-190		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	2.3X10 <sup>3</sup>	6.2X10 <sup>4</sup>
Ir-192		<sup>c</sup> 1.0	<sup>c</sup> 2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.4X10 <sup>2</sup>	9.2X10 <sup>3</sup>
Ir-194		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	3.1X10 <sup>4</sup>	8.4X10 <sup>5</sup>
K-40	Potassium (19)	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	2.4X10 <sup>-7</sup>	6.4X10 <sup>-6</sup>
K-42		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	2.2X10 <sup>5</sup>	6.0X10 <sup>6</sup>
K-43		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.2X10 <sup>5</sup>	3.3X10 <sup>6</sup>
Kr-79	Krypton (36)	4.0	1.1X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	4.2X10 <sup>4</sup>	1.1X10 <sup>6</sup>
Kr-81		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	7.8X10 <sup>-4</sup>	2.1X10 <sup>-2</sup>
Kr-85		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.5X10 <sup>1</sup>	3.9X10 <sup>2</sup>
Kr-85m		8.0	2.2X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	3.0X10 <sup>5</sup>	8.2X10 <sup>6</sup>
Kr-87		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	1.0X10 <sup>6</sup>	2.8X10 <sup>7</sup>
La-137	Lanthanum (57)	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	6.0	1.6X10 <sup>2</sup>	1.6X10 <sup>-3</sup>	4.4X10 <sup>-2</sup>
La-140		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	2.1X10 <sup>4</sup>	5.6X10 <sup>5</sup>
Lu-172	Lutetium (71)	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	4.2X10 <sup>3</sup>	1.1X10 <sup>5</sup>
Lu-173		8.0	2.2X10 <sup>2</sup>	8.0	2.2X10 <sup>2</sup>	5.6X10 <sup>1</sup>	1.5X10 <sup>3</sup>
Lu-174		9.0	2.4X10 <sup>2</sup>	9.0	2.4X10 <sup>2</sup>	2.3X10 <sup>1</sup>	6.2X10 <sup>2</sup>
Lu-174m		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	2.0X10 <sup>2</sup>	5.3X10 <sup>3</sup>
Lu-177		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	4.1X10 <sup>3</sup>	1.1X10 <sup>5</sup>
Mg-28 (a)	Magnesium (12)	3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	2.0X10 <sup>5</sup>	5.4X10 <sup>6</sup>
Mn-52	Manganese (25)	3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.6X10 <sup>4</sup>	4.4X10 <sup>5</sup>
Mn-53		Unlimited	Unlimited	Unlimited	Unlimited	6.8X10 <sup>-5</sup>	1.8X10 <sup>-3</sup>
Mn-54		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	2.9X10 <sup>2</sup>	7.7X10 <sup>3</sup>
Mn-56		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	8.0X10 <sup>5</sup>	2.2X10 <sup>7</sup>
Mo-93	Molybdenum (42)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	4.1X10 <sup>-2</sup>	1.1
Mo-99 (a) (h)		1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.8X10 <sup>4</sup>	4.8X10 <sup>5</sup>
N-13	Nitrogen (7)	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	5.4X10 <sup>7</sup>	1.5X10 <sup>9</sup>
Na-22	Sodium (11)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	2.3X10 <sup>2</sup>	6.3X10 <sup>3</sup>
Na-24		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	3.2X10 <sup>5</sup>	8.7X10 <sup>6</sup>
Nb-93m	Niobium (41)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	8.8	2.4X10 <sup>2</sup>
Nb-94		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.9X10 <sup>-3</sup>	1.9X10 <sup>-1</sup>
Nb-95		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.5X10 <sup>3</sup>	3.9X10 <sup>4</sup>
Nb-97		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	9.9X10 <sup>5</sup>	2.7X10 <sup>7</sup>
Nd-147	Neodymium (60)	6.0	1.6X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.0X10 <sup>3</sup>	8.1X10 <sup>4</sup>
Nd-149		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	4.5X10 <sup>5</sup>	1.2X10 <sup>7</sup>
Ni-59	Nickel (28)	Unlimited	Unlimited	Unlimited	Unlimited	3.0X10 <sup>-3</sup>	8.0X10 <sup>-2</sup>
Ni-63		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	2.1	5.7X10 <sup>1</sup>
Ni-65		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	7.1X10 <sup>5</sup>	1.9X10 <sup>7</sup>
Np-235	Neptunium (93)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	5.2X10 <sup>1</sup>	1.4X10 <sup>3</sup>
Np-236 (short-lived)		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	4.7X10 <sup>-4</sup>	1.3X10 <sup>-2</sup>
Np-236 (long-lived)		9.0	2.4X10 <sup>2</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	4.7X10 <sup>-4</sup>	1.3X10 <sup>-2</sup>
Np-237		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>-3</sup>	5.4X10 <sup>-2</sup>	2.6X10 <sup>-5</sup>	7.1X10 <sup>-4</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Np-239		7.0	1.9X10 <sup>2</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	8.6X10 <sup>3</sup>	2.3X10 <sup>5</sup>
Os-185	Osmium (76)	1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	2.8X10 <sup>2</sup>	7.5X10 <sup>3</sup>
Os-191		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	1.6X10 <sup>3</sup>	4.4X10 <sup>4</sup>
Os-191m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	4.6X10 <sup>4</sup>	1.3X10 <sup>6</sup>
Os-193		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.2X10 <sup>4</sup>	5.3X10 <sup>5</sup>
Os-194 (a)		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.1X10 <sup>1</sup>	3.1X10 <sup>2</sup>
P-32	Phosphorus (15)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	1.1X10 <sup>4</sup>	2.9X10 <sup>5</sup>
P-33		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0	2.7X10 <sup>1</sup>	5.8X10 <sup>3</sup>	1.6X10 <sup>5</sup>
Pa-230 (a)	Protactinium (91)	2.0	5.4X10 <sup>1</sup>	7.0X10 <sup>-2</sup>	1.9	1.2X10 <sup>3</sup>	3.3X10 <sup>4</sup>
Pa-231		4.0	1.1X10 <sup>2</sup>	4.0X10 <sup>-4</sup>	1.1X10 <sup>-2</sup>	1.7X10 <sup>-3</sup>	4.7X10 <sup>-2</sup>
Pa-233		5.0	1.4X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.7X10 <sup>2</sup>	2.1X10 <sup>4</sup>
Pb-201	Lead (82)	1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	6.2X10 <sup>4</sup>	1.7X10 <sup>6</sup>
Pb-202		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.2X10 <sup>-4</sup>	3.4X10 <sup>-3</sup>
Pb-203		4.0	1.1X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	1.1X10 <sup>4</sup>	3.0X10 <sup>5</sup>
Pb-205		Unlimited	Unlimited	Unlimited	Unlimited	4.5X10 <sup>-6</sup>	1.2X10 <sup>-4</sup>
Pb-210 (a)		1.0	2.7X10 <sup>1</sup>	5.0X10 <sup>-2</sup>	1.4	2.8	7.6X10 <sup>1</sup>
Pb-212 (a)		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	2.0X10 <sup>-1</sup>	5.4	5.1X10 <sup>4</sup>	1.4X10 <sup>6</sup>
Pd-103 (a)	Palladium (46)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.8X10 <sup>3</sup>	7.5X10 <sup>4</sup>
Pd-107		Unlimited	Unlimited	Unlimited	Unlimited	1.9X10 <sup>-5</sup>	5.1X10 <sup>-4</sup>
Pd-109		2.0	5.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	7.9X10 <sup>4</sup>	2.1X10 <sup>6</sup>
Pm-143	Promethium (61)	3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	1.3X10 <sup>2</sup>	3.4X10 <sup>3</sup>
Pm-144		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	9.2X10 <sup>1</sup>	2.5X10 <sup>3</sup>
Pm-145		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	5.2	1.4X10 <sup>2</sup>
Pm-147		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0	5.4X10 <sup>1</sup>	3.4X10 <sup>1</sup>	9.3X10 <sup>2</sup>
Pm-148m (a)		8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	7.9X10 <sup>2</sup>	2.1X10 <sup>4</sup>
Pm-149		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.5X10 <sup>4</sup>	4.0X10 <sup>5</sup>
Pm-151		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.7X10 <sup>4</sup>	7.3X10 <sup>5</sup>
Po-210	Polonium (84)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	1.7X10 <sup>2</sup>	4.5X10 <sup>3</sup>
Pr-142	Praseodymium (59)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.3X10 <sup>4</sup>	1.2X10 <sup>6</sup>
Pr-143		3.0	8.1X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.5X10 <sup>3</sup>	6.7X10 <sup>4</sup>
Pt-188 (a)	Platinum (78)	1.0	2.7X10 <sup>1</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	2.5X10 <sup>3</sup>	6.8X10 <sup>4</sup>
Pt-191		4.0	1.1X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	8.7X10 <sup>3</sup>	2.4X10 <sup>5</sup>
Pt-193		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.4	3.7X10 <sup>1</sup>
Pt-193m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.8X10 <sup>3</sup>	1.6X10 <sup>5</sup>
Pt-195m		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	6.2X10 <sup>3</sup>	1.7X10 <sup>5</sup>
Pt-197		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.2X10 <sup>4</sup>	8.7X10 <sup>5</sup>
Pt-197m		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.7X10 <sup>5</sup>	1.0X10 <sup>7</sup>
Pu-236	Plutonium (94)	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.0X10 <sup>-3</sup>	8.1X10 <sup>-2</sup>	2.0X10 <sup>1</sup>	5.3X10 <sup>2</sup>
Pu-237		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	4.5X10 <sup>2</sup>	1.2X10 <sup>4</sup>
Pu-238		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	6.3X10 <sup>-1</sup>	1.7X10 <sup>1</sup>
Pu-239		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	2.3X10 <sup>-3</sup>	6.2X10 <sup>-2</sup>
Pu-240		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	8.4X10 <sup>-3</sup>	2.3X10 <sup>-1</sup>
Pu-241 (a)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-2</sup>	1.6	3.8	1.0X10 <sup>2</sup>
Pu-242		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	1.5X10 <sup>-4</sup>	3.9X10 <sup>-3</sup>
Pu-244 (a)		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	6.7X10 <sup>-7</sup>	1.8X10 <sup>-5</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Ra-223 (a)	Radium (88)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	7.0X10 <sup>-3</sup>	1.9X10 <sup>-1</sup>	1.9X10 <sup>3</sup>	5.1X10 <sup>4</sup>
Ra-224 (a)		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	5.9X10 <sup>3</sup>	1.6X10 <sup>5</sup>
