

PART T**TRANSPORTATION OF RADIOACTIVE MATERIAL**Sec. T.1 - Purpose and Scope.

- a. The regulations in this Part establish requirements for packaging, preparation for shipment, and transportation of radioactive material;
- b. The packaging and transport of radioactive material are also subject to other Parts of these regulations and to the regulations of other agencies (such as the United States Department of Transportation, the United States Postal Service and the United States Nuclear Regulatory Commission) having jurisdiction over means of transport. The requirements of this Part are in addition to, and not in substitution for, other requirements.
- c. This Part applies to any licensee authorized by specific or general license issued to receive, possess, use, or transfer licensed material, if the licensee delivers that material to a carrier for transport, transports the material outside the site of usage as specified in the license, or transports that material on public highways. No provision of this Part authorizes possession of licensed material.
- d. Exemptions from the requirement for license are specified in T.4. General licenses for which no package approval is required are issued in T.8 through T.10. The general license in T.7 requires that a United States Nuclear Regulatory Commission certificate of compliance or other package approval be issued for the package to be used under the general license. The transport of licensed material or delivery of licensed material to a carrier for transport is subject to the operating controls and procedures requirements of T.15 through T.19, to the quality assurance requirements of T.20 and to the general provisions of rules T.1 through T.5, including referenced United States Department of Transportation regulations.
- e. These rules apply to any person required to obtain a certificate of compliance or an approved compliance plan from the United States Nuclear Regulatory Commission pursuant to 10 CFR 71 if the person delivers radioactive material to a common or contract carrier for transport or transports the material outside the confines of the person's plant or other authorized place of use.

Sec. T.2 - Definitions. As used in this Part, the following definitions apply:

"A₁" means the maximum activity of special form radioactive material permitted in a Type A package. This value is either listed in Tables A-1, A-1(Supplement) and A-3 in Appendix A of this Part, or may be derived in accordance with the procedures prescribed in Appendix A of this Part.

"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 Tables A-1, A-1 Supplement or A-3 in Appendix A of this Part, or may be derived in accordance with the procedures prescribed in Appendix A of this Part.

"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.

"Certificate of Compliance" (CoC) means the certificate issued by the U.S. Nuclear Regulatory Commission under subpart D of 10 CFR 71 which approves the design of a package for the transportation of radioactive material.

"Certificate Holder" means a person who has been issued a Certificate of Compliance or other package approval by the US Nuclear Regulatory Commission.

"Closed transport vehicle" means a transport vehicle equipped with a securely attached exterior enclosure that during normal transportation restricts the access of unauthorized persons to the cargo space containing the radioactive material. The enclosure may be either temporary or permanent but shall limit access from top, sides, and ends. In the case of packaged materials, it may be of the "see-through" type.

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

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

"Conveyance" means:

- (1) For transport by public highway or rail, any transport vehicle or large freight container;
- (2) 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
- (3) For transport by any aircraft.

"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 containing fissile material during transportation. Determination of the criticality safety index is described in T.9 and T.10 and 10 CFR 71.59.

"Depleted Uranium" means, the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium does not include special nuclear material.

"Deuterium" means, for the purposes of T.4 and T.9, deuterium and any deuterium compounds, including heavy water, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5000.

"Enriched Uranium" means, the source material uranium in which the isotope uranium-235 is greater than 0.711 weight percent of the total uranium present.

"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.

"Fissile material" means the radionuclides U-233, U-235, Pu-239, and Pu-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 T.4 and 10 CFR 71.15.

"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.

"Graphite" means, for the purposes of this Part, graphite with a boron equivalent content less than five parts per million and density greater than 1.5 grams per cubic centimeter.

"Highway Route Controlled Quantity (HRCQ)" means a quantity within a single package which exceeds:

- (1) 3,000 times the A_1 value of the radionuclides as specified in 49 CFR 173.435 for special form Class 7 (radioactive) material;
- (2) 3,000 times the A_2 value of the radionuclides as specified in 49 CFR 173.435 for normal form Class 7 (radioactive) material; or
- (3) 1,000 TBq (27,000 Ci), whichever is least.

"Indian tribe" means an Indian or Alaska 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.

"Low specific activity (LSA) material" means radioactive material with limited specific activity which is nonfissile or excepted under this Part 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:

- (1) LSA-I
 - (i) Uranium and thorium ores, concentrates of uranium and thorium ores, and other ores containing naturally occurring radioactive radionuclides which are not intended to be processed for the use of these radionuclides;
 - (ii) Solid unirradiated natural uranium or depleted uranium or natural thorium or their solid or liquid compounds or mixtures.
 - (iii) Radioactive material for which the A_2 value is unlimited; or

- (iv) Other radioactive material in which the radioactive material is distributed throughout and the estimated average specific activity does not exceed 30 times the value for exempt material activity concentrations determined under Appendix A.
- (2) LSA-II
- (i) Water with tritium concentration up to 0.8 TBq/L (20.0 Ci/L); or
 - (ii) Material in which the radioactive material is distributed throughout, and the average specific activity does not exceed 10^{-4} A₂/g for solids and gases, and 10^{-5} A₂/g for liquids.
- (3) LSA-III Solids, excluding powders, that satisfy the requirements of 10 CFR 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; for example, concrete, bitumen, or ceramic 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 7 days, would not exceed 0.1 A₂; and
 - (iii) The estimated average specific activity of the solid does not exceed 2×10^{-3} A₂/g.

"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 10 days.

"Natural thorium" means thorium with the naturally occurring distribution of thorium isotopes, which is essentially 100 weight percent thorium-232.

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

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

"Nuclear waste" means a quantity of source, byproduct or special nuclear material required to be in US Nuclear Regulatory Commission-approved specification packaging while transported to, through or across a state boundary to a disposal site, or to a collection point for transport to a disposal site.

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

- (1) 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.
- (2) 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 CFR Part 173.
- (3) Type B package means a Type B packaging together with its radioactive contents. On approval, 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/in²) gauge or a pressure relief device that would allow the release of radioactive material to the environment under the tests specified in 10 CFR 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 CFR Part 173. A Type B package approved before September 6, 1983, was designated only as Type B. Limitations on its use are specified in 10 CFR 71.19.

"Packaging" means the assembly of components necessary to ensure compliance with the packaging requirements of 49 CFR Part 173, Subpart I and 10 CFR 71. 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.

"Regulations of the US Department of Transportation" means the regulations in 49 CFR Parts 100-189 and Parts 390-397.

"Regulations of the US Nuclear Regulatory Commission" means the regulations in 10 CFR 71 for purposes of Part T.

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

- (1) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;
- (2) The piece or capsule has at least one dimension not less than 5 mm (0.2 in.); and
- (3) It satisfies the requirements of 10 CFR 71.75. A special form encapsulation designed in accordance with the requirements of 10 CFR 71.4 in effect on June 30, 1983 (see 10 CFR part 71, revised as of January 1, 1983), and constructed before July 1, 1985, and a special form encapsulation designed in accordance with the requirements of 10 CFR 71.4 in effect on March 31, 1996 (see 10 CFR part 71, revised as of January 1, 1983), and constructed before April 1, 1998, may continue to be used. Any other special form encapsulation must meet the specifications of this definition.

"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.

"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. An SCO must be in one of two groups with surface activity not exceeding the following limits:

- (1) SCO-I: A solid object on which:
 - (i) The non-fixed contamination on the accessible surface averaged over 300 cm^2 , (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm^2 ($10^{-4} \text{ } \mu\text{Ci/cm}^2$) for beta and gamma and low toxicity alpha emitters, or 0.4 Bq/cm^2 ($10^{-5} \text{ } \mu\text{Ci/cm}^2$) for all other alpha emitters;
 - (ii) The fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $4 \times 10^4 \text{ Bq/cm}^2$ ($1.0 \text{ } \mu\text{Ci/cm}^2$) for beta and gamma and low toxicity alpha emitters, or $4 \times 10^3 \text{ Bq/cm}^2$ ($0.1 \text{ } \mu\text{Ci/cm}^2$) for all other alpha emitters; and
 - (iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 , (or the area of the surface if less than 300 cm^2) does not exceed $4 \times 10^4 \text{ Bq/cm}^2$ ($1 \text{ } \mu\text{Ci/cm}^2$) for beta and gamma and low toxicity alpha emitters, or $4 \times 10^3 \text{ Bq/cm}^2$ ($0.1 \text{ } \mu\text{Ci/cm}^2$) for all other alpha emitters.
- (2) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:
 - (i) The non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 ($10^{-2} \text{ } \mu\text{Ci/cm}^2$) for beta and gamma and low toxicity alpha emitters or 40 Bq/cm^2 ($10^{-3} \text{ } \mu\text{Ci/cm}^2$) for all other alpha emitters;
 - (ii) The fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $8 \times 10^5 \text{ Bq/cm}^2$ ($20 \text{ } \mu\text{Ci/cm}^2$) for beta and gamma and low toxicity alpha emitters, or $8 \times 10^4 \text{ Bq/cm}^2$ ($2 \text{ } \mu\text{Ci/cm}^2$) for all other alpha emitters; and
 - (iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $8 \times 10^5 \text{ Bq/cm}^2$ ($20 \text{ } \mu\text{Ci/cm}^2$) for beta and gamma and low toxicity alpha emitters, or $8 \times 10^4 \text{ Bq/cm}^2$ ($2 \text{ } \mu\text{Ci/cm}^2$) for all other alpha emitters.

"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 feet) from the external surface of the package by 100, which is equivalent to the maximum radiation level in millirem per hour at 1 meter (3.3 feet).

"Tribal official" means the highest ranking individual that represents Tribal leadership, such as the Chief, President, or Tribal Council leadership.

"Type A package" means a packaging that, together with its radioactive contents limited to A_1 or A_2 as appropriate, meets the requirements of 49 CFR 173.410 and 173.412 and is designed to retain the integrity of containment and shielding required by this Part T under normal conditions of transport as demonstrated by the tests set forth in 49 CFR 173.465 or 173.466, as appropriate.

"Type A quantity" means a quantity of radioactive material, the aggregate radioactivity of which does not exceed A_1 for special form radioactive material or A_2 for normal form radioactive material, where A_1 and A_2 are given in Appendix A or may be determined by procedures described in Appendix A.

"Type B package" means a Type B packaging, that together with its radioactive contents, is designed to retain the integrity of containment and shielding required by 49 CFR 173 when subjected to the normal conditions of transport and hypothetical accident conditions set forth in 10 CFR 71.

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

"Unirradiated uranium" means uranium containing not more than 2×10^3 Bq (54 nCi) of plutonium per gram of uranium-235, not more than 9×10^6 Bq (243 μ Ci) of fission products per gram of uranium-235, and not more than 0.005 grams of uranium-236 per gram of uranium-235.

General Regulatory Provisions

Sec. T.3 - Requirement for License. No person shall transport radioactive material or deliver radioactive material to a carrier for transport except as authorized in a general or specific license issued by the Agency or as exempted in T.4.

Sec. T.4 - Exemptions.

- a. Common and contract carriers, freight forwarders, and warehouse workers who are subject to the requirements of the US Department of Transportation in 49 CFR 170 through 189 or the US Postal Service in the US Postal Service Domestic Mail Manual (DMM), Section C-023.9.0, and the US Postal Service, are exempt from the requirements of this Part to the extent that they transport or store radioactive material in the regular course of their carriage for others or storage incident thereto. Common and contract carriers who are not subject to the requirements of the US Department of Transportation or US Postal Service are subject to T.3 and other applicable requirements of these regulations.
- b. A licensee is exempt from the requirements of this Part with respect to shipment or carriage of the following low-level materials:

- i. Natural material and ores containing naturally occurring radionuclides that are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in Appendix A, Table A-2, of this Part.
 - ii. Materials for which the activity concentration is not greater than the activity concentration values specified in Appendix A, Table A-2 of this Part, or for which the consignment activity is not greater than the limit for an exempt consignment found in Appendix A, Table A-2 of this Part.
- c. Fissile materials meeting one of the following requirements are exempt from classification as fissile material and from the fissile material package standards of 10 CFR 71.55 and 10 CFR 71.59, but are subject to all other requirements of 10 CFR 71, except as noted.
- i. Individual package containing 2 grams or less of fissile material.
 - ii. 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.
 - iii. Low concentrations of solid fissile material commingled with solid nonfissile material, provided that there is at least 2000 grams of solid nonfissile material for every gram of fissile material and that there is no more than 180 grams of fissile material distributed within 360 kg of contiguous nonfissile 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 of solid nonfissile material.
 - iv. 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 present in the package is less than 5 percent of the uranium mass.
 - v. Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of two percent by mass, provided that:
 - (1) The total plutonium and uranium-233 content does not exceed 0.002 percent of the total mass of uranium;
 - (2) The nitrogen to uranium atomic ratio (N/U) is greater than or equal to 2.0; and
 - (3) The material must be contained in at least a DOT Type A package.

- vi. Plutonium with a total mass not more than 1000 grams, provided that: plutonium-239, plutonium-241, or any combination of these radionuclides, constitutes not more than 20 percent by mass of the total quantity of plutonium in the package.
- d. Any physician licensed by a State to dispense drugs in the practice of medicine is exempt from T.5 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 Part G, 10 CFR Part 35 or the equivalent Agreement State regulations.

Sec. T.5 - Transportation of Licensed Material.

