

Chapter DHS 157

APPENDIX O

Determination of A_1 and A_2

- I. Values of A_1 and A_2 for individual radionuclides, which are the bases for many activity limits elsewhere in these regulations, are given in TABLE VI. The curie (Ci) values specified are obtained by converting from the Terabecquerel (TBq) figure. The curie values are expressed to 3 significant figures to assure that the difference in the TBq and Ci quantities is one tenth of one percent or less. Where values of A_1 or A_2 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 VI, the determination of the values of A_1 and A_2 requires department approval, except that the values of A_1 and A_2 in TABLE VIII may be used without obtaining department approval.
- (b) For individual radionuclides whose identities are known, but which are not listed in Table VII, the exempt material activity concentration and exempt consignment activity values contained in Table VIII may be used. Otherwise, the licensee shall obtain prior department approval of the exempt material activity concentration and exempt consignment activity values for radionuclides not listed in Table VII, before shipping the material.
- (c) The licensee shall submit requests for prior approval, described under paragraphs II(a) and II(b) of this Appendix, in writing to the department.
- III. In the calculations of A_1 and A_2 for a radionuclide not in TABLE VI, 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 A_1 or A_2 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 in special form, 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:

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

where $B(i)$ is the activity of radionuclide i in normal form, and $A_2(i)$ is the value for radionuclide i .

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

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

where $B(i)$ is the activity of radionuclide i as special form radioactive material, $A_1(i)$ is the A_1 value for radionuclide i , $C(j)$ is the activity of radionuclide j as normal form radioactive material, $A_2(j)$ is the A_2 value for radionuclide j .

- ~~(e)~~(d) Alternatively, the 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)~~(e) 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 for radionuclide (i) in the mixture, and $A_2(i)$ is the appropriate A_2 value for radionuclide (i).

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

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

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

- ~~(f)~~(g) The activity limit for an exempt consignment for mixtures of radionuclides 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 of radionuclide (i) in the mixture, and A is the activity limit for exempt consignments for radionuclide (i).

- V. (a) When the identity of each radionuclide is known, but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest 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.

(b) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest $[A]$ (activity concentration for exempt

material) or A (activity limit for exempt consignment) value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paragraph IV. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest [A] or A values for the alpha emitters and beta/gamma emitters, respectively.

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (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 |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (Ci/g) | |
|------------------------|------------------------|----------------------|----------------------|----------------------|----------------------|-------------------------------------|----------------------|
| 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 |
| 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 | 3.0X10 ⁻³ | 8.1X10 ⁻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 |
| 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 | 1.4 X10 ¹ | 5.0X10 ⁻¹ | 1.4 X10 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 | 9.2X10 ⁴ |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (Ci/g) | |
|------------------------|------------------------|----------------------|---------------------|----------------------|----------------------|-------------------------------------|----------------------|
| 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 | 3.9X10 ⁶ |
| 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 | Europium (63) | 2.0 | 5.4X10 ¹ | 2.0 | 5.4X10 ¹ | 1.4X10 ³ | 3.7X10 ⁴ |
| Eu-148 | | 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 |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (Ci/g) | |
|------------------------|------------------------|----------------------|---------------------|----------------------|---------------------|-------------------------------------|----------------------|
| 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 |
| 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 | | 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 | 6.4X10 ⁻⁶ |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) | Specific Activity (Ci/g) |
|------------------------|------------------------|----------------------|---------------------|----------------------|----------------------|---------------------------|--------------------------|
| Mn-54 | | 1.0 | 2.7X10 ¹ | 1.0 | 2.7X10 ¹ | 2.9X10 ² | 7.7X10 ³ |
| 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) | | 1.0 | 2.7X10 ¹ | 6.0X10 ⁻¹ | 1.6X10 ¹ | 1.8X10 ⁴ | 4.8X10 ⁵ |
| Mo-99 (h) | | | | | | | |
| 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) | | 9.0 | 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 |
| 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 | 7.5X10 ⁴ |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) | Specific Activity (Ci/g) |
|------------------------|------------------------|----------------------|---------------------|----------------------|----------------------|---------------------------|--------------------------|
| 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 |
| 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 | 5.3X10 ² |
| 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 | Rubidium (37) | 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 |
| Rb-86 | | 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) | Specific Activity (Ci/g) |
|------------------------|------------------------|----------------------|---------------------|----------------------|----------------------|---------------------------|--------------------------|
| 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 | 8.2X10 ⁴ |
| 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 |
| 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 | 1.5X10 ⁴ |
| 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 | 6.2X10 ⁴ |
| 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 |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (Ci/g) | |
|------------------------|------------------------|----------------------|---------------------|----------------------|----------------------|-------------------------------------|----------------------|
| 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 |
| 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 | 1.7X10 ² |
| 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (Ci/g) | |
|---|------------------------|----------------------|---------------------|----------------------|----------------------|-------------------------------------|----------------------|
| 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) | Uranium (92) | 4.0X10 ¹ | 1.1X10 ³ | 1.0X10 ⁻¹ | 2.7 | 1.0X10 ³ | 2.7X10 ⁴ |
| U-230 (medium lung absorption) (a)(e) | | 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 |