Ra-225 (a)		2.0X10 <sup>-1</sup>	5.4	4.0X10 <sup>-3</sup>	1.1X10 <sup>-1</sup>	1.5X10 <sup>3</sup>	3.9X10 <sup>4</sup>
Ra-226 (a)		2.0X10 <sup>-1</sup>	5.4	3.0X10 <sup>-3</sup>	8.1X10 <sup>-2</sup>	3.7X10 <sup>-2</sup>	1.0
Ra-228 (a)		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>
Rb-81	Rubidium (37)	2.0	5.4X10 <sup>1</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	3.1X10 <sup>5</sup>	8.4X10 <sup>6</sup>
Rb-83 (a)		2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	6.8X10 <sup>2</sup>	1.8X10 <sup>4</sup>
Rb-84		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.8X10 <sup>3</sup>	4.7X10 <sup>4</sup>
Rb-86		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	3.0X10 <sup>3</sup>	8.1X10 <sup>4</sup>
Rb-87		Unlimited	Unlimited	Unlimited	Unlimited	3.2X10 <sup>-9</sup>	8.6X10 <sup>-8</sup>
Rb (nat)		Unlimited	Unlimited	Unlimited	Unlimited	6.7X10 <sup>6</sup>	1.8X10 <sup>8</sup>
Re-184	Rhenium (75)	1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	6.9X10 <sup>2</sup>	1.9X10 <sup>4</sup>
Re-184m		3.0	8.1X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.6X10 <sup>2</sup>	4.3X10 <sup>3</sup>
Re-186		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.9X10 <sup>3</sup>	1.9X10 <sup>5</sup>
Re-187		Unlimited	Unlimited	Unlimited	Unlimited	1.4X10 <sup>-9</sup>	3.8X10 <sup>-8</sup>
Re-188		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	3.6X10 <sup>4</sup>	9.8X10 <sup>5</sup>
Re-189 (a)		3.0	8.1X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.5X10 <sup>4</sup>	6.8X10 <sup>5</sup>
Re (nat)		Unlimited	Unlimited	Unlimited	Unlimited	0.0	2.4X10 <sup>-8</sup>
Rh-99	Rhodium (45)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	3.0X10 <sup>3</sup>	8.2X10 <sup>4</sup>
Rh-101		4.0	1.1X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	4.1X10 <sup>1</sup>	1.1X10 <sup>3</sup>
Rh-102		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	4.5X10 <sup>1</sup>	1.2X10 <sup>3</sup>
Rh-102m		2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	2.3X10 <sup>2</sup>	6.2X10 <sup>3</sup>
Rh-103m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.2X10 <sup>6</sup>	3.3X10 <sup>7</sup>
Rh-105		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	3.1X10 <sup>4</sup>	8.4X10 <sup>5</sup>
Rn-222 (a)	Radon (86)	3.0X10 <sup>-1</sup>	8.1	4.0X10 <sup>-3</sup>	1.1X10 <sup>-1</sup>	5.7X10 <sup>3</sup>	1.5X10 <sup>5</sup>
Ru-97	Ruthenium (44)	5.0	1.4X10 <sup>2</sup>	5.0	1.4X10 <sup>2</sup>	1.7X10 <sup>4</sup>	4.6X10 <sup>5</sup>
Ru-103 (a)		2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	1.2X10 <sup>3</sup>	3.2X10 <sup>4</sup>
Ru-105		1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.5X10 <sup>5</sup>	6.7X10 <sup>6</sup>
Ru-106 (a)		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	1.2X10 <sup>2</sup>	3.3X10 <sup>3</sup>
S-35	Sulphur (16)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0	8.1X10 <sup>1</sup>	1.6X10 <sup>3</sup>	4.3X10 <sup>4</sup>
Sb-122	Antimony (51)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.5X10 <sup>4</sup>	4.0X10 <sup>5</sup>
Sb-124		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.5X10 <sup>2</sup>	1.7X10 <sup>4</sup>
Sb-125		2.0	5.4X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	3.9X10 <sup>1</sup>	1.0X10 <sup>3</sup>
Sb-126		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	3.1X10 <sup>3</sup>	8.4X10 <sup>4</sup>
Sc-44	Scandium (21)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	6.7X10 <sup>5</sup>	1.8X10 <sup>7</sup>
Sc-46		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	1.3X10 <sup>3</sup>	3.4X10 <sup>4</sup>
Sc-47		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	3.1X10 <sup>4</sup>	8.3X10 <sup>5</sup>
Sc-48		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	5.5X10 <sup>4</sup>	1.5X10 <sup>6</sup>
Se-75	Selenium (34)	3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.5X10 <sup>4</sup>
Se-79		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0	5.4X10 <sup>1</sup>	2.6X10 <sup>-3</sup>	7.0X10 <sup>-2</sup>
Si-31	Silicon (14)	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.4X10 <sup>6</sup>	3.9X10 <sup>7</sup>
Si-32		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	3.9	1.1X10 <sup>2</sup>
Sm-145	Samarium (62)	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	9.8X10 <sup>1</sup>	2.6X10 <sup>3</sup>
Sm-147		Unlimited	Unlimited	Unlimited	Unlimited	<del>(8.5X10<sup>-1</sup>)</del> 8.5X10 <sup>-10</sup>	2.3X10 <sup>-8</sup>
Sm-151		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	9.7X10 <sup>-1</sup>	2.6X10 <sup>1</sup>
Sm-153		9.0	2.4X10 <sup>2</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.6X10 <sup>4</sup>	4.4X10 <sup>5</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Sn-113 (a)	Tin (50)	4.0	1.1X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	3.7X10 <sup>2</sup>	1.0X10 <sup>4</sup>
Sn-117m		7.0	1.9X10 <sup>2</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	3.0X10 <sup>3</sup>	8.2X10 <sup>4</sup>
Sn-119m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	1.4X10 <sup>2</sup>	3.7X10 <sup>3</sup>
Sn-121m (a)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>
Sn-123		8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	3.0X10 <sup>2</sup>	8.2X10 <sup>3</sup>
Sn-125		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>3</sup>	1.1X10 <sup>5</sup>
Sn-126 (a)		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.0X10 <sup>-3</sup>	2.8X10 <sup>-2</sup>
Sr-82 (a)	Strontium (38)	2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	2.3X10 <sup>3</sup>	6.2X10 <sup>4</sup>
Sr-85		2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	8.8X10 <sup>2</sup>	2.4X10 <sup>4</sup>
Sr-85m		5.0	1.4X10 <sup>2</sup>	5.0	1.4X10 <sup>2</sup>	1.2X10 <sup>6</sup>	3.3X10 <sup>7</sup>
Sr-87m		3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	4.8X10 <sup>5</sup>	1.3X10 <sup>7</sup>
Sr-89		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.9X10 <sup>4</sup>
Sr-90 (a)		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	5.1	1.4X10 <sup>2</sup>
Sr-91 (a)		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.3X10 <sup>5</sup>	3.6X10 <sup>6</sup>
Sr-92 (a)		1.0	2.7X10 <sup>1</sup>	3.0X10 <sup>-1</sup>	8.1	4.7X10 <sup>5</sup>	1.3X10 <sup>7</sup>
T(H-3)	Tritium (1)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.6X10 <sup>2</sup>	9.7X10 <sup>3</sup>
Ta-178 (long-lived)	Tantalum (73)	1.0	2.7X10 <sup>1</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	4.2X10 <sup>6</sup>	1.1X10 <sup>8</sup>
Ta-179		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	4.1X10 <sup>1</sup>	1.1X10 <sup>3</sup>
Ta-182		9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	2.3X10 <sup>2</sup>	6.2X10 <sup>3</sup>
Tb-157	Terbium (65)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	5.6X10 <sup>-1</sup>	1.5X10 <sup>1</sup>
Tb-158		1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	5.6X10 <sup>-1</sup>	1.5X10 <sup>1</sup>
Tb-160		1.0	2.7X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	4.2X10 <sup>2</sup>	1.1X10 <sup>4</sup>
Tc-95m (a)	Technetium (43)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	8.3X10 <sup>2</sup>	2.2X10 <sup>4</sup>
Tc-96		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.2X10 <sup>4</sup>	3.2X10 <sup>5</sup>
Tc-96m (a)		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.4X10 <sup>6</sup>	3.8X10 <sup>7</sup>
Tc-97		Unlimited	Unlimited	Unlimited	Unlimited	5.2X10 <sup>-5</sup>	1.4X10 <sup>-3</sup>
Tc-97m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0	2.7X10 <sup>1</sup>	5.6X10 <sup>2</sup>	1.5X10 <sup>4</sup>
Tc-98		8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	3.2X10 <sup>-5</sup>	8.7X10 <sup>-4</sup>
Tc-99		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.3X10 <sup>-4</sup>	1.7X10 <sup>-2</sup>
Tc-99m		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	4.0	1.1X10 <sup>2</sup>	1.9X10 <sup>5</sup>	5.3X10 <sup>6</sup>
Te-121	Tellurium (52)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	2.4X10 <sup>3</sup>	6.4X10 <sup>4</sup>
Te-121m		5.0	1.4X10 <sup>2</sup>	3.0	8.1X10 <sup>1</sup>	2.6X10 <sup>2</sup>	7.0X10 <sup>3</sup>
Te-123m		8.0	2.2X10 <sup>2</sup>	1.0	2.7X10 <sup>1</sup>	3.3X10 <sup>2</sup>	8.9X10 <sup>3</sup>
Te-125m		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.7X10 <sup>2</sup>	1.8X10 <sup>4</sup>
Te-127		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	9.8X10 <sup>4</sup>	2.6X10 <sup>6</sup>
Te-127m (a)		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	3.5X10 <sup>2</sup>	9.4X10 <sup>3</sup>
Te-129		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	7.7X10 <sup>5</sup>	2.1X10 <sup>7</sup>
Te-129m (a)		8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>4</sup>
Te-131m (a)		7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	3.0X10 <sup>4</sup>	8.0X10 <sup>5</sup>
Te-132 (a)		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	1.1X10 <sup>4</sup>	3.0X10 <sup>5</sup>
Th-227	Thorium (90)	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	5.0X10 <sup>-3</sup>	1.4X10 <sup>-1</sup>	1.1X10 <sup>3</sup>	3.1X10 <sup>4</sup>
Th-228 (a)		5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	3.0X10 <sup>1</sup>	8.2X10 <sup>2</sup>
Th-229		5.0	1.4X10 <sup>2</sup>	5.0X10 <sup>-4</sup>	1.4X10 <sup>-2</sup>	7.9X10 <sup>-3</sup>	2.1X10 <sup>-1</sup>
Th-230		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	7.6X10 <sup>-4</sup>	2.1X10 <sup>-2</sup>
Th-231		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	2.0X10 <sup>4</sup>	5.3X10 <sup>5</sup>
Th-232		Unlimited	Unlimited	Unlimited	Unlimited	4.0X10 <sup>-9</sup>	1.1X10 <sup>-7</sup>
Th-234 (a)		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	8.6X10 <sup>2</sup>	2.3X10 <sup>4</sup>

Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Th(nat)		Unlimited	Unlimited	Unlimited	Unlimited	8.1X10 <sup>-9</sup>	2.2X10 <sup>-7</sup>
Ti-44 (a)	Titanium (22)	5.0X10 <sup>-1</sup>	1.4X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	6.4	1.7X10 <sup>2</sup>
Tl-200	Thallium (81)	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	2.2X10 <sup>4</sup>	6.0X10 <sup>5</sup>
Tl-201		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	4.0	1.1X10 <sup>2</sup>	7.9X10 <sup>3</sup>	2.1X10 <sup>5</sup>
Tl-202		2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	2.0X10 <sup>3</sup>	5.3X10 <sup>4</sup>
Tl-204		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	1.7X10 <sup>1</sup>	4.6X10 <sup>2</sup>
Tm-167	Thulium (69)	7.0	1.9X10 <sup>2</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	3.1X10 <sup>3</sup>	8.5X10 <sup>4</sup>
Tm-170		3.0	8.1X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.2X10 <sup>2</sup>	6.0X10 <sup>3</sup>
Tm-171		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>
U-230 (fast lung absorption) (a)(d)	Uranium (92)	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0X10 <sup>-1</sup>	2.7	1.0X10 <sup>3</sup>	2.7X10 <sup>4</sup>
U-230 (medium lung absorption) (a)(e)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>-3</sup>	1.1X10 <sup>-1</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>4</sup>
U-230 (slow lung absorption) (a)(f)		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.0X10 <sup>-3</sup>	8.1X10 <sup>-2</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>4</sup>
U-232 (fast lung absorption) (d)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	1.0X10 <sup>-2</sup>	2.7X10 <sup>-1</sup>	8.3X10 <sup>-1</sup>	2.2X10 <sup>1</sup>
U-232 (medium lung absorption) (e)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	7.0X10 <sup>-3</sup>	1.9X10 <sup>-1</sup>	8.3X10 <sup>-1</sup>	2.2X10 <sup>1</sup>
U-232 (slow lung absorption) (f)		1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	1.0X10 <sup>-3</sup>	2.7X10 <sup>-2</sup>	8.3X10 <sup>-1</sup>	2.2X10 <sup>1</sup>
U-233 (fast lung absorption) (d)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	9.0X10 <sup>-2</sup>	2.4	3.6X10 <sup>-4</sup>	9.7X10 <sup>-3</sup>
U-233 (medium lung absorption) (e)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	3.6X10 <sup>-4</sup>	9.7X10 <sup>-3</sup>
U-233 (slow lung absorption) (f)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-3</sup>	1.6X10 <sup>-1</sup>	3.6X10 <sup>-4</sup>	9.7X10 <sup>-3</sup>
U-234 (fast lung absorption) (d)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	9.0X10 <sup>-2</sup>	2.4	2.3X10 <sup>-4</sup>	6.2X10 <sup>-3</sup>
U-234 (medium lung absorption) (e)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	2.3X10 <sup>-4</sup>	6.2X10 <sup>-3</sup>
U-234 (slow lung absorption) (f)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-3</sup>	1.6X10 <sup>-1</sup>	2.3X10 <sup>-4</sup>	6.2X10 <sup>-3</sup>
U-235 (all lung absorption types) (a), (d), (e), (f)		Unlimited	Unlimited	Unlimited	Unlimited	8.0X10 <sup>-8</sup>	2.2X10 <sup>-6</sup>
U-236 (fast lung absorption) (d)		Unlimited	Unlimited	Unlimited	Unlimited	2.4X10 <sup>-6</sup>	6.5X10 <sup>-5</sup>
U-236 (medium lung absorption) (e)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	2.0X10 <sup>-2</sup>	5.4X10 <sup>-1</sup>	2.4X10 <sup>-6</sup>	6.5X10 <sup>-5</sup>
U-236 (slow lung absorption) (f)		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	6.0X10 <sup>-3</sup>	1.6X10 <sup>-1</sup>	2.4X10 <sup>-6</sup>	6.5X10 <sup>-5</sup>
U-238 (all lung absorption types) (d), (e), (f)		Unlimited	Unlimited	Unlimited	Unlimited	1.2X10 <sup>-8</sup>	3.4X10 <sup>-7</sup>
U (nat)		Unlimited	Unlimited	Unlimited	Unlimited	2.6X10 <sup>-8</sup>	7.1X10 <sup>-7</sup>
U (enriched to 20% or less) (g)		Unlimited	Unlimited	Unlimited	Unlimited	See Table A-4	See Table A-4
U (dep)		Unlimited	Unlimited	Unlimited	Unlimited	See Table A-4	See Table A-3
V-48	Vanadium (23)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	6.3X10 <sup>3</sup>	1.7X10 <sup>5</sup>
V-49		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.0X10 <sup>2</sup>	8.1X10 <sup>3</sup>
W-178 (a)	Tungsten (74)	9.0	2.4X10 <sup>2</sup>	5.0	1.4X10 <sup>2</sup>	1.3X10 <sup>3</sup>	3.4X10 <sup>4</sup>
W-181		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	2.2X10 <sup>2</sup>	6.0X10 <sup>3</sup>
W-185		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	3.5X10 <sup>2</sup>	9.4X10 <sup>3</sup>
W-187		2.0	5.4X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	2.6X10 <sup>4</sup>	7.0X10 <sup>5</sup>
W-188 (a)		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	3.0X10 <sup>-1</sup>	8.1	3.7X10 <sup>2</sup>	1.0X10 <sup>4</sup>
Xe-122 (a)	Xenon (54)	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.8X10 <sup>4</sup>	1.3X10 <sup>6</sup>
Xe-123		2.0	5.4X10 <sup>1</sup>	7.0X10 <sup>-1</sup>	1.9X10 <sup>1</sup>	4.4X10 <sup>5</sup>	1.2X10 <sup>7</sup>