- a. Each licensee who transports licensed material outside the site of usage, as specified in the Agency license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall:
 - i. Comply with the applicable requirements, appropriate to the mode of transport, of the regulations of the US Department of Transportation 49 CFR parts 107, 171 through 180, and 390 through 397; particularly the regulations of the US Department of Transportation in the following areas:
 - (1) Packaging - 49 CFR Part 173: Subparts A, B, and I.
 - (2) Marking and labeling - 49 CFR Part 172: Subpart D; §§ 172.400 through 172.407 and §§ 172.436 through 172.441 of Subpart E.
 - (3) Placarding - 49 CFR Part 172: Subpart F, especially §§ 172.500 through 172.519 and 172.556; and Appendices B and C.
 - (4) Accident reporting - 49 CFR Part 171: §§ 171.15 and 171.16.
 - (5) Shipping papers and emergency information - 49 CFR Part 172: Subpart C and Subpart G.
 - (6) Hazardous material employee training - 49 CFR Part 172: Subpart H.
 - (7) Security Plans - 49 CFR Part 172: subpart I.
 - (8) Hazardous material shipper/carrier registration - 49 CFR Part 107: Subpart G.
 - ii. The licensee shall also comply with applicable US Department of Transportation regulations pertaining to the following modes of transportation:
 - (1) Rail - 49 CFR Part 174: Subparts A through D and K.
 - (2) Air - 49 CFR Part 175.
 - (3) Vessel - 49 CFR Part 176: Subparts A through F and M.

- (4) Public Highway - 49 CFR Part 177 and Parts 390 through 397.
- iii. Assure that any special instructions needed to safely open the package are sent to or have been made available to the consignee in accordance with D.1906e of these regulations.
- b. If, for any reason, the regulations of the US Department of Transportation are not applicable to a shipment of licensed material, the licensee shall conform to the standards and requirements of T.5a. to the mode of transport to the same extent as if the shipment was subject to the Department of Transportation regulations. A request for modification, waiver, or exemption from these requirements, and any notification referred to in these requirements, shall be submitted in writing to the Agency.

General Licenses

Sec. T.6 - General Licenses for Carriers.

- a. A general license is hereby issued to any common or contract carrier not exempt under T.4 to receive, possess, transport, and store radioactive material in the regular course of their carriage for others or storage incident thereto, provided the transportation and storage is in accordance with the applicable requirements, appropriate to the mode of transport, of the US Department of Transportation relating to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting.^{1/}
- b. A general license is hereby issued to any private carrier to transport radioactive material, provided the transportation is in accordance with the applicable requirements, appropriate to the mode of transport, of the US Department of Transportation insofar as requirements relate to the loading and storage of packages, placarding of the transporting vehicle, and incident reporting.^{1/}
- c. Persons who transport radioactive material pursuant to the general licenses in T.6a. or T.6b. are exempt from the requirements of Parts D and J of these regulations to the extent that they transport radioactive material.

Sec. T.7 - General License: Nuclear Regulatory Commission-Approved Packages.

- a. A general license is hereby issued to any licensee to transport, or to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance, or other approval has been issued by the Nuclear Regulatory Commission.
- b. This general license applies only to a licensee who has a quality assurance program approved by the Nuclear Regulatory Commission as satisfying the provisions of subpart H of 10 CFR 71
- c. This general license applies only to a licensee who:

^{1/} Notification of an incident shall be filed with, or made to, the Agency as prescribed in 49 CFR, regardless of and in addition to notification made to the US Department of Transportation or other agencies.

- i. Has a copy of the specific license, certificate of compliance, or other approval by the Nuclear Regulatory Commission of the package and has the drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment;
 - ii. Complies with the terms and conditions of the license, certificate, or other approval by the Nuclear Regulatory Commission, as applicable, and the applicable requirements of this Part T;
 - iii. Prior to the licensee's first use of the package, submits in writing to attn: document control desk, director, spent fuel project office, office of nuclear material safety and safeguards, using an appropriate method listed in 10 C.F.R. 71.1(a), the licensee's name and license number and the package identification number specified in the package approval.
 - iv. Has a quality assurance program that complies with Subpart H of 10 CFR 71.
- d. The general license in T.7a. applies only when the package approval authorizes use of the package under this general license.
 - e. For a Type B or fissile material package, the design of which was approved by the Nuclear Regulatory Commission before April 1, 1996, the general license is subject to the additional restrictions of 10 CFR 71.19.

Sec. T.8 - General License: Use of Foreign Approved Package.

- a. A general license is issued to any licensee to transport, or to deliver to a carrier for transport, licensed material in a package the design of which has been approved in a foreign national competent authority certificate which has been revalidated by the US Department of Transportation as meeting the applicable requirements of 49 CFR 171.12.
- b. The general license applies only to shipments made to or from locations outside the United States.
- c. This general license applies only to a licensee who:
 - i. Has a quality assurance program approved by the United States Nuclear Regulatory Commission.
 - ii. Has a copy of the applicable certificate, the revalidation, and the drawings and other documents referenced in the certificate relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment; and
 - iii. Complies with the terms and conditions of the certificate and revalidation, and with the applicable requirements of this Part.

Sec. T.9 - General License: Fissile Material.

- a. A general license is hereby issued to any licensee 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 subparts E and F of 10 CFR 71; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).
- b. The general license applies only to a licensee who has a quality assurance program approved by the NRC as satisfying the provision of subpart H of 10 CFR 71.
- c. The general license applies only when a package's contents:
 - i. Contain no more than a Type A quantity of radioactive material; and
 - ii. Contain less than 500 total grams of beryllium, graphite, or hydrogenous material enriched in deuterium.
- d. The general license applies only to packages containing fissile material that are labeled with a CSI which:
 - i. Has been determined in accordance with T.9e.;
 - ii. Has a value less than or equal to 10.0; and
 - iii. For a shipment of multiple packages containing fissile material, the sum of the CSIs must be less than or equal to 50.0 (for shipment on a nonexclusive use conveyance) and less than or equal to 100.0 (for shipment on an exclusive use conveyance).
- e. i. The value for the CSI must be greater than or equal to the number calculated by the following equation:

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

- ii. The calculated CSI must be rounded up to the first decimal place;
- iii. The values of X, Y, and Z used in the CSI equation must be taken from Tables I or II, as appropriate;
- iv. If Table II 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
- v. Table I values for X, Y, and Z must be used to determine the CSI if:
 - (1) Uranium-233 is present in the package;
 - (2) The mass of plutonium exceeds one percent of the mass of uranium-235;
 - (3) The uranium is of unknown uranium-235 enrichment or greater than 24

weight percent enrichment; or

- (4) Substances having a moderating effectiveness (i.e., an average hydrogen density greater than H₂O [e.g., certain hydrocarbon oils or plastics]) are present in any form, except as polyethylene used for packing or wrapping.

TABLE I — Mass Limits for General License Packages Containing Mixed Quantities of Fissile Material or Uranium-235 of Unknown Enrichment per T.9e.

| Fissile Materials | Fissile material mass mixed with moderating substances having an average hydrogen density less than or equal to H ₂ O. (grams) | Fissile material mass mixed with moderating substances having an average hydrogen density greater than H ₂ O ^a . (grams) |
|--|---|--|
| ²³⁵ U (X) | 60 | 38 |
| ²³³ U (Y) | 43 | 27 |
| ²³⁹ Pu or ²⁴¹ Pu (Z) | 37 | 24 |

^aWhen 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 H₂O.

Table II Mass Limits for General License Packages Containing Uranium-235 of Known Enrichment per T.9e.

| Uranium enrichment in weight % U-235 not exceeding | Fissile material mass of U-235 (x) grams |
|--|--|
| 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 |
| 4 | 120 |
| 3.5 | 132 |
| 3 | 150 |
| 2.5 | 180 |
| 2 | 246 |
| 1.5 | 408 |
| 1.35 | 480 |
| 1 | 1020 |
| 0.92 | 1800 |

Sec. T.10 - General License: Plutonium-Beryllium Special Form Materials.

- a. A general license is issued to any licensee to transport fissile material in the form of plutonium-beryllium (Pu-Be) special form sealed sources, or to deliver Pu-Be sealed sources to a carrier for transport, if the material is shipped in accordance with this section. This material need not be contained in a package which meets the standards of subparts E and F of 10 CFR 71; however, the material must be contained in a Type A package. The Type A package must also meet the DOT requirements of 49 CFR 173.417(a).
- b. The general license applies only to a licensee who has a quality assurance program approved by the Nuclear Regulatory Commission as satisfying the provision of subpart H of 10 CFR 71.
- c. The general license applies when a package's contents:
 - i. Contain no more than a Type A quantity of material; and
 - ii. Contain less than 1000 grams of plutonium, provided that: plutonium-239, plutonium-241, or any combination of these radionuclides, constitutes less than 240 grams of the total quantity of plutonium in the package.
- d. The general license applies only to packages labeled with a CSI which:
 - i. Has been determined in accordance with T.10e.
 - ii. Has a value less than or equal to 100.0; and
 - iii. For a shipment of multiple packages containing Pu-Be sealed sources, the sum of the CSIs must be less than or equal to 50.0 (for shipment on a nonexclusive use conveyance) and to less than or equal to 100.0 (for shipment on an exclusive use conveyance).
- e.
 - i. The value for the CSI must be greater than or equal to the number calculated by the following equation:

$$\text{CSI} = 10 \left[\frac{\text{grams of } ^{239}\text{Pu} + \text{grams of } ^{241}\text{Pu}}{24} \right]; \text{ and}$$

- ii. The calculated CSI must be rounded up to the first decimal place.

Sec. T.11 - Reserved.**Operating Controls and Procedures**

Sec. T.12 - Assumptions as to Unknown Properties of Fissile Material. When the isotopic abundance, mass, concentration, degree of irradiation, degree of moderation, or other pertinent property of fissile material in any package is not known, the licensee shall package the fissile

material as if the unknown properties have credible values that will cause the maximum neutron multiplication.

Sec. T.13 - Preliminary Determinations. Prior to the first use of any packaging for the shipment of radioactive material:

- a. The licensee shall ascertain that there are no defects which could significantly reduce the effectiveness of the packaging;
- b. Where the maximum normal operating pressure will exceed 35 kilopascal (5 lbf/in²) gauge, the licensee shall test the containment system at an internal pressure at least 50 percent higher than the maximum normal operating pressure to verify the capability of that system to maintain its structural integrity at that pressure;
- c. The licensee shall determine that the packaging has been fabricated in accordance with the design approved by the Nuclear Regulatory Commission; and
- d. The licensee shall conspicuously and durably mark the packaging with its model number, serial number, gross weight, and a package identification number as assigned by the Nuclear Regulatory Commission.

Sec. T.14 - Routine Determinations. Prior to each shipment of licensed material, the licensee shall determine that:

- a. The package is proper for the contents to be shipped;
- b. The package is in unimpaired physical condition except for superficial defects such as marks or dents;
- c. Each closure device of the packaging, including any required gasket, is properly installed and secured and free of defects;
- d. Any system for containing liquid is adequately sealed and has adequate space or other specified provision for expansion of the liquid;
- e. Any pressure relief device is operable and set in accordance with written procedures;
- f. The package has been loaded and closed in accordance with written procedures;
- g. For fissile material, any moderator or neutron absorber, if required, is present and in proper condition;
- h. Any structural part of the package which could be used to lift or tie down the package during transport is rendered inoperable for that purpose unless it satisfies design requirements specified in 10 CFR 71.45;
- i. The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for transport must be kept as low as reasonably achievable. The level of

non-fixed radioactive contamination may not exceed the limits set forth in Table III and must be determined by either:

- i. Wiping an area of 300 cm² of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. The amount of radioactivity measured on any single wiping material, divided by the surface area wiped and divided by the efficiency of the wipe procedure (the fraction of removable contamination transferred from the surface to the absorbent material), may not exceed the limits set forth in Table III at any time during transport. For this purpose the actual wipe efficiency may be used, or the wipe efficiency may be assumed to be 0.10; or
 - ii. Alternatively, the level of non-fixed radioactive contamination may be determined by using other methods of equal or greater efficiency.
- j. Except as provided in T.14l. in the case of packages transported as exclusive use shipments by rail or public highway only, the removable (non-fixed) radioactive contamination on any package at any time during transport may not exceed ten times the levels prescribed in paragraph i of this section. The levels at the beginning of transport may not exceed the levels prescribed in paragraph i of this section.

TABLE III
NON-FIXED (REMOVABLE) EXTERNAL RADIOACTIVE
CONTAMINATION LIMITS for PACKAGES

| Contaminant | Maximum Permissible Limits | | |
|---|----------------------------|---------------------|---------------------|
| | Bq/cm ² | µCi/cm ² | dpm/cm ² |
| Beta and gamma emitters and low toxicity alpha emitters | 4 | 10 ⁻⁴ | 220 |
| All other alpha emitting radionuclides | 0.4 | 10 ⁻⁵ | 22 |

- k. Except as provided in T.14l., each transport vehicle used for transporting Class 7 (radioactive) materials as an exclusive use shipment that utilizes the provisions of T.14j. must be surveyed with appropriate radiation detection instruments after each use. A vehicle may not be returned to service until the radiation dose rate at each accessible surface is 0.005 mSv per hour (0.5 mrem per hour) or less, and there is no significant removable (non-fixed) radioactive surface contamination as specified in paragraph (i) of this section.
- l. T.14j. and T.14k. do not apply to any closed transport vehicle used solely for the transportation by highway or rail of Class 7 (radioactive) material packages with contamination levels that do not exceed 10 times the levels prescribed in T.14.i. if:

- i. A survey of the interior surfaces of the empty vehicle shows that the radiation dose rate at any point does not exceed 0.1 mSv per hour (10 mrem per hour) at the surface or 0.02 mSv per hour (2 mrem per hour) at 1 m (3.3 feet) from the surface;
 - ii. Each vehicle is stenciled with the words “For Radioactive Materials Use Only” in letters at least 76 millimeters (3 inches) high in a conspicuous place on both sides of the exterior of the vehicle;and
 - iii. Each vehicle is kept closed except for loading or unloading.
- m. Except as provided in paragraph (n) 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 external radiation levels will not exceed 2 mSv per hour (200 mrem/hr) at any point on the external surface of the package at any time during transportation. The transport index shall not exceed 10.0;
- n. A package that exceeds the radiation level limits specified in paragraph T.14m. 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:
- i. 2 mSv per hour (200 mrem/hr) on the external surface of the package unless the following conditions are met, in which case the limit is 10 mSv per hour (1000 mrem/hr);
 - (1) The shipment is made in a closed transport vehicle;
 - (2) Provisions are made to secure the package so that its position within the vehicle remains fixed during transportation; and
 - (3) There are no loading or unloading operations between the beginning and end of the transportation.
 - ii. 2 mSv per hour (200 mrem/hr) 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;
 - iii. 0.1 mSv per hour (10 mrem/hr) at any point 2 meters from the vertical planes represented by the outer lateral surfaces of the vehicle, or, in the case of a flat-bed style vehicle, at any point 2 meters from the vertical planes projected from the outer edges of the vehicle; and
 - iv. 0.02 mSv per hour (2 mrem/hr) in any normally occupied positions of the vehicle, except that this provision does not apply to private motor carriers when persons occupying these positions are provided with personnel radiation exposure monitoring devices.