TABLE VI
A₁ AND A₂ VALUES FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | A ₁ (TBq) | A ₁ (Ci) | A ₂ (TBq) | A ₂ (Ci) | Specific Activity (TBq/g) (Ci/g) | |
|---|------------------------|----------------------|---------------------|----------------------|----------------------|-------------------------------------|----------------------|
| 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 |
| U (nat) | | Unlimited | Unlimited | Unlimited | Unlimited | 2.6X10 ⁻⁸ | 7.1X10 ⁻⁷ |
| U (enriched to 20% or less)(g) | | Unlimited | Unlimited | Unlimited | Unlimited | N/A | N/A |
| U (dep) | | Unlimited | Unlimited | Unlimited | Unlimited | 0.0 | (See Table IX) |
| 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 | 1.3X10 ⁶ |
| 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 |
| Y-93 | | 3.0X10 ⁻¹ | 8.1 | 3.0X10 ⁻¹ | 8.1 | 1.2X10 ⁵ | 3.3X10 ⁶ |
| Yb-169 | Ytterbium (79) | 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) A_1 and/or A_2 values include contributions from daughter nuclides with half-lives less than 10 days, as listed in the following:

| | |
|----------------|------------------------|
| <u>Mg-28</u> | <u>Al-28</u> |
| <u>Ca-47</u> | <u>Sc-47</u> |
| <u>Ti-44</u> | <u>Sc-44</u> |
| <u>Fe-52</u> | <u>Mn-52m</u> |
| <u>Fe-60</u> | <u>Co-60m</u> |
| <u>Zn-69m</u> | <u>Zn-69</u> |
| <u>Ge-68</u> | <u>Ga-68</u> |
| <u>Rb-83</u> | <u>Kr-83m</u> |
| <u>Sr-82</u> | <u>Rb-82</u> |
| <u>Sr-90</u> | <u>Y-90</u> |
| <u>Sr-91</u> | <u>Y-91m</u> |
| <u>Sr-92</u> | <u>Y-92</u> |
| <u>Y-87</u> | <u>Sr-87m</u> |
| <u>Zr-95</u> | <u>Nb-95m</u> |
| <u>Zr-97</u> | <u>Nb-97m, Nb-97</u> |
| <u>Mo-99</u> | <u>Tc-99m</u> |
| <u>Tc-95m</u> | <u>Tc-95</u> |
| <u>Tc-96m</u> | <u>Tc-96</u> |
| <u>Ru-103</u> | <u>Rh-103m</u> |
| <u>Ru-106</u> | <u>Rh-106</u> |
| <u>Pd-103</u> | <u>Rh-103m</u> |
| <u>Ag-108m</u> | <u>Ag-108</u> |
| <u>Ag-110m</u> | <u>Ag-110</u> |
| <u>Cd-115</u> | <u>In-115m</u> |
| <u>In-114m</u> | <u>In-114</u> |
| <u>Sn-113</u> | <u>In-113m</u> |
| <u>Sn-121m</u> | <u>Sn-121</u> |
| <u>Sn-126</u> | <u>Sb-126m</u> |
| <u>Te-127m</u> | <u>Te-127</u> |
| <u>Te-129m</u> | <u>Te-129</u> |
| <u>Te-131m</u> | <u>Te-131</u> |
| <u>Te-132</u> | <u>I-132</u> |
| <u>I-135</u> | <u>Xe-135m</u> |
| <u>Xe-122</u> | <u>I-122</u> |
| <u>Cs-137</u> | <u>Ba-137m</u> |
| <u>Ba-131</u> | <u>Cs-131</u> |
| <u>Ba-140</u> | <u>La-140</u> |
| <u>Ce-144</u> | <u>Pr-144m, Pr-144</u> |
| <u>Pm-148m</u> | <u>Pm-148</u> |