Symbol of radionuclide	Element and atomic number	A1 (TBq)	A1 (Ci) <sup>b</sup>	A2 (TBq)	A2 (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Xe-127		4.0	1.1X10 <sup>2</sup>	2.0	5.4X10 <sup>1</sup>	1.0X10 <sup>3</sup>	2.8X10 <sup>4</sup>
Xe-131m		4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	4.0X10 <sup>1</sup>	1.1X10 <sup>3</sup>	3.1X10 <sup>3</sup>	8.4X10 <sup>4</sup>
Xe-133		2.0X10 <sup>1</sup>	5.4X10 <sup>2</sup>	1.0X10 <sup>1</sup>	2.7X10 <sup>2</sup>	6.9X10 <sup>3</sup>	1.9X10 <sup>5</sup>
Xe-135		3.0	8.1X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	9.5X10 <sup>4</sup>	2.6X10 <sup>6</sup>
Y-87 (a)	Yttrium (39)	1.0	2.7X10 <sup>1</sup>	1.0	2.7X10 <sup>1</sup>	1.7X10 <sup>4</sup>	4.5X10 <sup>5</sup>
Y-88		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	5.2X10 <sup>2</sup>	1.4X10 <sup>4</sup>
Y-90		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	2.0X10 <sup>4</sup>	5.4X10 <sup>5</sup>
Y-91		6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	9.1X10 <sup>2</sup>	2.5X10 <sup>4</sup>
Y-91m		2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	1.5X10 <sup>6</sup>	4.2X10 <sup>7</sup>
Y-92		2.0X10 <sup>-1</sup>	5.4	2.0X10 <sup>-1</sup>	5.4	3.6X10 <sup>5</sup>	9.6X10 <sup>6</sup>
Y-93		3.0X10 <sup>-1</sup>	8.1	3.0X10 <sup>-1</sup>	8.1	1.2X10 <sup>5</sup>	3.3X10 <sup>6</sup>
Yb-169	Ytterbium (70)	4.0	1.1X10 <sup>2</sup>	1.0	2.7X10 <sup>1</sup>	8.9X10 <sup>2</sup>	2.4X10 <sup>4</sup>
Yb-175		3.0X10 <sup>1</sup>	8.1X10 <sup>2</sup>	9.0X10 <sup>-1</sup>	2.4X10 <sup>1</sup>	6.6X10 <sup>3</sup>	1.8X10 <sup>5</sup>
Zn-65	Zinc (30)	2.0	5.4X10 <sup>1</sup>	2.0	5.4X10 <sup>1</sup>	3.0X10 <sup>2</sup>	8.2X10 <sup>3</sup>
Zn-69		3.0	8.1X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.8X10 <sup>6</sup>	4.9X10 <sup>7</sup>
Zn-69m (a)		3.0	8.1X10 <sup>1</sup>	6.0X10 <sup>-1</sup>	1.6X10 <sup>1</sup>	1.2X10 <sup>5</sup>	3.3X10 <sup>6</sup>
Zr-88	Zirconium (40)	3.0	8.1X10 <sup>1</sup>	3.0	8.1X10 <sup>1</sup>	6.6X10 <sup>2</sup>	1.8X10 <sup>4</sup>
Zr-93		Unlimited	Unlimited	Unlimited	Unlimited	9.3X10 <sup>-5</sup>	2.5X10 <sup>-3</sup>
Zr-95 (a)		2.0	5.4X10 <sup>1</sup>	8.0X10 <sup>-1</sup>	2.2X10 <sup>1</sup>	7.9X10 <sup>2</sup>	2.1X10 <sup>4</sup>
Zr-97 (a)		4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	4.0X10 <sup>-1</sup>	1.1X10 <sup>1</sup>	7.1X10 <sup>4</sup>	1.9X10 <sup>6</sup>