- o. For shipments made under the provisions of T.14n., 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. 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.
- p. A package must be prepared for transport so that in still air at 38°Celsius (100°F) and in the shade, no accessible surface of a package would have a temperature exceeding 50°Celsius (122°F) in a nonexclusive use shipment or 85°Celsius (185°F) in an exclusive use shipment. Accessible package surface temperatures shall not exceed these limits at any time during transportation.

Sec. T.15 - Air Transport of Plutonium. Notwithstanding the provisions of any general licenses and notwithstanding any exemptions stated directly in this Part or included indirectly by citation of the US Department of Transportation regulations, as may be applicable, the licensee shall assure that plutonium in any form is not transported by air, or delivered to a carrier for air transport, unless:

- a. The plutonium is contained in a medical device designed for individual human application; or,
- b. The plutonium is contained in a material in which the specific activity is less than or equal to the activity concentration values for plutonium specified in Table A-2 of this chapter and in which the radioactivity is essentially uniformly distributed; or,
- c. The plutonium is shipped in a single package containing no more than an A₂ quantity of plutonium in any isotope or form and is shipped in accordance with T.5; or
- d. The plutonium is shipped in a package specifically authorized, in the certificate of compliance issued by the Nuclear Regulatory Commission for the shipment of plutonium by air, and the licensee requires, through special arrangement with the carrier, compliance with 49 CFR 175.704.

Sec. T.16 - Opening Instructions. Before delivery of a package to a carrier for transport, the licensee shall ensure that any special instructions needed to safely open the package have been sent to, or otherwise made available to, the consignee for the consignee's use in accordance with D.1906e., or equivalent state regulation.

Sec. T.17 - Shipment Records. Each licensee shall maintain for a period of 3 years after shipment a record of each shipment of licensed material not exempt under T.4, showing, where applicable:

- a. Identification of the packaging by model number and serial number;
- b. Verification that the packaging, as shipped, had no significant defect;

- c. Volume and identification of coolant;
- d. Type and quantity of licensed material in each package, and the total quantity of each shipment;
- e. Date of the shipment;
- f. Name and address of the transferee;
- g. Address to which the shipment was made; and
- h. Results of the determinations required by T.14 and by the conditions of the package approval.

Sec. T.18 - Reports. The licensee shall report to the Agency within 30 days:

- a. Any instance in which there is significant reduction in the effectiveness of any packaging during use;
- b. Details of any defects with safety significance in the packaging after first use, the means employed to repair the defects and prevent their recurrence; or
- c. Instances in which the conditions of approval in the certificate of compliance were not observed in making a shipment.

Sec. T.19 - Advance Notification of Shipment of Nuclear Waste.

- a.
 - i. Prior to the transport of any nuclear waste outside of the confines of the licensee's facility or other place of use or storage, or prior to the delivery of any nuclear waste to a carrier for transport, each licensee shall provide advance notification of such transport to the governor, or governor's designee,^{2/} of each state (list of names and mailing addresses is available from Director, Division of Intergovernmental Liaison and Rulemaking, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001) within or through which the waste will be transported.
 - ii. Prior to the transport of any nuclear waste outside of the confines of the licensee's facility or other place of use or storage, or prior to the delivery of any nuclear waste to a carrier for transport, each licensee shall provide advance notification of such transport to the Tribal official^{2/} of participating Tribes (list of names and mailing addresses is available from Director, Division of Intergovernmental Liaison and Rulemaking, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001) or the Tribal official's designee of the shipment of nuclear waste, within or across the boundary of the Tribe's reservation.

^{2/} The list was published in the Federal Register on June 30, 1995 (60 FR 34306) and will be published in the Federal Register annually on or about June 30 to reflect any changes in information.

- b. Advance notification is also required, other than for irradiated fuel, when:
- i. The nuclear waste is required to be in Type B packaging for transportation;
 - ii. The nuclear waste is being transported into, within, or through a state enroute to a disposal facility or to a collection point for transport to a disposal facility; and
 - iii. The quantity of licensed material in a single package exceeds the least of the following:
 - (1) 3000 times the A_1 value of the radionuclides as specified in Appendix A, Table A-1 for special form radioactive material;
 - (2) 3000 times the A_2 value of the radionuclides as specified in Appendix A, Table A-1 for normal form radioactive material; or
 - (3) 1000 TBq (27,000 Ci).
- c. Each advance notification required by T.19.a. and T.19.b. shall contain the following information:
- i. The name, address, and telephone number of the shipper, carrier, and receiver of the shipment;
 - ii. A description of the nuclear waste contained in the shipment as required by 49 CFR 172.202 and 172.203(d);
 - iii. The point of origin of the shipment and the 7-day period during which departure of the shipment is estimated to occur;
 - iv. The 7-day period during which arrival of the shipment at state boundaries or Tribal reservation boundaries is estimated to occur;
 - v. The destination of the shipment, and the 7-day period during which arrival of the shipment is estimated to occur; and
 - vi. A point of contact with a telephone number for current shipment information.
- d. The notification required by T.19a. and T.19b. shall be made in writing to:
- i. The office of each appropriate governor, or governor's designee,
 - ii. The office of each appropriate Tribal official or Tribal official's designee, and
 - iii. The appropriate state radiation control Agency^{3/}.

A notification delivered by mail must be postmarked at least 7 days before the beginning of

^{3/}Optional

- the 7-day period during which departure of the shipment is estimated to occur. A notification delivered by any other means than mail must reach the office of the governor or governor's designee or the Tribal official or Tribal official's designee at least 4 days before the beginning of the 7-day period during which departure of the shipment is estimated to occur. A copy of the notification shall be retained by the licensee for 3 years.
- e. Revisions: The licensee shall notify each appropriate governor or governor's designee or a Tribal official or Tribal official's designee, and the Agency of any changes to schedule information provided pursuant to T.19a. and T.19b. Such notification shall be by telephone to a responsible individual in the office of the governor of the State(s) or governor's designee, or the Tribal official or the Tribal official's designee providing the official with the pertinent information about the delay. The licensee shall maintain for 3 years a record of the name of the individual contacted.
- f. Cancellations: Each licensee who cancels a nuclear waste shipment, for which advance notification has been sent, shall send a cancellation notice, identifying the advance notification that is being canceled, to the governor of each State, or governor's designee previously notified, each Tribal official or to the Tribal official's designee previously notified and to the Agency. A copy of the notice shall be retained by the licensee for 3 years.

Quality Assurance

Sec. T.20 - Quality Assurance Requirements.

- a. This Part describes quality assurance requirements applying to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of components of packaging that are important to safety. As used in this Part, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a system or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of the material or component to predetermined requirements. The licensee, certificate holder, and applicant for a certificate of compliance (CoC) are responsible for the quality assurance requirements as they apply to design, fabrication, testing, and modification of packaging. Each licensee is responsible for the quality assurance provision which applies to its use of a packaging for the shipment of licensed material subject to this Part.
- b. Each licensee, certificate holder, and applicant for a CoC shall establish, maintain, and execute a quality assurance program satisfying each of the applicable criteria of 10 C.F.R. 71.101 through 71.137 and satisfying any specific provisions that are applicable to the licensee's activities including procurement of packaging. The licensee, certificate holder, and applicant for a CoC shall execute the applicable criteria in a graded approach to an extent that is commensurate with the quality assurance requirement's importance to safety.
- c. Before the use of any package for the shipment of licensed material subject to this Part, each licensee shall obtain United States Nuclear Regulatory Commission approval of its quality assurance program.

- d. A program for transport container inspection and maintenance limited to radiographic exposure devices, source changers, or packages transporting these devices and meeting the requirements of Part E.12 of these regulations, NRC or equivalent Agreement State requirements is deemed to satisfy the requirements of T.7b. and T.20b.
- e. The licensee, certificate holder, and applicant for a CoC shall be responsible for the establishment and execution of the quality assurance program. The licensee, certificate holder, and applicant for a CoC may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part of the quality assurance program, but shall retain responsibility for the program. The licensee shall clearly establish and delineate, in writing, the authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions. While the term licensee is used in these criteria, the requirements are applicable to whatever design, fabrication, assembly, and testing of the package is accomplished with respect to a package before the time a package approval is issued.
- f. The quality assurance functions are:
 - i. Assuring that an appropriate quality assurance program is established and effectively executed; and
 - ii. Verifying, by procedures such as checking, auditing, and inspection, that activities affecting the safety-related functions have been performed correctly.
- g. The persons and organizations performing quality assurance functions must have sufficient authority and organizational freedom to:
 - i. Identify quality problems;
 - ii. Initiate, recommend, or provide solutions; and
 - iii. Verify implementation of solutions.

PART T

APPENDIX A

DETERMINATION OF A₁ AND A₂

- I. Values of A₁ and A₂ for individual radionuclides, which are the bases for many activity limits elsewhere in these regulations, are given in TABLE A-1. 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.
- II. (a) For individual radionuclides whose identities are known, but which are not listed in TABLE A-1, the A₁ and A₂ values contained in Table A-3 may be used. Otherwise, the licensee shall obtain prior Agency approval of the A₁ and A₂ values for radionuclides not listed in Table A-1, before shipping the material.
- (b) For individual radionuclides whose identities are known, but which are not listed in Table A-2, the exempt material activity concentration and exempt consignment activity values contained in Table A-3 may be used. Otherwise, the licensee shall obtain prior Agency approval of the exempt material activity concentration and exempt consignment activity values for radionuclides not listed in Table A-2, before shipping the material.
- (c) The licensee shall submit requests for prior approval, described under paragraphs II(a) and II(b) of this Appendix, to the Agency, in accordance with Part A.12 of these regulations.
- III. In the calculations of A₁ and A₂ for a radionuclide not in Table A-1, a single radioactive decay chain, in which radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days, or longer than that of the parent nuclide, 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 nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days, or greater than that of the parent nuclide, the parent and those daughter nuclides shall be considered as mixtures of different nuclides.
- IV. 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 and $A_1(i)$ is the A_1 value for radionuclide I.

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

$$\sum B(i) / A_2(i) \leq 1$$

where $B(i)$ is the activity of radionuclide I and $A_2(i)$ is the A_2 values for radionuclide I.

- (c) Alternatively, an A_1 value for mixtures of special form material may be determined as follows:

$$A_1 \text{ for mixtures} = \frac{1}{\sum_I \frac{f(i)}{A_1(i)}}$$

where $f(i)$ is the fraction of activity of nuclide I in the mixture and $A_1(i)$ is the appropriate A_1 value for nuclide I.

- (d) Alternatively, the A_2 value for mixtures of normal form material may be determined as follows:

$$A_2 \text{ for mixtures} = \frac{1}{\sum_I \frac{f(i)}{A_2(i)}}$$

where $f(i)$ is the fraction of activity of nuclide I in the mixture and $A_2(i)$ is the appropriate A_2 value for nuclide I.

- (e) 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 $[A]$ is the activity concentration for exempt material containing radionuclide I.

- (f) 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 is the activity limit for exempt consignments for radionuclide I.

- V. 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_1 or A_2 value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paragraph IV. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest A_1 or A_2 values for the alpha emitters and beta/gamma emitters.