| | |
|--------------------------------|---|
| <u>Gd-146</u> | <u>Eu-146</u> |
| <u>Dy-166</u> | <u>Ho-166</u> |
| <u>Hf-172</u> | <u>Lu-172</u> |
| <u>W-178</u> | <u>Ta-178</u> |
| <u>W-188</u> | <u>Re-188</u> |
| <u>Re-189</u> | <u>Os-189m</u> |
| <u>Os-194</u> | <u>Ir-194</u> |
| <u>Ir-189</u> | <u>Os-189m</u> |
| <u>Pt-188</u> | <u>Ir-188</u> |
| <u>Hg-194</u> | <u>Au-194</u> |
| <u>Hg-195m</u> | <u>Hg-195</u> |
| <u>Pb-210</u> | <u>Bi-210</u> |
| <u>Pb-212</u> | <u>Bi-212, Tl-208, Po-212</u> |
| <u>Bi-210m</u> | <u>Tl-206</u> |
| <u>Bi-212</u> | <u>Tl-208, Po-212</u> |
| <u>At-211</u> | <u>Po-211</u> |
| <u>Rn-222</u> | <u>Po-218, Pb-214, At-218, Bi-214, Po-214</u> |
| <u>Ra-223</u> | <u>Rn-219, Po-215, Pb-211, Bi-211, Po-211, Tl-207</u> |
| <u>Ra-224</u> | <u>Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212</u> |
| <u>Ra-225</u> | <u>Ac-225, Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209</u> |
| <u>Ra-226</u> | <u>Rn-222, Po-218, Pb-214, At-218, Bi-214, Po-214</u> |
| <u>Ra-228</u> | <u>Ac-228</u> |
| <u>Ac-225</u> | <u>Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209</u> |
| <u>Ac-227</u> | <u>Fr-223</u> |
| <u>Th-228</u> | <u>Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212</u> |
| <u>Th-234</u> | <u>Pa-234m, Pa-234</u> |
| <u>Pa-230</u> | <u>Ac-226, Th-226, Fr-222, Ra-222, Rn-218, Po-214</u> |
| <u>U-230</u> | <u>Th-226, Ra-222, Rn-218, Po-214</u> |
| <u>U-235</u> | <u>Th-231</u> |
| <u>Pu-241</u> | <u>U-237</u> |
| <u>Pu-244</u> | <u>U-240, Np-240m</u> |
| <u>Am-242m</u> | <u>Am-242, Np-238</u> |
| <u>Am-243</u> | <u>Np-239</u> |
| <u>Cm-247</u> | <u>Pu-243</u> |
| <u>Bk-249</u> | <u>Am-245</u> |
| <u>Cf-253</u> | <u>Cm-249</u> |

(b) The values of A_1 and A_2 in curies (Ci) are approximate and for information only; the regulatory standard units are Terabecquerels (TBq).

(c) The ~~quantity~~ **activity of Ir-192 in special form** may be determined from a measurement of the rate of decay or a measurement of the radiation level at a prescribed distance from the source.

(d) These values apply only to compounds of uranium that take the chemical form of UF_6 , UO_2F_2 and $\text{UO}_2(\text{NO}_3)_2$ in both normal and accident conditions of transport.

(e) 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.

(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) ~~$A_1 = 0.1 \text{ TBq (2.7 Ci)}$ and $A_2 = 0.001 \text{ TBq (0.027 Ci)}$ for Cf-252 for domestic use.~~ $A_2 = 0.74 \text{ TBq (20 Ci)}$ for Mo-99 for domestic use.