(a)	A <sub>1</sub> or A <sub>2</sub> values include contributions from daughter nuclides with half-lives less than ten days, as listed in the following:	
	Mg-28	Al-28
	Ca-47	Sc-47
	Ti-44	Sc-44
	Fe-52	Mn-52m
	Fe-60	Co-60m
	Zn-69m	Zn-69
	Ge-68	Ga-68
	Rb-83	Kr-83m
	Sr-82	Rb-82
	Sr-90	Y-90
	Sr-91	Y-91m
	Sr-92	Y-92
	Y-87	Sr-87m
	Zr-95	Nb-95m
	Zr-97	Nb-97m, Nb-97
	Mo-99	Tc-99m
	Tc-95m	Tc-95
	Tc-96m	Tc-96
	Ru-103	Rh-103m
	Ru-106	Rh-106
	Pd-103	Rh-103m
	Ag-108m	Ag-108
	Ag-110m	Ag-110
	Cd-115	In-115m
	In-114m	In-114
	Sn-113	In-113m
	Sn-121m	Sn-121
	Sn-126	Sb-126m
	Te-127m	Te-127
	Te-129m	Te-129
	Te-131m	Te-131
	Te-132	I-132
	I-135	Xe-135m
	Xe-122	I-122
	Cs-137	Ba-137m
	Ba-131	Cs-131
	Ba-140	La-140
	Ce-144	Pr-144m, Pr-144
	Pm-148m	Pm-148
	Gd-146	Eu-146
	Dy-166	Ho-166
	Hf-172	Lu-172
	W-178	Ta-178