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Ac-225 (a) | Actinium (89) | 8.0X10 ⁻¹ | 2.2X10 ¹ | 6.0X10 ⁻³ | 1.6X10 ⁻¹ | 2.1X10 ³ | 5.8X10 ⁴ |
| Ac-227 (a) | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 9.0X10 ⁻⁵ | 2.4X10 ⁻³ | 2.7 | 7.2X10 ¹ |
| Ac-228 | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 8.4X10 ⁴ | 2.2X10 ⁶ |
| Ag-105 | Silver (47) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 1.1X10 ³ | 3.0X10 ⁴ |
| Ag-108m (a) | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 9.7X10 ⁻¹ | 2.6X10 ¹ |
| Ag-110m (a) | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.8X10 ² | 4.7X10 ³ |
| Ag-111 | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 5.8X10 ³ | 1.6X10 ⁵ |
| Al-26 | Aluminum (13) | 1.0X10 ⁻¹ | 2.7 | 1.0X10 ⁻¹ | 2.7 | 7.0X10 ⁻⁴ | 1.9X10 ⁻² |
| Am-241 | Americium (95) | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 1.3X10 ⁻¹ | 3.4 |
| Am-242m (a) | | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 3.6X10 ⁻¹ | 1.0X10 ¹ |
| Am-243 (a) | | 5.0 | 1.4X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 7.4X10 ⁻³ | 2.0X10 ⁻¹ |
| Ar-37 | Argon (18) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 3.7X10 ³ | 9.9X10 ⁴ |
| Ar-39 | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ¹ | 5.4X10 ² | 1.3 | 3.4X10 ¹ |
| Ar-41 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.5X10 ⁶ | 4.2X10 ⁷ |
| As-72 | Arsenic (33) | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 6.2X10 ⁴ | 1.7X10 ⁶ |
| As-73 | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 8.2X10 ² | 2.2X10 ⁴ |
| As-74 | | 1.0 | 2.7X10 ¹ | 9.0X10 ⁻¹ | 2.4X10 ¹ | 3.7X10 ³ | 9.9X10 ⁴ |
| As-76 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 5.8X10 ⁴ | 1.6X10 ⁶ |
| As-77 | | 2.0X10 ¹ | 5.4X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 3.9X10 ⁴ | 1.0X10 ⁶ |
| At-211 (a) | Astatine (85) | 2.0X10 ¹ | 5.4X10 ² | 5.0X10 ⁻¹ | 1.4X10 ¹ | 7.6X10 ⁴ | 2.1X10 ⁶ |
| Au-193 | Gold (79) | 7.0 | 1.9X10 ² | 2.0 | 5.4X10 ¹ | 3.4X10 ⁴ | 9.2X10 ⁵ |
| Au-194 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 1.5X10 ⁴ | 4.1X10 ⁵ |
| Au-195 | | 1.0X10 ¹ | 2.7X10 ² | 6.0 | 1.6X10 ² | 1.4X10 ² | 3.7X10 ³ |
| Au-198 | | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 9.0X10 ³ | 2.4X10 ⁵ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Au-199 | | 1.0X10 ¹ | 2.7X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 7.7X10 ³ | 2.1X10 ⁵ |
| Ba-131 (a) | Barium (56) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 3.1X10 ³ | 8.4X10 ⁴ |
| Ba-133 | | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 9.4 | 2.6X10 ² |
| Ba-133m | | 2.0X10 ¹ | 5.4X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.2X10 ⁴ | 6.1X10 ⁵ |
| Ba-140 (a) | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 3.0X10 ⁻¹ | 8.1 | 2.7X10 ³ | 7.3X10 ⁴ |
| Be-7 | Beryllium (4) | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ¹ | 5.4X10 ² | 1.3X10 ⁴ | 3.5X10 ⁵ |
| Be-10 | | 4.0X10 ¹ | 1.1X10 ³ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 8.3X10 ⁻⁴ | 2.2X10 ⁻² |
| Bi-205 | Bismuth (83) | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 1.5X10 ³ | 4.2X10 ⁴ |
| Bi-206 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 3.8X10 ³ | 1.0X10 ⁵ |
| Bi-207 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 1.9 | 5.2X10 ¹ |
| Bi-210 | | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 4.6X10 ³ | 1.2X10 ⁵ |
| Bi-210m (a) | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 2.1X10 ⁻⁵ | 5.7X10 ⁻⁴ |
| Bi-212 (a) | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 5.4X10 ⁵ | 1.5X10 ⁷ |
| Bk-247 | Berkelium (97) | 8.0 | 2.2X10 ² | 8.0X10 ⁻⁴ | 2.2X10 ⁻² | 3.8X10 ⁻² | 1.0 |
| Bk-249 (a) | | 4.0X10 ¹ | 1.1X10 ³ | 3.0X10 ⁻¹ | 8.1 | 6.1X10 ¹ | 1.6X10 ³ |
| Br-76 | Bromine (35) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 9.4X10 ⁴ | 2.5X10 ⁶ |
| Br-77 | | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 2.6X10 ⁴ | 7.1X10 ⁵ |
| Br-82 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁴ | 1.1X10 ⁶ |
| C-11 | Carbon (6) | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.1X10 ⁷ | 8.4X10 ⁸ |
| C-14 | | 4.0X10 ¹ | 1.1X10 ³ | 3.0 | 8.1X10 ¹ | 1.6X10 ⁻¹ | 4.5 |
| Ca-41 | Calcium (20) | Unlimited | Unlimited | Unlimited | Unlimited | 3.1X10 ⁻³ | 8.5X10 ⁻² |
| Ca-45 | | 4.0X10 ¹ | 1.1X10 ³ | 1.0 | 2.7X10 ¹ | 6.6X10 ² | 1.8X10 ⁴ |
| Ca-47 (a) | | 3.0 | 8.1X10 ¹ | 3.0X10 ⁻¹ | 8.1 | 2.3X10 ⁴ | 6.1X10 ⁵ |
| Cd-109 | Cadmium (48) | 3.0X10 ¹ | 8.1X10 ² | 2.0 | 5.4X10 ¹ | 9.6X10 ¹ | 2.6X10 ³ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Cd-113m | | 4.0X10 ¹ | 1.1X10 ³ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 8.3 | 2.2X10 ² |
| Cd-115 (a) | | 3.0 | 8.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.9X10 ⁴ | 5.1X10 ⁵ |
| Cd-115m | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 9.4X10 ² | 2.5X10 ⁴ |
| Ce-139 | Cerium (58) | 7.0 | 1.9X10 ² | 2.0 | 5.4X10 ¹ | 2.5X10 ² | 6.8X10 ³ |
| Ce-141 | | 2.0X10 ¹ | 5.4X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.1X10 ³ | 2.8X10 ⁴ |
| Ce-143 | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.5X10 ⁴ | 6.6X10 ⁵ |
| Ce-144 (a) | | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 1.2X10 ² | 3.2X10 ³ |
| Cf-248 | Californium (98) | 4.0X10 ¹ | 1.1X10 ³ | 6.0X10 ⁻³ | 1.6X10 ⁻¹ | 5.8X10 ¹ | 1.6X10 ³ |
| Cf-249 | | 3.0 | 8.1X10 ¹ | 8.0X10 ⁻⁴ | 2.2X10 ⁻² | 1.5X10 ⁻¹ | 4.1 |
| Cf-250 | | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ⁻³ | 5.4X10 ⁻² | 4.0 | 1.1X10 ² |
| Cf-251 | | 7.0 | 1.9X10 ² | 7.0X10 ⁻⁴ | 1.9X10 ⁻² | 5.9X10 ⁻² | 1.6 |
| Cf-252 (h) | | 1.0X10 ⁻¹ | 2.7 | 1.0X10 ⁻³ | 2.7X10 ⁻² | 2.0X10 ¹ | 5.4X10 ² |
| Cf-253 (a) | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ⁻² | 1.1 | 1.1X10 ³ | 2.9X10 ⁴ |
| Cf-254 | | 1.0X10 ⁻³ | 2.7X10 ⁻² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 3.1X10 ² | 8.5X10 ³ |
| Cl-36 | Chlorine (17) | 1.0X10 ¹ | 2.7X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.2X10 ⁻³ | 3.3X10 ⁻² |
| Cl-38 | | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 4.9X10 ⁶ | 1.3X10 ⁸ |
| Cm-240 | Curium (96) | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 7.5X10 ² | 2.0X10 ⁴ |
| Cm-241 | | 2.0 | 5.4X10 ¹ | 1.0 | 2.7X10 ¹ | 6.1X10 ² | 1.7X10 ⁴ |
| Cm-242 | | 4.0X10 ¹ | 1.1X10 ³ | 1.0X10 ⁻² | 2.7X10 ⁻¹ | 1.2X10 ² | 3.3X10 ³ |
| Cm-243 | | 9.0 | 2.4X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 1.9X10 ⁻³ | 5.2X10 ¹ |
| Cm-244 | | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ⁻³ | 5.4X10 ⁻² | 3.0 | 8.1X10 ¹ |
| Cm-245 | | 9.0 | 2.4X10 ² | 9.0X10 ⁻⁴ | 2.4X10 ⁻² | 6.4X10 ⁻³ | 1.7X10 ⁻¹ |
| Cm-246 | | 9.0 | 2.4X10 ² | 9.0X10 ⁻⁴ | 2.4X10 ⁻² | 1.1X10 ⁻² | 3.1X10 ⁻¹ |
| Cm-247 (a) | | 3.0 | 8.1X10 ¹ | 1.0X10 ⁻³ | 2.7X10 ⁻² | 3.4X10 ⁻⁶ | 9.3X10 ⁻⁵ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Cm-248 | | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 3.0X10 ⁻⁴ | 8.1X10 ⁻³ | 1.6X10 ⁻⁴ | 4.2X10 ⁻³ |
| Co-55 | Cobalt (27) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 1.1X10 ⁵ | 3.1X10 ⁶ |
| Co-56 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.1X10 ³ | 3.0X10 ⁴ |
| Co-57 | | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ¹ | 2.7X10 ² | 3.1X10 ² | 8.4X10 ³ |
| Co-58 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 1.2X10 ³ | 3.2X10 ⁴ |
| Co-58m | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 2.2X10 ⁵ | 5.9X10 ⁶ |
| Co-60 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.2X10 ¹ | 1.1X10 ³ |
| Cr-51 | | Chromium (24) | 3.0X10 ¹ | 8.1X10 ² | 3.0X10 ¹ | 8.1X10 ² | 3.4X10 ³ |
| Cs-129 | Cesium (55) | 4.0 | 1.1X10 ² | 4.0 | 1.1X10 ² | 2.8X10 ⁴ | 7.6X10 ⁵ |
| Cs-131 | | 3.0X10 ¹ | 8.1X10 ² | 3.0X10 ¹ | 8.1X10 ² | 3.8X10 ³ | 1.0X10 ⁵ |
| Cs-132 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 5.7X10 ³ | 1.5X10 ⁵ |
| Cs-134 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 4.8X10 ¹ | 1.3X10 ³ |
| Cs-134m | | 4.0X10 ¹ | 1.1X10 ³ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.0X10 ⁵ | 8.0X10 ⁶ |
| Cs-135 | | 4.0X10 ¹ | 1.1X10 ³ | 1.0 | 2.7X10 ¹ | 4.3X10 ⁻⁵ | 1.2X10 ⁻³ |
| Cs-136 | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 2.7X10 ³ | 7.3X10 ⁴ |
| Cs-137 (a) | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.2 | 8.7X10 ¹ |
| Cu-64 | | Copper (29) | 6.0 | 1.6X10 ² | 1.0 | 2.7X10 ¹ | 1.4X10 ⁵ |
| Cu-67 | 1.0X10 ¹ | | 2.7X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 2.8X10 ⁴ | 7.6X10 ⁵ |
| Dy-159 | Dysprosium (66) | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ¹ | 5.4X10 ² | 2.1X10 ² | 5.7X10 ³ |
| Dy-165 | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.0X10 ⁵ | 8.2X10 ⁶ |
| Dy-166 (a) | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 3.0X10 ⁻¹ | 8.1 | 8.6X10 ³ | 2.3X10 ⁵ |
| Er-169 | Erbium (68) | 4.0X10 ¹ | 1.1X10 ³ | 1.0 | 2.7X10 ¹ | 3.1X10 ³ | 8.3X10 ⁴ |
| Er-171 | | 8.0X10 ⁻¹ | 2.2X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 9.0X10 ⁴ | 2.4X10 ⁶ |
| Eu-147 | | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 1.4X10 ³ | 3.7X10 ⁴ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Eu-148 | Europium (63) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 6.0X10 ² | 1.6X10 ⁴ |
| Eu-149 | | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ¹ | 5.4X10 ² | 3.5X10 ² | 9.4X10 ³ |
| Eu-150 (short lived) | | 2.0 | 5.4X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 6.1X10 ⁴ | 1.6X10 ⁶ |
| Eu-150 (long lived) | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 6.1X10 ⁴ | 1.6X10 ⁶ |
| Eu-152 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 6.5 | 1.8X10 ² |
| Eu-152m | | 8.0X10 ⁻¹ | 2.2X10 ¹ | 8.0X10 ⁻¹ | 2.2X10 ¹ | 8.2X10 ⁴ | 2.2X10 ⁶ |
| Eu-154 | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 9.8 | 2.6X10 ² |
| Eu-155 | | 2.0X10 ¹ | 5.4X10 ² | 3.0 | 8.1X10 ¹ | 1.8X10 ¹ | 4.9X10 ² |
| Eu-156 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 2.0X10 ³ | 5.5X10 ⁴ |
| F-18 | Fluorine (9) | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.5X10 ⁶ | 9.5X10 ⁷ |
| Fe-52 (a) | Iron (26) | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 2.7X10 ⁵ | 7.3X10 ⁶ |
| Fe-55 | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 8.8X10 ¹ | 2.4X10 ³ |
| Fe-59 | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 9.0X10 ⁻¹ | 2.4X10 ¹ | 1.8X10 ³ | 5.0X10 ⁴ |
| Fe-60 (a) | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻¹ | 5.4 | 7.4X10 ⁻⁴ | 2.0X10 ⁻² |
| Ga-67 | Gallium (31) | 7.0 | 1.9X10 ² | 3.0 | 8.1X10 ¹ | 2.2X10 ⁴ | 6.0X10 ⁵ |
| Ga-68 | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 1.5X10 ⁶ | 4.1X10 ⁷ |
| Ga-72 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.1X10 ⁵ | 3.1X10 ⁶ |
| Gd-146 (a) | Gadolinium (64) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 6.9X10 ² | 1.9X10 ⁴ |
| Gd-148 | | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ⁻³ | 5.4X10 ⁻² | 1.2 | 3.2X10 ¹ |
| Gd-153 | | 1.0X10 ¹ | 2.7X10 ² | 9.0 | 2.4X10 ² | 1.3X10 ² | 3.5X10 ³ |
| Gd-159 | | 3.0 | 8.1X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.9X10 ⁴ | 1.1X10 ⁶ |
| Ge-68 (a) | Germanium (32) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 2.6X10 ² | 7.1X10 ³ |
| Ge-71 | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 5.8X10 ³ | 1.6X10 ⁵ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) | |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|---------------------|
| Ge-77 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.3X10 ⁵ | 3.6X10 ⁶ | |
| Hf-172 (a) | Hafnium (72) | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 4.1X10 ¹ | 1.1X10 ³ | |
| Hf-175 | | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 3.9X10 ² | 1.1X10 ⁴ | |
| Hf-181 | | 2.0 | 5.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 6.3X10 ² | 1.7X10 ⁴ | |
| Hf-182 | | Unlimited | Unlimited | Unlimited | Unlimited | 8.1X10 ⁻⁶ | 2.2X10 ⁻⁴ | |
| Hg-194 (a) | Mercury (80) | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 1.3X10 ⁻¹ | 3.5 | |
| Hg-195m (a) | | 3.0 | 8.1X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 1.5X10 ⁴ | 4.0X10 ⁵ | |
| Hg-197 | | 2.0X10 ¹ | 5.4X10 ² | 1.0X10 ¹ | 2.7X10 ² | 9.2X10 ³ | 2.5X10 ⁵ | |
| Hg-197m | | 1.0X10 ¹ | 2.7X10 ² | 4.0X10 ⁻¹ | 1.1X10 ¹ | 2.5X10 ⁴ | 6.7X10 ⁵ | |
| Hg-203 | | 5.0 | 1.4X10 ² | 1.0 | 2.7X10 ¹ | 5.1X10 ² | 1.4X10 ⁴ | |
| Ho-166 | Holmium (67) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 2.6X10 ⁴ | 7.0X10 ⁵ | |
| Ho-166m | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 6.6X10 ⁻² | 1.8 | |
| I-123 | Iodine (53) | 6.0 | 1.6X10 ² | 3.0 | 8.1X10 ¹ | 7.1X10 ⁴ | 1.9X10 ⁶ | |
| I-124 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 9.3X10 ³ | 2.5X10 ⁵ | |
| I-125 | | 2.0X10 ¹ | 5.4X10 ² | 3.0 | 8.1X10 ¹ | 6.4X10 ² | 1.7X10 ⁴ | |
| I-126 | | 2.0 | 5.4X10 ¹ | 1.0 | 2.7X10 ¹ | 2.9X10 ³ | 8.0X10 ⁴ | |
| I-129 | | Unlimited | Unlimited | Unlimited | Unlimited | 6.5X10 ⁻⁶ | 1.8X10 ⁻⁴ | |
| I-131 | | 3.0 | 8.1X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 4.6X10 ³ | 1.2X10 ⁵ | |
| I-132 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 3.8X10 ⁵ | 1.0X10 ⁷ | |
| I-133 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 4.2X10 ⁴ | 1.1X10 ⁶ | |
| I-134 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 9.9X10 ⁵ | 2.7X10 ⁷ | |
| I-135 (a) | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.3X10 ⁵ | 3.5X10 ⁶ | |
| In-111 | | Indium (49) | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 1.5X10 ⁴ | 4.2X10 ⁵ |
| In-113m | | | 4.0 | 1.1X10 ² | 2.0 | 5.4X10 ¹ | 6.2X10 ⁵ | 1.7X10 ⁷ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| In-114m (a) | | 1.0X10 ¹ | 2.7X10 ² | 5.0X10 ⁻¹ | 1.4X10 ¹ | 8.6X10 ⁻² | 2.3X10 ⁴ |
| In-115m | | 7.0 | 1.9X10 ² | 1.0 | 2.7X10 ¹ | 2.2X10 ⁻⁵ | 6.1X10 ⁶ |
| Ir-189 (a) | Iridium (77) | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ¹ | 2.7X10 ² | 1.9X10 ⁻³ | 5.2X10 ⁴ |
| Ir-190 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 2.3X10 ⁻³ | 6.2X10 ⁴ |
| Ir-192 (c) | | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.4X10 ⁻² | 9.2X10 ³ |
| Ir-194 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 3.1X10 ⁻⁴ | 8.4X10 ⁵ |
| K-40 | | Potassium (19) | 9.0X10 ⁻¹ | 2.4X10 ¹ | 9.0X10 ⁻¹ | 2.4X10 ¹ | 2.4X10 ⁻⁷ |
| K-42 | 2.0X10 ⁻¹ | | 5.4 | 2.0X10 ⁻¹ | 5.4 | 2.2X10 ⁻⁵ | 6.0X10 ⁶ |
| K-43 | 7.0X10 ⁻¹ | | 1.9X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.2X10 ⁻⁵ | 3.3X10 ⁶ |
| Kr-81 | Krypton (36) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 7.8X10 ⁻⁴ | 2.1X10 ⁻² |
| Kr-85 | | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ¹ | 2.7X10 ² | 1.5X10 ¹ | 3.9X10 ² |
| Kr-85m | | 8.0 | 2.2X10 ² | 3.0 | 8.1X10 ¹ | 3.0X10 ⁵ | 8.2X10 ⁶ |
| Kr-87 | | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 1.0X10 ⁶ | 2.8X10 ⁷ |
| La-137 | Lanthanum (57) | 3.0X10 ¹ | 8.1X10 ² | 6.0 | 1.6X10 ² | 1.6X10 ⁻³ | 4.4X10 ⁻² |
| La-140 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 2.1X10 ⁻⁴ | 5.6X10 ⁵ |
| Lu-172 | Lutetium (71) | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 4.2X10 ⁻³ | 1.1X10 ⁵ |
| Lu-173 | | 8.0 | 2.2X10 ² | 8.0 | 2.2X10 ² | 5.6X10 ⁻¹ | 1.5X10 ³ |
| Lu-174 | | 9.0 | 2.4X10 ² | 9.0 | 2.4X10 ² | 2.3X10 ⁻¹ | 6.2X10 ² |
| Lu-174m | | 2.0X10 ¹ | 5.4X10 ² | 1.0X10 ¹ | 2.7X10 ² | 2.0X10 ⁻² | 5.3X10 ³ |
| Lu-177 | | 3.0X10 ¹ | 8.1X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 4.1X10 ⁻³ | 1.1X10 ⁵ |
| Mg-28 (a) | Magnesium (12) | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 2.0X10 ⁻⁵ | 5.4X10 ⁶ |
| Mn-52 | Manganese (25) | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.6X10 ⁻⁴ | 4.4X10 ⁵ |
| Mn-53 | | Unlimited | Unlimited | Unlimited | Unlimited | 6.8X10 ⁻⁵ | 1.8X10 ⁻³ |
| Mn-54 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 2.9X10 ⁻² | 7.7X10 ³ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Mn-56 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 8.0X10 ⁵ | 2.2X10 ⁷ |
| Mo-93 | Molybdenum (42) | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ¹ | 5.4X10 ² | 4.1X10 ⁻² | 1.1 |
| Mo-99 (a) (h) | | 1.0 | 2.7X10 ¹ | 7.4X10 ⁻¹ | 2.0X10 ¹ | 1.8X10 ⁴ | 4.8X10 ⁵ |
| N-13 | Nitrogen (7) | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 5.4X10 ⁷ | 1.5X10 ⁹ |
| Na-22 | Sodium (11) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 2.3X10 ² | 6.3X10 ³ |
| Na-24 | | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 3.2X10 ⁵ | 8.7X10 ⁶ |
| Nb-93m | Niobium (41) | 4.0X10 ¹ | 1.1X10 ³ | 3.0X10 ¹ | 8.1X10 ² | 8.8 | 2.4X10 ² |
| Nb-94 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 6.9X10 ⁻³ | 1.9X10 ⁻¹ |
| Nb-95 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 1.5X10 ³ | 3.9X10 ⁴ |
| Nb-97 | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 9.9X10 ⁵ | 2.7X10 ⁷ |
| Nd-147 | Neodymium (60) | 6.0 | 1.6X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.0X10 ³ | 8.1X10 ⁴ |
| Nd-149 | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 4.5X10 ⁵ | 1.2X10 ⁷ |
| Ni-59 | Nickel (28) | Unlimited | Unlimited | Unlimited | Unlimited | 3.0X10 ⁻³ | 8.0X10 ⁻² |
| Ni-63 | | 4.0X10 ¹ | 1.1X10 ³ | 3.0X10 ¹ | 8.1X10 ² | 2.1 | 5.7X10 ¹ |
| Ni-65 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 7.1X10 ⁵ | 1.9X10 ⁷ |
| Np-235 | Neptunium (93) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 5.2X10 ¹ | 1.4X10 ³ |
| Np-236 (short-lived) | | 2.0X10 ¹ | 5.4X10 ² | 2.0 | 5.4X10 ¹ | 4.7X10 ⁻⁴ | 1.3X10 ⁻² |
| Np-236 (long-lived) | | 9.0X10 ⁰ | 2.4X10 ² | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 4.7X10 ⁻⁴ | 1.3X10 ⁻² |
| Np-237 | | 2.0X10 ¹ | 5.4X10 ² | 2.0X10 ⁻³ | 5.4X10 ⁻² | 2.6X10 ⁻⁵ | 7.1X10 ⁻⁴ |