	W-188	Re-188
	Re-189	Os-189m
	Os-194	Ir-194
	Ir-189	Os-189m
	Pt-188	Ir-188
	Hg-194	Au-194
	Hg-195m	Hg-195
	Pb-210	Bi-210
	Pb-212	Bi-212, Tl-208, Po-212
	Bi-210m	Tl-206
	Bi-212	Tl-208, Po-212
	At-211	Po-211
	Rn-222	Po-218, Pb-214, At-218, Bi-214, Po-214
	Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Po-211, Tl-207
	Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
	Ra-225	Ac-225, Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
	Ra-226	Rn-222, Po-218, Pb-214, At-218, Bi-214, Po-214
	Ra-228	Ac-228
	Ac-225	Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
	Ac-227	Fr-223
	Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
	Th-234	Pa-234m, Pa-234
	Pa-230	Ac-226, Th-226, Fr-222, Ra-222, Rn-218, Po-214
	U-230	Th-226, Ra-222, Rn-218, Po-214
	U-235	Th-231
	Pu-241	U-237
	Pu-244	U-240, Np-240m
	Am-242m	Am-242, Np-238
	Am-243	Np-239
	Cm-247	Pu-243
	Bk-249	Am-245
	Cf-253	Cm-249
	Am-243	Np-239
	Cm-247	Pu-243
	Bk-249	Am-245
	Cf-253	Cm-249
(b)	The values of A <sub>1</sub> and A <sub>2</sub> in Curies (Ci) are approximate and for information only the regulatory standard units are terabecquerels (TBq).	
(c)	The activity of IR-192 in special form may be determined from a measurement of the rate of decay or a measurement of the radiation level at a prescribed distance from the source.	
(d)	These values apply only to compounds of uranium that take the chemical form of UF <sub>6</sub> , UO <sub>2</sub> F <sub>2</sub> and UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub> in both normal and accident conditions of transport.	
(e)	These values apply only to compounds of uranium that take the chemical form of UO <sub>3</sub> , UF <sub>4</sub> , UCl <sub>4</sub> and hexavalent compounds in both normal and accident conditions of transport.	
(f)	These values apply to all compounds of uranium other than those specified in notes (d) and (e) of this table.	
(g)	These values apply to unirradiated uranium only.	
(h)	A <sub>2</sub> = 0.74 TBq (20 Ci) for Mo-99 for domestic use.	

Table A-2.—Exempt Material Activity Concentrations and Exempt Consignment Activity Limits for Radionuclides

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Ac-225	Actinium (89)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Ac-227	-	1.0X10 <sup>-1</sup>	2.7X10 <sup>-12</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Ac-228	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ag-105	Silver (47)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ag-108m (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ag-110m	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ag-111	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Al-26	Aluminum (13)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Am-241	Americium (95)	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Am-242m (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Am-243 (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Ar-37	Argon (18)	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Ar-39	-	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Ar-41	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
As-72	Arsenic (33)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
As-73	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
As-74	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
As-76	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
As-77	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
At-211	Astatine (85)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Au-193	Gold (79)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Au-194	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Au-195	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Au-198	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Au-199	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ba-131	Barium (56)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ba-133	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ba-133m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ba-140 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Be-7	Beryllium (4)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Be-10	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Bi-205	Bismuth (83)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Bi-206	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Bi-207	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Bi-210	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Bi-210m	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Bi-212 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Bk-247	Berkelium (97)	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Bk-249	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Br-76	Bromine (35)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Br-77	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Br-82	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
C-11	Carbon (6)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
C-14	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ca-41	Calcium (20)	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ca-45	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ca-47	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cd-109	Cadmium (48)	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cd-113m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cd-115	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cd-115m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ce-139	Cerium (58)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ce-141	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ce-143	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ce-144 (b)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cf-248	Californium (98)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cf-249	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Cf-250	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cf-251	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Cf-252	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cf-253	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Cf-254	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Cl-36	Chlorine (17)	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cl-38	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cm-240	Curium (96)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cm-241	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cm-242	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cm-243	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cm-244	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cm-245	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Cm-246	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Cm-247	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cm-248	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Co-55	Cobalt (27)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Co-56	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Co-57	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Co-58	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Co-58m	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Co-60	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cr-51	Chromium (24)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Cs-129	Cesium (55)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cs-131	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cs-132	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cs-134	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cs-134m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cs-135	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Cs-136	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Cs-137 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Cu-64	Copper (29)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Cu-67	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Dy-159	Dysprosium (66)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Dy-165	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Dy-166	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Er-169	Erbium (68)	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Er-171	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-147	Europium (63)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-148	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-149	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Eu-150 (short lived)	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-150 (long lived)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-152	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-152m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-154	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Eu-155	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Eu-156	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
F-18	Fluorine (9)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Fe-52	Iron (26)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Fe-55	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Fe-59	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Fe-60	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ga-67	Gallium (31)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ga-68	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ga-72	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Gd-146	Gadolinium (64)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Gd-148	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Gd-153	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Gd-159	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ge-68	Germanium (32)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ge-71	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Ge-77	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Hf-172	Hafnium (72)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hf-175	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hf-181	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hf-182	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hg-194	Mercury (80)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hg-195m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hg-197	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Hg-197m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Hg-203	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ho-166	Holmium (67)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ho-166m	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
I-123	Iodine (53)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
I-124	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
I-125	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
I-126	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
I-129	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
I-131	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
I-132	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
I-133	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
I-134	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
I-135	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
In-111	Indium (49)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
In-113m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
In-114m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
In-115m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ir-189	Iridium (77)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ir-190	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ir-192	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Ir-194	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
K-40	Potassium (19)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
K-42	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
K-43	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Kr-79	Krypton (36)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Kr-81		1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Kr-85	-	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Kr-85m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>10</sup>	2.7X10 <sup>-1</sup>
Kr-87	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
La-137	Lanthanum (57)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
La-140	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Lu-172	Lutetium (71)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Lu-173	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Lu-174	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Lu-174m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Lu-177	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Mg-28	Magnesium (12)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Mn-52	Manganese (25)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Mn-53	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Mn-54	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Mn-56	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Mo-93	Molybdenum (42)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Mo-99	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
N-13	Nitrogen (7)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Na-22	Sodium (11)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Na-24	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Nb-93m	Niobium (41)	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Nb-94	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Nb-95	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Nb-97	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Nd-147	Neodymium (60)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Nd-149	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ni-59	Nickel (28)	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Ni-63	-	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Ni-65	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Np-235	Neptunium (93)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Np-236 (short-lived)	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Np-236 (long-lived)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Np-237 (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Np-239	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Os-185	Osmium (76)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Os-191	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Os-191m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Os-193	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Os-194	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
P-32	Phosphorus (15)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
P-33	-	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Pa-230	Protactinium (91)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pa-231	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Pa-233	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pb-201	Lead (82)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Pb-202	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pb-203	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pb-205	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pb-210 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Pb-212 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Pd-103	Palladium (46)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Pd-107	-	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Pd-109	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pm-143	Promethium (61)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pm-144	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pm-145	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pm-147	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pm-148m	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pm-149	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pm-151	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Po-210	Polonium (84)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Pr-142	Praseodymium (59)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Pr-143	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pt-188	Platinum (78)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pt-191	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pt-193	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pt-193m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pt-195m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pt-197	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pt-197m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Pu-236	Plutonium (94)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Pu-237	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Pu-238	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Pu-239	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Pu-240	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Pu-241	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Pu-242	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Pu-244	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Ra-223 (b)	Radium (88)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ra-224 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ra-225	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Ra-226 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Ra-228 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Rb-81	Rubidium (37)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Rb-83	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Rb-84	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Rb-86	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Rb-87	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Rb (nat)	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Re-184	Rhenium (75)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Re-184m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Re-186	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Re-187	-	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Re-188	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Re-189	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Re (nat)	-	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Rh-99	Rhodium (45)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Rh-101	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Rh-102	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Rh-102m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Rh-103m	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Rh-105	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Rn-222 (b)	Radon (86)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Ru-97	Ruthenium (44)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ru-103	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ru-105	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ru-106 (b)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
S-35	Sulphur (16)	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Sb-122	Antimony (51)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Sb-124	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sb-125	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sb-126	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Sc-44	Scandium (21)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Sc-46	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sc-47	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sc-48	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Se-75	Selenium (34)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Se-79	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Si-31	Silicon (14)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Si-32	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sm-145	Samarium (62)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Sm-147	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Sm-151	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Sm-153	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sn-113	Tin (50)	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Sn-117m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sn-119m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Sn-121m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Sn-123	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sn-125	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Sn-126	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Sr-82	Strontium (38)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Sr-85	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sr-85m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Sr-87m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sr-89	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Sr-90 (b)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>



Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Sr-91	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Sr-92	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
T(H-3)	Tritium (1)	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Ta-178 (long-lived)	Tantalum (73)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Ta-179	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Ta-182	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Tb-157	Terbium (65)	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Tb-158	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tb-160	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tc-95m	Technetium (43)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tc-96	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tc-96m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Tc-97	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
Tc-97m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Tc-98	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tc-99	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Tc-99m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Te-121	Tellurium (52)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Te-121m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Te-123m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Te-125m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Te-127	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Te-127m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Te-129	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Te-129m	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Te-131m	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Te-132	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Th-227	Thorium (90)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Th-228 (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Th-229 (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Th-230	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Th-231	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Th-232	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Th-234 (b)	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Th (nat) (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
Ti-44	Titanium (22)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Tl-200	Thallium (81)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tl-201	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tl-202	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tl-204	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Tm-167	Thulium (69)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tm-170	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Tm-171	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>8</sup>	2.7X10 <sup>-3</sup>
U-230 (fast lung absorption) (b), (d)	Uranium (92)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
U-230 (medium lung absorption) (e)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-230 (slow lung absorption) (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
U-232 (fast lung absorption) (b), (d)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
U-232 (medium lung absorption) (e)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-232 (slow lung absorption) (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-233 (fast lung absorption) (d)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-233 (medium lung absorption) (e)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
U-233 (slow lung absorption) (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
U-234 (fast lung absorption) (d)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-234 (medium lung absorption) (e)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
U-234 (slow lung absorption) (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
U-235 (all lung absorption types) (b), (d), (e), (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-236 (fast lung absorption) (d)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-236 (medium lung absorption) (e)	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
U-236 (slow lung absorption) (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U-238 (all lung absorption types) (b), (d), (e), (f)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
U (nat) (b)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
U (enriched to 20% or less) (g)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
U (dep)	-	1.0	2.7X10 <sup>-11</sup>	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>
V-48	Vanadium (23)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
V-49	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
W-178	Tungsten (74)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
W-181	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
W-185	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
W-187	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
W-188	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Xe-122	Xenon (54)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Xe-123	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>9</sup>	2.7X10 <sup>-2</sup>
Xe-127	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Xe-131m	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Xe-133	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>
Xe-135	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>10</sup>	2.7X10 <sup>-1</sup>
Y-87	Yttrium (39)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Y-88	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Y-90	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Y-91	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Y-91m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Y-92	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Y-93	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>
Yb-169	Ytterbium (70)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Yb-175	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Zn-65	Zinc (30)	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Zn-69	-	1.0X10 <sup>4</sup>	2.7X10 <sup>-7</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Zn-69m	-	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Zr-88	Zirconium (40)	1.0X10 <sup>2</sup>	2.7X10 <sup>-9</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>
Zr-93 (b)	-	1.0X10 <sup>3</sup>	2.7X10 <sup>-8</sup>	1.0X10 <sup>7</sup>	2.7X10 <sup>-4</sup>
Zr-95	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>6</sup>	2.7X10 <sup>-5</sup>