| Np-239 | | 7.0 | 1.9X10 ² | 4.0X10 ⁻¹ | 1.1X10 ¹ | 8.6X10 ³ | 2.3X10 ⁵ |
| Os-185 | Osmium (76) | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 2.8X10 ² | 7.5X10 ³ |
| Os-191 | | 1.0X10 ¹ | 2.7X10 ² | 2.0 | 5.4X10 ¹ | 1.6X10 ³ | 4.4X10 ⁴ |
| Os-191m | | 4.0X10 ¹ | 1.1X10 ³ | 3.0X10 ¹ | 8.1X10 ² | 4.6X10 ⁴ | 1.3X10 ⁶ |
| Os-193 | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.0X10 ⁴ | 5.3X10 ⁵ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Os-194 (a) | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.1X10 ¹ | 3.1X10 ² |
| P-32 | Phosphorus (15) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 1.1X10 ⁴ | 2.9X10 ⁵ |
| P-33 | | 4.0X10 ¹ | 1.1X10 ³ | 1.0 | 2.7X10 ¹ | 5.8X10 ³ | 1.6X10 ⁵ |
| Pa-230 (a) | Protactinium (91) | 2.0 | 5.4X10 ¹ | 7.0X10 ⁻² | 1.9 | 1.2X10 ³ | 3.3X10 ⁴ |
| Pa-231 | | 4.0 | 1.1X10 ² | 4.0X10 ⁻⁴ | 1.1X10 ⁻² | 1.7X10 ⁻³ | 4.7X10 ⁻² |
| Pa-233 | | 5.0 | 1.4X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.7X10 ² | 2.1X10 ⁴ |
| Pb-201 | Lead (82) | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 6.2X10 ⁴ | 1.7X10 ⁶ |
| Pb-202 | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ¹ | 5.4X10 ² | 1.2X10 ⁻⁴ | 3.4X10 ⁻³ |
| Pb-203 | | 4.0 | 1.1X10 ² | 3.0 | 8.1X10 ¹ | 1.1X10 ⁴ | 3.0X10 ⁵ |
| Pb-205 | | Unlimited | Unlimited | Unlimited | Unlimited | 4.5X10 ⁻⁶ | 1.2X10 ⁻⁴ |
| Pb-210 (a) | | 1.0 | 2.7X10 ¹ | 5.0X10 ⁻² | 1.4 | 2.8 | 7.6X10 ¹ |
| Pb-212 (a) | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 2.0X10 ⁻¹ | 5.4 | 5.1X10 ⁴ | 1.4X10 ⁶ |
| Pd-103 (a) | | Palladium (46) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 2.8X10 ³ |
| Pd-107 | Unlimited | | Unlimited | Unlimited | Unlimited | 1.9X10 ⁻⁵ | 5.1X10 ⁻⁴ |
| Pd-109 | 2.0 | | 5.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 7.9X10 ⁴ | 2.1X10 ⁶ |
| Pm-143 | Promethium (61) | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 1.3X10 ² | 3.4X10 ³ |
| Pm-144 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 9.2X10 ¹ | 2.5X10 ³ |
| Pm-145 | | 3.0X10 ¹ | 8.1X10 ² | 1.0X10 ¹ | 2.7X10 ² | 5.2 | 1.4X10 ² |
| Pm-147 | | 4.0X10 ¹ | 1.1X10 ³ | 2.0 | 5.4X10 ¹ | 3.4X10 ¹ | 9.3X10 ² |
| Pm-148m (a) | | 8.0X10 ⁻¹ | 2.2X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 7.9X10 ² | 2.1X10 ⁴ |
| Pm-149 | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.5X10 ⁴ | 4.0X10 ⁵ |
| Pm-151 | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.7X10 ⁴ | 7.3X10 ⁵ |
| Po-210 | Polonium (84) | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 1.7X10 ² | 4.5X10 ³ |
| Pr-142 | Praseodymium (59) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.3X10 ⁴ | 1.2X10 ⁶ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Pr-143 | | 3.0 | 8.1X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.5X10 ³ | 6.7X10 ⁴ |
| Pt-188 (a) | Platinum (78) | 1.0 | 2.7X10 ¹ | 8.0X10 ⁻¹ | 2.2X10 ¹ | 2.5X10 ³ | 6.8X10 ⁴ |
| Pt-191 | | 4.0 | 1.1X10 ² | 3.0 | 8.1X10 ¹ | 8.7X10 ³ | 2.4X10 ⁵ |
| Pt-193 | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 1.4 | 3.7X10 ¹ |
| Pt-193m | | 4.0X10 ¹ | 1.1X10 ³ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.8X10 ³ | 1.6X10 ⁵ |
| Pt-195m | | 1.0X10 ¹ | 2.7X10 ² | 5.0X10 ⁻¹ | 1.4X10 ¹ | 6.2X10 ³ | 1.7X10 ⁵ |
| Pt-197 | | 2.0X10 ¹ | 5.4X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.2X10 ⁴ | 8.7X10 ⁵ |
| Pt-197m | | 1.0X10 ¹ | 2.7X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.7X10 ⁵ | 1.0X10 ⁷ |
| Pu-236 | | Plutonium (94) | 3.0X10 ¹ | 8.1X10 ² | 3.0X10 ⁻³ | 8.1X10 ⁻² | 2.0X10 ¹ |
| Pu-237 | 2.0X10 ¹ | | 5.4X10 ² | 2.0X10 ¹ | 5.4X10 ² | 4.5X10 ² | 1.2X10 ⁴ |
| Pu-238 | 1.0X10 ¹ | | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 6.3X10 ⁻¹ | 1.7X10 ¹ |
| Pu-239 | 1.0X10 ¹ | | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 2.3X10 ⁻³ | 6.2X10 ⁻² |
| Pu-240 | 1.0X10 ¹ | | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 8.4X10 ⁻³ | 2.3X10 ⁻¹ |
| Pu-241 (a) | 4.0X10 ¹ | | 1.1X10 ³ | 6.0X10 ⁻² | 1.6 | 3.8 | 1.0X10 ² |
| Pu-242 | 1.0X10 ¹ | | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 1.5X10 ⁻⁴ | 3.9X10 ⁻³ |
| Pu-244 (a) | 4.0X10 ⁻¹ | | 1.1X10 ¹ | 1.0X10 ⁻³ | 2.7X10 ⁻² | 6.7X10 ⁻⁷ | 1.8X10 ⁻⁵ |
| Ra-223 (a) | Radium (88) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 7.0X10 ⁻³ | 1.9X10 ⁻¹ | 1.9X10 ³ | 5.1X10 ⁴ |
| Ra-224 (a) | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 5.9X10 ³ | 1.6X10 ⁵ |
| Ra-225 (a) | | 2.0X10 ⁻¹ | 5.4 | 4.0X10 ⁻³ | 1.1X10 ⁻¹ | 1.5X10 ³ | 3.9X10 ⁴ |
| Ra-226 (a) | | 2.0X10 ⁻¹ | 5.4 | 3.0X10 ⁻³ | 8.1X10 ⁻² | 3.7X10 ⁻² | 1.0 |
| Ra-228 (a) | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 1.0X10 ¹ | 2.7X10 ² |
| Rb-81 | | 2.0 | 5.4X10 ¹ | 8.0X10 ⁻¹ | 2.2X10 ¹ | 3.1X10 ⁵ | 8.4X10 ⁶ |
| Rb-83 (a) | | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 6.8X10 ² | 1.8X10 ⁴ |
| Rb-84 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 1.8X10 ³ | 4.7X10 ⁴ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Rb-86 | Rubidium (37) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 3.0X10 ³ | 8.1X10 ⁴ |
| Rb-87 | | Unlimited | Unlimited | Unlimited | Unlimited | 3.2X10 ⁻⁹ | 8.6X10 ⁻⁸ |
| Rb(nat) | | Unlimited | Unlimited | Unlimited | Unlimited | 6.7X10 ⁶ | 1.8X10 ⁸ |
| Re-184 | Rhenium (75) | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 6.9X10 ² | 1.9X10 ⁴ |
| Re-184m | | 3.0 | 8.1X10 ¹ | 1.0 | 2.7X10 ¹ | 1.6X10 ² | 4.3X10 ³ |
| Re-186 | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.9X10 ³ | 1.9X10 ⁵ |
| Re-187 | | Unlimited | Unlimited | Unlimited | Unlimited | 1.4X10 ⁻⁹ | 3.8X10 ⁻⁸ |
| Re-188 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 3.6X10 ⁴ | 9.8X10 ⁵ |
| Re-189 (a) | | 3.0 | 8.1X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.5X10 ⁴ | 6.8X10 ⁵ |
| Re(nat) | | Unlimited | Unlimited | Unlimited | Unlimited | 0.0 | 2.4X10 ⁻⁸ |
| Rh-99 | | Rhodium (45) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 3.0X10 ³ |
| Rh-101 | 4.0 | | 1.1X10 ² | 3.0 | 8.1X10 ¹ | 4.1X10 ¹ | 1.1X10 ³ |
| Rh-102 | 5.0X10 ⁻¹ | | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 4.5X10 ¹ | 1.2X10 ³ |
| Rh-102m | 2.0 | | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 2.3X10 ² | 6.2X10 ³ |
| Rh-103m | 4.0X10 ¹ | | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 1.2X10 ⁶ | 3.3X10 ⁷ |
| Rh-105 | 1.0X10 ¹ | | 2.7X10 ² | 8.0X10 ⁻¹ | 2.2X10 ¹ | 3.1X10 ⁴ | 8.4X10 ⁵ |
| Rn-222 (a) | Radon (86) | 3.0X10 ⁻¹ | 8.1 | 4.0X10 ⁻³ | 1.1X10 ⁻¹ | 5.7X10 ³ | 1.5X10 ⁵ |
| Ru-97 | Ruthenium (44) | 5.0 | 1.4X10 ² | 5.0 | 1.4X10 ² | 1.7X10 ⁴ | 4.6X10 ⁵ |
| Ru-103 (a) | | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 1.2X10 ³ | 3.2X10 ⁴ |
| Ru-105 | | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.5X10 ⁵ | 6.7X10 ⁶ |
| Ru-106 (a) | | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 1.2X10 ² | 3.3X10 ³ |
| S-35 | Sulphur (16) | 4.0X10 ¹ | 1.1X10 ³ | 3.0 | 8.1X10 ¹ | 1.6X10 ³ | 4.3X10 ⁴ |
| Sb-122 | Antimony (51) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.5X10 ⁴ | 4.0X10 ⁵ |
| Sb-124 | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.5X10 ² | 1.7X10 ⁴ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Sb-125 | | 2.0 | 5.4X10 ¹ | 1.0 | 2.7X10 ¹ | 3.9X10 ¹ | 1.0X10 ³ |
| Sb-126 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 3.1X10 ³ | 8.4X10 ⁴ |
| Sc-44 | Scandium (21) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 6.7X10 ⁵ | 1.8X10 ⁷ |
| Sc-46 | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 1.3X10 ³ | 3.4X10 ⁴ |
| Sc-47 | | 1.0X10 ¹ | 2.7X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 3.1X10 ⁴ | 8.3X10 ⁵ |
| Sc-48 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 5.5X10 ⁴ | 1.5X10 ⁶ |
| Se-75 | | Selenium (34) | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 5.4X10 ² |
| Se-79 | 4.0X10 ¹ | | 1.1X10 ³ | 2.0 | 5.4X10 ¹ | 2.6X10 ⁻³ | 7.0X10 ⁻² |
| Si-31 | Silicon (14) | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.4X10 ⁶ | 3.9X10 ⁷ |
| Si-32 | | 4.0X10 ¹ | 1.1X10 ³ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 3.9 | 1.1X10 ² |
| Sm-145 | Samarium (62) | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ¹ | 2.7X10 ² | 9.8X10 ¹ | 2.6X10 ³ |
| Sm-147 | | Unlimited | Unlimited | Unlimited | Unlimited | 8.5X10 ⁻¹ | 2.3X10 ⁻⁸ |
| Sm-151 | | 4.0X10 ¹ | 1.1X10 ³ | 1.0X10 ¹ | 2.7X10 ² | 9.7X10 ⁻¹ | 2.6X10 ¹ |
| Sm-153 | | 9.0 | 2.4X10 ² | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.6X10 ⁴ | 4.4X10 ⁵ |
| Sn-113 (a) | Tin (50) | 4.0 | 1.1X10 ² | 2.0 | 5.4X10 ¹ | 3.7X10 ² | 1.0X10 ⁴ |
| Sn-117m | | 7.0 | 1.9X10 ² | 4.0X10 ⁻¹ | 1.1X10 ¹ | 3.0X10 ³ | 8.2X10 ⁴ |
| Sn-119m | | 4.0X10 ¹ | 1.1X10 ³ | 3.0X10 ¹ | 8.1X10 ² | 1.4X10 ² | 3.7X10 ³ |
| Sn-121m (a) | | 4.0X10 ¹ | 1.1X10 ³ | 9.0X10 ⁻¹ | 2.4X10 ¹ | 2.0 | 5.4X10 ¹ |
| Sn-123 | | 8.0X10 ⁻¹ | 2.2X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 3.0X10 ² | 8.2X10 ³ |
| Sn-125 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ³ | 1.1X10 ⁵ |
| Sn-126 (a) | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.0X10 ⁻³ | 2.8X10 ⁻² |
| Sr-82 (a) | | Strontium (38) | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 2.3X10 ³ |
| Sr-85 | 2.0 | | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 8.8X10 ² | 2.4X10 ⁴ |
| Sr-85m | 5.0 | | 1.4X10 ² | 5.0 | 1.4X10 ² | 1.2X10 ⁶ | 3.3X10 ⁷ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Sr-87m | | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 4.8X10 ⁵ | 1.3X10 ⁷ |
| Sr-89 | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.1X10 ³ | 2.9X10 ⁴ |
| Sr-90 (a) | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 5.1 | 1.4X10 ² |
| Sr-91 (a) | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.3X10 ⁵ | 3.6X10 ⁶ |
| Sr-92 (a) | | 1.0 | 2.7X10 ¹ | 3.0X10 ⁻¹ | 8.1 | 4.7X10 ⁵ | 1.3X10 ⁷ |
| T(H-3) | Tritium (1) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 3.6X10 ² | 9.7X10 ³ |
| Ta-178 (long-lived) | Tantalum (73) | 1.0 | 2.7X10 ¹ | 8.0X10 ⁻¹ | 2.2X10 ¹ | 4.2X10 ⁶ | 1.1X10 ⁸ |
| Ta-179 | | 3.0X10 ¹ | 8.1X10 ² | 3.0X10 ¹ | 8.1X10 ² | 4.1X10 ¹ | 1.1X10 ³ |
| Ta-182 | | 9.0X10 ⁻¹ | 2.4X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 2.3X10 ² | 6.2X10 ³ |
| Tb-157 | Terbium (65) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 5.6X10 ⁻¹ | 1.5X10 ¹ |
| Tb-158 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 5.6X10 ⁻¹ | 1.5X10 ¹ |
| Tb-160 | | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 4.2X10 ² | 1.1X10 ⁴ |
| Tc-95m (a) | Technetium (43) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 8.3X10 ² | 2.2X10 ⁴ |
| Tc-96 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.2X10 ⁴ | 3.2X10 ⁵ |
| Tc-96m (a) | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.4X10 ⁶ | 3.8X10 ⁷ |
| Tc-97 | | Unlimited | Unlimited | Unlimited | Unlimited | 5.2X10 ⁻⁵ | 1.4X10 ⁻³ |
| Tc-97m | | 4.0X10 ¹ | 1.1X10 ³ | 1.0 | 2.7X10 ¹ | 5.6X10 ² | 1.5X10 ⁴ |
| Tc-98 | | 8.0X10 ⁻¹ | 2.2X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 3.2X10 ⁻⁵ | 8.7X10 ⁻⁴ |
| Tc-99 | | 4.0X10 ¹ | 1.1X10 ³ | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.3X10 ⁻⁴ | 1.7X10 ⁻² |
| Tc-99m | | 1.0X10 ¹ | 2.7X10 ² | 4.0 | 1.1X10 ² | 1.9X10 ⁵ | 5.3X10 ⁶ |
| Te-121 | Tellurium (52) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 2.4X10 ³ | 6.4X10 ⁴ |
| Te-121m | | 5.0 | 1.4X10 ² | 3.0 | 8.1X10 ¹ | 2.6X10 ² | 7.0X10 ³ |
| Te-123m | | 8.0 | 2.2X10 ² | 1.0 | 2.7X10 ¹ | 3.3X10 ² | 8.9X10 ³ |
| Te-125m | | 2.0X10 ¹ | 5.4X10 ² | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.7X10 ² | 1.8X10 ⁴ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|-------------------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Te-127 | | 2.0X10 ¹ | 5.4X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 9.8X10 ⁴ | 2.6X10 ⁶ |
| Te-127m (a) | | 2.0X10 ¹ | 5.4X10 ² | 5.0X10 ⁻¹ | 1.4X10 ¹ | 3.5X10 ² | 9.4X10 ³ |
| Te-129 | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 7.7X10 ⁵ | 2.1X10 ⁷ |
| Te-129m (a) | | 8.0X10 ⁻¹ | 2.2X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.1X10 ³ | 3.0X10 ⁴ |
| Te-131m (a) | | 7.0X10 ⁻¹ | 1.9X10 ¹ | 5.0X10 ⁻¹ | 1.4X10 ¹ | 3.0X10 ⁴ | 8.0X10 ⁵ |
| Te-132 (a) | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 1.1X10 ⁴ | 3.0X10 ⁵ |
| Th-227 | Thorium (90) | 1.0X10 ¹ | 2.7X10 ² | 5.0X10 ⁻³ | 1.4X10 ⁻¹ | 1.1X10 ³ | 3.1X10 ⁴ |
| Th-228 (a) | | 5.0X10 ⁻¹ | 1.4X10 ¹ | 1.0X10 ⁻³ | 2.7X10 ⁻² | 3.0X10 ¹ | 8.2X10 ² |
| Th-229 | | 5.0 | 1.4X10 ² | 5.0X10 ⁻⁴ | 1.4X10 ⁻² | 7.9X10 ⁻³ | 2.1X10 ⁻¹ |
| Th-230 | | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 7.6X10 ⁻⁴ | 2.1X10 ⁻² |
| Th-231 | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 2.0X10 ⁴ | 5.3X10 ⁵ |
| Th-232 | | Unlimited | Unlimited | Unlimited | Unlimited | 4.0X10 ⁻⁹ | 1.1X10 ⁻⁷ |
| Th-234 (a) | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 8.6X10 ² | 2.3X10 ⁴ |
| Th(nat) | | Unlimited | Unlimited | Unlimited | Unlimited | 8.1X10 ⁻⁹ | 2.2X10 ⁻⁷ |
| Ti-44 (a) | | Titanium (22) | 5.0X10 ⁻¹ | 1.4X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 6.4 |
| Tl-200 | Thallium (81) | 9.0X10 ⁻¹ | 2.4X10 ¹ | 9.0X10 ⁻¹ | 2.4X10 ¹ | 2.2X10 ⁴ | 6.0X10 ⁵ |
| Tl-201 | | 1.0X10 ¹ | 2.7X10 ² | 4.0 | 1.1X10 ² | 7.9X10 ³ | 2.1X10 ⁵ |
| Tl-202 | | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 2.0X10 ³ | 5.3X10 ⁴ |
| Tl-204 | | 1.0X10 ¹ | 2.7X10 ² | 7.0X10 ⁻¹ | 1.9X10 ¹ | 1.7X10 ¹ | 4.6X10 ² |
| Tm-167 | Thulium (69) | 7.0 | 1.9X10 ² | 8.0X10 ⁻¹ | 2.2X10 ¹ | 3.1X10 ³ | 8.5X10 ⁴ |
| Tm-170 | | 3.0 | 8.1X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.2X10 ² | 6.0X10 ³ |
| Tm-171 | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ |
| U-230 (fast lung absorption) (a)(d) | | 4.0X10 ¹ | 1.1X10 ³ | 1.0X10 ⁻¹ | 2.7 | 1.0X10 ³ | 2.7X10 ⁴ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|---|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| U-230 (medium lung absorption) (a)(e) | Uranium (92) | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ⁻³ | 1.1X10 ⁻¹ | 1.0X10 ³ | 2.7X10 ⁴ |
| U-230 (slow lung absorption) (a)(f) | | 3.0X10 ¹ | 8.1X10 ² | 3.0X10 ⁻³ | 8.1X10 ⁻² | 1.0X10 ³ | 2.7X10 ⁴ |
| U-232 (fast lung absorption) (d) | | 4.0X10 ¹ | 1.1X10 ³ | 1.0X10 ⁻² | 2.7X10 ⁻¹ | 8.3X10 ⁻¹ | 2.2X10 ¹ |
| U-232 (medium lung absorption) (e) | | 4.0X10 ¹ | 1.1X10 ³ | 7.0X10 ⁻³ | 1.9X10 ⁻¹ | 8.3X10 ⁻¹ | 2.2X10 ¹ |
| U-232 (slow lung absorption)(f) | | 1.0X10 ¹ | 2.7X10 ² | 1.0X10 ⁻³ | 2.7X10 ⁻² | 8.3X10 ⁻¹ | 2.2X10 ⁻¹ |
| U-233 (fast lung absorption) (d) | | 4.0X10 ¹ | 1.1X10 ³ | 9.0X10 ⁻² | 2.4 | 3.6X10 ⁻⁴ | 9.7X10 ⁻³ |
| U-233 (medium lung absorption) (e) | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 3.6X10 ⁻⁴ | 9.7X10 ⁻³ |
| U-233 (slow lung absorption) (f) | | 4.0X10 ¹ | 1.1X10 ³ | 6.0X10 ⁻³ | 1.6X10 ⁻¹ | 3.6X10 ⁻⁴ | 9.7X10 ⁻³ |
| U-234 (fast lung absorption) (d) | | 4.0X10 ¹ | 1.1X10 ³ | 9.0X10 ⁻² | 2.4 | 2.3X10 ⁻⁴ | 6.2X10 ⁻³ |
| U-234 (medium lung absorption) (e) | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 2.3X10 ⁻⁴ | 6.2X10 ⁻³ |
| U-234 (slow lung absorption) (f) | | 4.0X10 ¹ | 1.1X10 ³ | 6.0X10 ⁻³ | 1.6X10 ⁻¹ | 2.3X10 ⁻⁴ | 6.2X10 ⁻³ |
| U-235 (all lung absorption types) (a),(d),(e),(f) | | Unlimited | Unlimited | Unlimited | Unlimited | 8.0X10 ⁻⁸ | 2.2X10 ⁻⁶ |
| U-236 (fast lung absorption) (d) | | Unlimited | Unlimited | Unlimited | Unlimited | 2.4X10 ⁻⁶ | 6.5X10 ⁻⁵ |
| U-236 (medium lung absorption) (e) | | 4.0X10 ¹ | 1.1X10 ³ | 2.0X10 ⁻² | 5.4X10 ⁻¹ | 2.4X10 ⁻⁶ | 6.5X10 ⁻⁵ |
| U-236 (slow lung absorption) (f) | | 4.0X10 ¹ | 1.1X10 ³ | 6.0X10 ⁻³ | 1.6X10 ⁻¹ | 2.4X10 ⁻⁶ | 6.5X10 ⁻⁵ |
| U-238 (all lung absorption types) (d),(e),(f) | | Unlimited | Unlimited | Unlimited | Unlimited | 1.2X10 ⁻⁸ | 3.4X10 ⁻⁷ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|--------------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| U (nat) | | Unlimited | Unlimited | Unlimited | Unlimited | 2.6X10 ⁻⁸ | 7.1X10 ⁻⁷ |
| 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-4) |
| V-48 | Vanadium (23) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 6.3X10 ³ | 1.7X10 ⁵ |
| V-49 | | 4.0X10 ¹ | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 3.0X10 ² | 8.1X10 ³ |
| W-178 (a) | Tungsten (74) | 9.0 | 2.4X10 ² | 5.0 | 1.4X10 ² | 1.3X10 ³ | 3.4X10 ⁴ |
| W-181 | | 3.0X10 ¹ | 8.1X10 ² | 3.0X10 ¹ | 8.1X10 ² | 2.2X10 ² | 6.0X10 ³ |
| W-185 | | 4.0X10 ¹ | 1.1X10 ³ | 8.0X10 ⁻¹ | 2.2X10 ¹ | 3.5X10 ² | 9.4X10 ³ |
| W-187 | | 2.0 | 5.4X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 2.6X10 ⁴ | 7.0X10 ⁵ |
| W-188 (a) | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 3.0X10 ⁻¹ | 8.1 | 3.7X10 ² | 1.0X10 ⁴ |
| Xe-122 (a) | | Xenon (54) | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.8X10 ⁴ |
| Xe-123 | 2.0 | | 5.4X10 ¹ | 7.0X10 ⁻¹ | 1.9X10 ¹ | 4.4X10 ⁵ | 1.2X10 ⁷ |
| Xe-127 | 4.0 | | 1.1X10 ² | 2.0 | 5.4X10 ¹ | 1.0X10 ³ | 2.8X10 ⁴ |
| Xe-131m | 4.0X10 ¹ | | 1.1X10 ³ | 4.0X10 ¹ | 1.1X10 ³ | 3.1X10 ³ | 8.4X10 ⁴ |
| Xe-133 | 2.0X10 ¹ | | 5.4X10 ² | 1.0X10 ¹ | 2.7X10 ² | 6.9X10 ³ | 1.9X10 ⁵ |
| Xe-135 | 3.0 | | 8.1X10 ¹ | 2.0 | 5.4X10 ¹ | 9.5X10 ⁴ | 2.6X10 ⁶ |
| Y-87 (a) | Yttrium (39) | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 1.7X10 ⁴ | 4.5X10 ⁵ |
| Y-88 | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 5.2X10 ² | 1.4X10 ⁴ |
| Y-90 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 2.0X10 ⁴ | 5.4X10 ⁵ |
| Y-91 | | 6.0X10 ⁻¹ | 1.6X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 9.1X10 ² | 2.5X10 ⁴ |
| Y-91m | | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 1.5X10 ⁶ | 4.2X10 ⁷ |
| Y-92 | | 2.0X10 ⁻¹ | 5.4 | 2.0X10 ⁻¹ | 5.4 | 3.6X10 ⁵ | 9.6X10 ⁶ |

TABLE A - 1: A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) ^b | A ₂ (TBq) | A ₂ (Ci) ^b | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|----------------------------------|----------------------|----------------------------------|---------------------------|--------------------------|
| Y-93 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.2X10 ⁵ | 3.3X10 ⁶ |
| Yb-169 | Ytterbium (70) | 4.0 | 1.1X10 ² | 1.0 | 2.7X10 ¹ | 8.9X10 ² | 2.4X10 ⁴ |
| Yb-175 | | 3.0X10 ¹ | 8.1X10 ² | 9.0X10 ⁻¹ | 2.4X10 ¹ | 6.6X10 ³ | 1.8X10 ⁵ |
| Zn-65 | Zinc (30) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 3.0X10 ² | 8.2X10 ³ |
| Zn-69 | | 3.0 | 8.1X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.8X10 ⁶ | 4.9X10 ⁷ |
| Zn-69m (a) | | 3.0 | 8.1X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.2X10 ⁵ | 3.3X10 ⁶ |
| Zr-88 | Zirconium (40) | 3.0 | 8.1X10 ¹ | 3.0 | 8.1X10 ¹ | 6.6X10 ² | 1.8X10 ⁴ |
| Zr-93 | | Unlimited | Unlimited | Unlimited | Unlimited | 9.3X10 ⁻⁵ | 2.5X10 ⁻³ |
| Zr-95 (a) | | 2.0 | 5.4X10 ¹ | 8.0X10 ⁻¹ | 2.2X10 ¹ | 7.9X10 ² | 2.1X10 ⁴ |
| Zr-97 (a) | | 4.0X10 ⁻¹ | 1.1X10 ¹ | 4.0X10 ⁻¹ | 1.1X10 ¹ | 7.1X10 ⁴ | 1.9X10 ⁶ |