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Zr-97 (b)	-	1.0X10 <sup>1</sup>	2.7X10 <sup>-10</sup>	1.0X10 <sup>5</sup>	2.7X10 <sup>-6</sup>

- (a) (Reserved)
- (b) Parent nuclides and their progeny included in secular equilibrium are listed as follows:
- |         |  |
|---------|--|
| Sr-90   | Y-90   |
| Zr-93   | Nb-93m   |
| Zr-97   | Nb-97  |
| Ru-106  | Rh-106   |
| Ag-108m | Ag-108   |
| Cs-137  | Ba-137m  |
| Ce-144  | Pr-144   |
| Ba-140  | La-140   |
| Bi-212  | Tl-208 (0.36), Po-212 (0.64)   |
| Pb-210  | Bi-210, Po-210   |
| Pb-212  | Bi-212, Tl-208 (0.36), Po-212 (0.64)   |
| Rn-222  | Po-218, Pb-214, Bi-214, Po-214   |
| Ra-223  | Rn-219, Po-215, Pb-211, Bi-211, Tl-207   |
| Ra-224  | Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)   |
| Ra-226  | Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210   |
| Ra-228  | Ac-228   |
| Th-228  | Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)                                   |
| Th-229  | Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209   |
| Th-nat  | Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)           |
| Th-234  | Pa-234m  |
| U-230   | Th-226, Ra-222, Rn-218, Po-214   |
| U-232   | Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)                           |
| U-235   | Th-231   |
| U-238   | Th-234, Pa-234m  |
| U-nat   | Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210 |
| Np-237  | Pa-233   |
| Am-242m | Am-242   |
| Am-243  | Np-239   |
- (c) (Reserved)
- (d) These values apply only to compounds of uranium that take the chemical form of UF<sub>6</sub>, UO<sub>2</sub>F<sub>2</sub> and UO<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub> in both normal and accident conditions of transport.
- (e) These values apply only to compounds of uranium that take the chemical form of UO<sub>3</sub>, UF<sub>4</sub>, UCl<sub>4</sub> and hexavalent compounds in both normal and accident conditions of transport.
- (f) These values apply to all compounds of uranium other than those specified in notes (d) and (e) of this table.
- (g) These values apply to unirradiated uranium only.

Table A-3. General Values for A1 and A2

Contents	A <sub>1</sub>		A <sub>2</sub>		Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limits for exempt consignments (Bq)	Activity limits for exempt consignments (Ci)
	(TBq)	(Ci)	(TBq)	(Ci)				
Only beta or gamma emitting radionuclides are known to be present	1 x 10 <sup>-1</sup>	2.7 x 10 <sup>0</sup>	2 x 10 <sup>-2</sup>	5.4 x 10 <sup>-1</sup>	1 x 10 <sup>1</sup>	2.7 x 10 <sup>-10</sup>	1 x 10 <sup>4</sup>	2.7 x 10 <sup>-7</sup>
Alpha emitting nuclides, but no neutron emitters, are known to be present (a)	2 x 10 <sup>-1</sup>	5.4 x 10 <sup>0</sup>	9 x 10 <sup>-5</sup>	2.4 x 10 <sup>-3</sup>	1 x 10 <sup>-1</sup>	2.7 x 10 <sup>-12</sup>	1 x 10 <sup>3</sup>	2.7 x 10 <sup>-8</sup>
Neutron emitting nuclides are known to be present or no relevant data are available	1 x 10 <sup>-3</sup>	2.7 x 10 <sup>-2</sup>	9 x 10 <sup>-5</sup>	2.4 x 10 <sup>-3</sup>	1 x 10 <sup>-1</sup>	2.7 x 10 <sup>-12</sup>	1 x 10 <sup>3</sup>	2.7 x 10 <sup>-8</sup>

- (a) If beta or gamma emitting nuclides are known to be present, the A<sub>1</sub> value of 0.1 TBq (2.7 Ci) should be used.

Table A-4. Activity-Mass Relationships for Uranium

Uranium Enrichment <sup>1</sup> wt % U-235 present	Specific Activity	
	TBq/g	Ci/g
0.45	1.8 x 10 <sup>-8</sup>	5.0 x 10 <sup>-7</sup>
0.72	2.6 x 10 <sup>-8</sup>	7.1 x 10 <sup>-7</sup>
1	2.8 x 10 <sup>-8</sup>	7.6 x 10 <sup>-7</sup>

Uranium Enrichment <sup>1</sup> wt % U-235 present	Specific Activity	
	TBq/g	Ci/g
1.5	$3.7 \times 10^{-8}$	$1.0 \times 10^{-6}$
5	$1.0 \times 10^{-7}$	$2.7 \times 10^{-6}$
10	$1.8 \times 10^{-7}$	$4.8 \times 10^{-6}$
20	$3.7 \times 10^{-7}$	$1.0 \times 10^{-5}$
35	$7.4 \times 10^{-7}$	$2.0 \times 10^{-5}$
50	$9.3 \times 10^{-7}$	$2.5 \times 10^{-5}$
90	$2.2 \times 10^{-6}$	$5.8 \times 10^{-5}$
93	$2.6 \times 10^{-6}$	$7.0 \times 10^{-5}$
95	$3.4 \times 10^{-6}$	$9.1 \times 10^{-5}$

<sup>1</sup> The figures for uranium include representative values for the activity of the uranium-234 that is concentrated during the enrichment process.