NOTES

- (a) A₁ and/or A₂ values include contributions from daughter nuclides with half-lives less than 10 days
- (b) The values of A₁ and A₂ in Curies (Ci) are approximate and for information only; the regulatory standard units are Terabecquerels (TBq), (See Appendix A Parts I-IV, Determination of A₁ and A₂.)
- (c) The quantity 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 UF₆, UO₂F₂ and UO₂(NO₃)₂ in both normal and accident conditions of transport.
- (e) These values apply only to compounds of uranium that take the chemical form of UO₃, UF₄, UCl₄, 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 (d) and (e), above.
- (g) These values apply to unirradiated uranium only.
- (h) These values apply to domestic transport only. For international transport, use the values in the table below.

TABLE A - 1 (SUPPLEMENT)
A₁ AND A₂ VALUES FOR RADIONUCLIDES
FOR INTERNATIONAL SHIPMENTS

| Symbol of radionuclide | Element and atomic number | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------|---------------------|----------------------|----------------------|---------------------------|--------------------------|
| Cf-252 | Californium (98) | 5.0X10 ⁻² | 1.4 | 3.0X10 ⁻³ | 8.1X10 ⁻² | 2.0X10 ¹ | 5.4X10 ² |
| Mo-99 (a) | Molybdenum (42) | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.8X10 ⁴ | 4.8X10 ⁵ |

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) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Ac-227 | | 1.0×10^{-1} | 2.7×10^{-12} | 1.0×10^3 | 2.7×10^{-8} |
| Ac-228 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Ag-105 | Silver (47) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ag-108m (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Ag-110m | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Ag-111 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Al-26 | Aluminum (13) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Am-241 | Americium (95) | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Am-242m (b) | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Am-243 (b) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Ar-37 | Argon (18) | 1.0×10^6 | 2.7×10^{-5} | 1.0×10^8 | 2.7×10^{-3} |
| Ar-39 | | 1.0×10^7 | 2.7×10^{-4} | 1.0×10^4 | 2.7×10^{-7} |
| Ar-41 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^9 | 2.7×10^{-2} |
| As-72 | Arsenic (33) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| As-73 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| As-74 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| As-76 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| As-77 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| At-211 | Astatine (85) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Au-193 | Gold (79) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Au-194 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Au-195 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Au-198 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Au-199 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ba-131 | Barium (56) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ba-133 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ba-133m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ba-140 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Be-7 | Beryllium (4) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Be-10 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^6 | 2.7×10^{-5} |
| Bi-205 | Bismuth (83) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Bi-206 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Bi-207 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Bi-210 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Bi-210m | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Bi-212 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Bk-247 | Berkelium (97) | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Bk-249 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Br-76 | Bromine (35) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Br-77 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Br-82 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| C-11 | Carbon (6) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| C-14 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Ca-41 | Calcium (20) | 1.0×10^5 | 2.7×10^{-6} | 1.0×10^7 | 2.7×10^{-4} |
| Ca-45 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Ca-47 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Cd-109 | Cadmium (48) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^6 | 2.7×10^{-5} |
| Cd-113m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Cd-115 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Cd-115m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Ce-139 | Cerium (58) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ce-141 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Ce-143 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ce-144 (b) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Cf-248 | Californium (98) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Cf-249 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Cf-250 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Cf-251 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Cf-252 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Cf-253 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Cf-254 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |

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) | |
|------------------------|---------------------------|---|---|--|--|----------------------|
| Cl-36 | Chlorine (17) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^6 | 2.7×10^{-5} | |
| Cl-38 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} | |
| Cm-240 | Curium (96) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} | |
| Cm-241 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Cm-242 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} | |
| Cm-243 | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} | |
| Cm-244 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} | |
| Cm-245 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} | |
| Cm-246 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} | |
| Cm-247 | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} | |
| Cm-248 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} | |
| Co-55 | | Cobalt (27) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Co-56 | | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Co-57 | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Co-58 | 1.0×10^1 | | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| Co-58m | 1.0×10^4 | | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} | |
| Co-60 | 1.0×10^1 | | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} | |
| Cr-51 | Chromium (24) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} | |
| Cs-129 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} | |
| Cs-131 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} | |

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) |
|------------------------|---------------------------|---|---|--|--|
| Cs-132 | Cesium (55) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Cs-134 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Cs-134m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} |
| Cs-135 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Cs-136 | | Cesium (55) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 |
| Cs-137 (b) | 1.0×10^1 | | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Cu-64 | Copper (29) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Cu-67 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Dy-159 | Dysprosium (66) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Dy-165 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Dy-166 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Er-169 | Erbium (68) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Er-171 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-147 | Europium (63) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-148 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-149 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Eu-150 (short lived) | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-150 (long lived) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-152 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-152 m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Eu-154 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Eu-155 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Eu-156 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| F-18 | Fluorine (9) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Fe-52 | Iron (26) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Fe-55 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^6 | 2.7×10^{-5} |
| Fe-59 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Fe-60 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Ga-67 | Gallium (31) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ga-68 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Ga-72 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Gd-146 | Gadolinium (64) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Gd-148 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Gd-153 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Gd-159 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Ge-68 | Germanium (32) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Ge-71 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^8 | 2.7×10^{-3} |
| Ge-77 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Hf-172 | Hafnium (72) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Hf-175 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Hf-181 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |

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) | |
|------------------------|---------------------------|---|---|--|--|----------------------|
| Hf-182 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Hg-194 | Mercury (80) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| Hg-195m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Hg-197 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} | |
| Hg-197m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Hg-203 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} | |
| | | | | | | |
| Ho-166 | Holmium (67) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} | |
| Ho-166m | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| I-123 | Iodine (53) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} | |
| I-124 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| I-125 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} | |
| I-126 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| I-129 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} | |
| I-131 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| I-132 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} | |
| I-133 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| I-134 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} | |
| I-135 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| | | | | | | |
| | | | | | | |
| In-111 | | Indium (49) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| In-113m | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| In-114m | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |

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) |
|------------------------|---------------------------|---|---|--|--|
| In-115m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ir-189 | Iridium (77) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Ir-190 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Ir-192 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Ir-194 | Iridium (77) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| K-40 | Potassium (19) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| K-42 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| K-43 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Kr-81 | Krypton (36) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Kr-85 | | 1.0×10^5 | 2.7×10^{-6} | 1.0×10^4 | 2.7×10^{-7} |
| Kr-85m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^{10} | 2.7×10^{-1} |
| Kr-87 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^9 | 2.7×10^{-2} |
| La-137 | Lanthanum (57) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| La-140 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Lu-172 | Lutetium (71) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Lu-173 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Lu-174 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Lu-174m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Lu-177 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Mg-28 | Magnesium (12) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Mn-52 | Manganese (25) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Mn-53 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^9 | 2.7×10^{-2} |
| Mn-54 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Mn-56 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Mo-93 | Molybdenum (42) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^8 | 2.7×10^{-3} |
| Mo-99 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| N-13 | Nitrogen (7) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^9 | 2.7×10^{-2} |
| Na-22 | Sodium (11) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Na-24 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Nb-93m | Niobium (41) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Nb-94 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Nb-95 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Nb-97 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Nd-147 | Neodymium (60) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Nd-149 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ni-59 | Nickel (28) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^8 | 2.7×10^{-3} |
| Ni-63 | | 1.0×10^5 | 2.7×10^{-6} | 1.0×10^8 | 2.7×10^{-3} |
| Ni-65 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Np-235 | Neptunium (93) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Np-236 (short-lived) | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Np-236 (long-lived) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Np-237(b) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Np-239 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Os-185 | Osmium (76) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Os-191 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Os-191m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Os-193 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Os-194 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| | | | | | |
| P-32 | Phosphorus (15) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} |
| P-33 | | 1.0×10^5 | 2.7×10^{-6} | 1.0×10^8 | 2.7×10^{-3} |
| Pa-230 | Protactinium (91) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Pa-231 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Pa-233 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Pb-201 | Lead (82) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Pb-202 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Pb-203 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Pb-205 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Pb-210 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Pb-212 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Pd-103 | Palladium (46) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^8 | 2.7×10^{-3} |
| Pd-107 | | 1.0×10^5 | 2.7×10^{-6} | 1.0×10^8 | 2.7×10^{-3} |
| Pd-109 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |

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) | |
|------------------------|---------------------------|---|---|--|--|----------------------|
| Pm-143 | Promethium (61) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Pm-144 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| Pm-145 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} | |
| Pm-147 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} | |
| Pm-148m | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| Pm-149 | | Promethium (61) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Pm-151 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Po-210 | Polonium (84) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} | |
| Pr-142 | Praseodymium (59) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} | |
| Pr-143 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^6 | 2.7×10^{-5} | |
| Pt-188 | Platinum (78) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} | |
| Pt-191 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Pt-193 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} | |
| Pt-193m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} | |
| Pt-195m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Pt-197 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} | |
| Pt-197m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} | |
| Pu-236 | Plutonium (94) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} | |
| Pu-237 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} | |
| Pu-238 | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} | |
| Pu-239 | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} | |

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) |
|------------------------|---------------------------|---|---|--|--|
| Pu-240 | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Pu-241 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Pu-242 | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Pu-244 | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Ra-223 (b) | Radium (88) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Ra-224 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Ra-225 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Ra-226 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Ra-228 (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Rb-81 | Rubidium (37) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Rb-83 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Rb-84 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Rb-86 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Rb-87 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Rb(nat) | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Re-184 | Rhenium (75) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Re-184m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Re-186 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Re-187 | | 1.0×10^6 | 2.7×10^{-5} | 1.0×10^9 | 2.7×10^{-2} |
| Re-188 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Re-189 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Re(nat) | | 1.0×10^6 | 2.7×10^{-5} | 1.0×10^9 | 2.7×10^{-2} |
| Rh-99 | Rhodium (45) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Rh-101 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Rh-102 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Rh-102m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Rh-103m | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^8 | 2.7×10^{-3} |
| Rh-105 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Rn-222 (b) | | Radon (86) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^8 |
| Ru-97 | Ruthenium (44) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Ru-103 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Ru-105 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Ru-106 (b) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| S-35 | Sulphur (16) | 1.0×10^5 | 2.7×10^{-6} | 1.0×10^8 | 2.7×10^{-3} |
| Sb-122 | Antimony (51) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^4 | 2.7×10^{-7} |
| Sb-124 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Sb-125 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Sb-126 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Sc-44 | Scandium (21) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Sc-46 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Sc-47 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Sc-48 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Se-75 | Selenium (34) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Se-79 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Si-31 | Silicon (14) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Si-32 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Sm-145 | Samarium (62) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Sm-147 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Sm-151 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^8 | 2.7×10^{-3} |
| Sm-153 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Sn-113 | Tin (50) | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Sn-117m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Sn-119m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Sn-121m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Sn-123 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Sn-125 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Sn-126 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Sr-82 | | Strontium (38) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 |
| Sr-85 | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Sr-85m | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Sr-87m | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Sr-89 | 1.0×10^3 | | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Sr-90 (b) | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^4 | 2.7×10^{-7} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Sr-91 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Sr-92 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| T(H-3) | Tritium (1) | 1.0×10^6 | 2.7×10^{-5} | 1.0×10^9 | 2.7×10^{-2} |
| Ta-178 (long-lived) | Tantalum (73) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Ta-179 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Ta-182 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Tb-157 | Terbium (65) | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Tb-158 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Tb-160 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Tc-95m | Technetium (43) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Tc-96 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Tc-96m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Tc-97 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^8 | 2.7×10^{-3} |
| Tc-97m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Tc-98 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Tc-99 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| Tc-99m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Te-121 | | Tellurium (52) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 |
| Te-121m | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Te-123m | 1.0×10^2 | | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Te-125m | 1.0×10^3 | | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Te-127 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Te-127m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Te-129 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Te-129m | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Te-131m | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Te-132 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Th-227 | | Thorium (90) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 |
| Th-228 (b) | 1.0 | | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Th-229 (b) | 1.0 | | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Th-230 | 1.0 | | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Th-231 | 1.0×10^3 | | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Th-232 | 1.0×10^1 | | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Th-234 (b) | 1.0×10^3 | | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} |
| Th (nat) (b) | 1.0 | | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| Ti-44 | Titanium (22) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Tl-200 | Thallium (81) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Tl-201 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Tl-202 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Tl-204 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^4 | 2.7×10^{-7} |
| Tm-167 | Thulium (69) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Tm-170 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |

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) |
|---|---------------------------|---|---|--|--|
| Tm-171 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^8 | 2.7×10^{-3} |
| U-230 (fast lung absorption)(b) (c) | Uranium (92) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| U-230 (medium lung absorption)(d) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-230 (slow lung absorption)(e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-232 (fast lung absorption) (b)(c) | Uranium (92) | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| U-232 (medium lung absorption) (d) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-232 (slow lung absorption) (e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-233 (fast lung absorption) (c) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-233 (medium lung absorption) (d) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| U-233 (slow lung absorption) (e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| U-234 (fast lung absorption) (c) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-234 (medium lung absorption) (d) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| U-234 (slow lung absorption) (e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| U-235 (all lung absorption types) (b),(c),(d),(e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-236 (fast lung | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |

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) |
|---|---------------------------|---|---|--|--|
| absorption) (c) | | | | | |
| U-236 (medium lung absorption) (d) | Uranium (92) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| U-236 (slow lung absorption) (e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-238 (all lung absorption types) (b) (c),(d),(e) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U (nat)(b) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| U (enriched to 20% or less)(f) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| U (dep) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| V-48 | | Vanadium (23) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 |
| V-49 | 1.0×10^4 | | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| W-178 | Tungsten (74) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| W-181 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| W-185 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^7 | 2.7×10^{-4} |
| W-187 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| W-188 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Xe-122 | Xenon (54) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^9 | 2.7×10^{-2} |
| Xe-123 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^9 | 2.7×10^{-2} |
| Xe-127 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} |
| Xe-131m | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^4 | 2.7×10^{-7} |

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) |
|------------------------|---------------------------|---|---|--|--|
| Xe-133 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^4 | 2.7×10^{-7} |
| Xe-135 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^{10} | 2.7×10^{-1} |
| Y-87 | Yttrium (39) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Y-88 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Y-90 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} |
| Y-91 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Y-91m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Y-92 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Y-93 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Yb-169 | | Ytterbium (70) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 |
| Yb-175 | 1.0×10^3 | | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Zn-65 | Zinc (30) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Zn-69 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^6 | 2.7×10^{-5} |
| Zn-69m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Zr-88 | Zirconium (40) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Zr-93(b) | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Zr-95 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Zr-97(b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |

NOTES

(a) [Reserved]

(b) Parent nuclides and their progeny included in secular equilibrium are listed in the following:

| | |
|---------|--|
| Sr-90 | Y-90 |
| Zr-93 | Nb-93m |
| Zr-97 | Nb-97 |
| Ru-106 | Rh-106 |
| Cs-137 | Ba-137m |
| Ce-134 | La-134 |
| 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-220 | Po-216 |
| 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-226 | Ra-222, Rn-218, Po-214 |
| 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 |
| U-240 | Np-240m |
| Np-237 | Pa-233 |
| Am-242m | Am-242 |
| Am-243 | Np-239 |

- (c) These values apply only to compounds of uranium that take the chemical form of UF_6 , UO_2F_2 , and $UO_2(NO_3)_2$ in both normal and accident conditions of transport.
- (d) These values apply only to compounds of uranium that take the chemical form of UO_3 , UF_4 , UCl_4 , and hexavalent compounds in both normal and accident conditions of transport.
- (e) These values apply to all compounds of uranium other than those specified in (c) and (d), above.
- (f) These values apply to unirradiated uranium only.

TABLE A-3: GENERAL VALUES FOR A₁ AND A₂

| Contents | A ₁ | | A ₂ | | 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 ⁻¹ | 2.7 x 10 ⁰ | 2 x 10 ⁻² | 5.4 x 10 ⁻¹ | 1 x 10 ¹ | 2.7 x 10 ⁻¹⁰ | 1 x 10 ⁴ | 2.7 x 10 ⁻⁷ |
| Only alpha emitting radionuclides are known to be present | 2 x 10 ⁻¹ | 5.4 x 10 ⁰ | 9 x 10 ⁻⁵ | 2.4 x 10 ⁻³ | 1 x 10 ⁻¹ | 2.7 x 10 ⁻¹² | 1 x 10 ³ | 2.7 x 10 ⁻⁸ |
| No relevant data are available | 1 x 10 ⁻³ | 2.7 x 10 ⁻² | 9 x 10 ⁻⁵ | 2.4 x 10 ⁻³ | 1 x 10 ⁻¹ | 2.7 x 10 ⁻¹² | 1 x 10 ³ | 2.7 x 10 ⁻⁸ |

TABLE A-4: ACTIVITY-MASS RELATIONSHIPS FOR URANIUM

| Uranium Enrichment ^{1/} wt % U-235 present | Specific Activity | |
|---|------------------------|------------------------|
| | TBq/g | Ci/g |
| 0.45 | 1.8 x 10 ⁻⁸ | 5.0 x 10 ⁻⁷ |
| 0.72 | 2.6 x 10 ⁻⁸ | 7.1 x 10 ⁻⁷ |
| 1 | 2.8 x 10 ⁻⁸ | 7.6 x 10 ⁻⁷ |
| 1.5 | 3.7 x 10 ⁻⁸ | 1.0 x 10 ⁻⁶ |
| 5 | 1.0 x 10 ⁻⁷ | 2.7 x 10 ⁻⁶ |
| 10 | 1.8 x 10 ⁻⁷ | 4.8 x 10 ⁻⁶ |
| 20 | 3.7 x 10 ⁻⁷ | 1.0 x 10 ⁻⁵ |
| 35 | 7.4 x 10 ⁻⁷ | 2.0 x 10 ⁻⁵ |
| 50 | 9.3 x 10 ⁻⁷ | 2.5 x 10 ⁻⁵ |
| 90 | 2.2 x 10 ⁻⁶ | 5.8 x 10 ⁻⁵ |
| 93 | 2.6 x 10 ⁻⁶ | 7.0 x 10 ⁻⁵ |
| 95 | 3.4 x 10 ⁻⁶ | 9.1 x 10 ⁻⁵ |

^{1/} The figures for uranium include representative values for the activity of the uranium-234 that is concentrated during the enrichment process.