~~(i) $A_2 = 0.74 \text{ TBq (20 Ci)}$ for Mo-99 for domestic use.~~

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES

| Symbol of Radionuclide | Element and Atomic No. | 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 (a) | | 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 (a) | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Am-243 (a) | | 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} |
| 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} |
| 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 (a) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| 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 (a) | | 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 VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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 (a) | | 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} |
| 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 | Cesium (55) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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-131 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Cs-132 | | 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 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Cs-137 (a) | | 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) | | 1.0×10^3 | 2.7×10^{-8} | 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} |
| 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} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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) |
|------------------------|-------------------------|---|---|--|--|
| Ge-77 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Hf-172 | Hafnium (72) | 1.0×10^2 | 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} |
| 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} |
| 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 | | 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 | | 1.0×10^2 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| <u>Kr-79</u> | <u>Krypton (36)</u> | <u>1.0×10^3</u> | <u>2.7×10^{-8}</u> | <u>1.0×10^5</u> | <u>2.7×10^{-6}</u> |
| 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} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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) |
|------------------------|------------------------|---|---|--|--|
| 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} |
| 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) | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^7 | 2.7×10^{-4} |
| Np-237 (a) | | 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} |
| | | | | | |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | Activity concentration for exempt material (Bq/g) | Activity concentration for exempt material (Ci/g) | Activity limit for exempt consignment (Bq) | Activity limit for exempt consignment (Ci) |
|------------------------|------------------------|---|---|--|--|
| Pb-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 (a) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Pb-212 (a) | Palladium (46) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Pd-103 | | 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} |
| Pm-143 | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Pm-144 | Promethium (61) | 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 | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^6 | 2.7×10^{-5} |
| Pm-151 | Polonium (84) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Po-210 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Pr-142 | | 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 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Pt-191 | Platinum (78) | 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 | Plutonium (94) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^6 | 2.7×10^{-5} |
| Pu-236 | | 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} |
| Pu-240 | Radium (88) | 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 (a) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^5 | 2.7×10^{-6} |
| Ra-224 (a) | Rubidium (37) | 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 (a) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| Ra-228 (a) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Rb-81 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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) |
|------------------------|------------------------|---|---|--|--|
| 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} |
| 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 (a) | Radon (86) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^8 | 2.7×10^{-3} |
| 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 (a) | | 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} |
| 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^{-10} | 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} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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) |
|------------------------|------------------------|---|---|--|--|
| 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 | 2.7×10^{-6} |
| 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 (a) | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^4 | 2.7×10^{-7} |
| Sr-91 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| Sr-92 | Tritium (1) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| T(H-3) | | 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 | Tellurium (52) | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^7 | 2.7×10^{-4} |
| Te-121 | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^6 | 2.7×10^{-5} |
| Te-121m | | 1.0×10^2 | 2.7×10^{-9} | 1.0×10^{6S} | 2.7×10^{-56} |
| 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} |
| 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} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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-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 | 2.7×10^{-7} |
| Th-228 (a) | | 1.0 | 2.7×10^{-11} | 1.0×10^4 | 2.7×10^{-7} |
| Th-229 (a) | | 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 (a) | | 1.0×10^3 | 2.7×10^{-8} | 1.0×10^5 | 2.7×10^{-6} |
| Th (nat) (a) | | 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} |
| Tm-171 | | 1.0×10^4 | 2.7×10^{-7} | 1.0×10^8 | 2.7×10^{-3} |
| U-230 (fast lung absorption) (a), (b) | Uranium (92) | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| U-230 (medium lung absorption) (c) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| U-230 (slow lung absorption) (d) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^5 | 2.7×10^{-6} |
| U-232 (fast lung absorption) (a), (b) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| U-232 (medium lung absorption) (c) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| U-232 (slow lung absorption) (d) | | 1.0 | 2.7×10^{-11} | 1.0×10^3 | 2.7×10^{-8} |
| U-233 (fast lung absorption) (b) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-233 (medium lung absorption) (c) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |
| U-233 (slow lung absorption) (d) | | 1.0×10^1 | 2.7×10^{-10} | 1.0×10^4 | 2.7×10^{-7} |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | Activity concentration for exempt material (Bq/g) | Activity concentration for exempt material (Ci/g) | Activity limit for exempt consignment (Bq) | Activity limit for exempt consignment (Ci) |
|--|------------------------|---|---|--|--|
| U-234 (fast lung absorption) (b) | Uranium (92) | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-234 (medium lung absorption) (c) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-234 (slow lung absorption) (d) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-235 (all lung absorption types) (a),(b),(c),(d) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-236 (fast lung absorption) (b) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-236 (medium lung absorption) (c) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-236 (slow lung absorption) (d) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U-238 (all lung absorption types) (a), (b),(c),(d) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| U (nat)(a) | | 1.0 | 2.7X10 ⁻¹¹ | 1.0X10 ³ | 2.7X10 ⁻⁸ |
| U (enriched to 20% or less)(e) | | 1.0 | 2.7X10 ⁻¹¹ | 1.0X10 ³ | 2.7X10 ⁻⁸ |
| U (dep) | | 1.0 | 2.7X10 ⁻¹¹ | 1.0X10 ³ | 2.7X10 ⁻⁸ |
| V-48 | Vanadium (23) | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |
| V-49 | | 1.0X10 ⁴ | 2.7X10 ⁻⁷ | 1.0X10 ⁷ | 2.7X10 ⁻⁴ |
| W-178 | Tungsten (74) | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| W-181 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁷ | 2.7X10 ⁻⁴ |
| W-185 | | 1.0X10 ⁴ | 2.7X10 ⁻⁷ | 1.0X10 ⁷ | 2.7X10 ⁻⁴ |
| W-187 | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| W-188 | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |
| Xe-122 | Xenon (54) | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁹ | 2.7X10 ⁻² |
| Xe-123 | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁹ | 2.7X10 ⁻² |
| Xe-127 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |
| Xe-131m | | 1.0X10 ⁴ | 2.7X10 ⁻⁷ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| Xe-133 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁴ | 2.7X10 ⁻⁷ |
| Xe-135 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ¹⁰ | 2.7X10 ⁻¹ |
| Y-87 | Yttrium (39) | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Y-88 | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Y-90 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |

TABLE VII
EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT
CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES (Continued)

| Symbol of Radionuclide | Element and Atomic No. | 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) |
|------------------------|------------------------|---|---|--|--|
| Y-91 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Y-91m | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Y-92 | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |
| Y-93 | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |
| Yb-169 | Ytterbium (79) | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁷ | 2.7X10 ⁻⁴ |
| Yb-175 | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁷ | 2.7X10 ⁻⁴ |
| Zn-65 | Zinc (30) | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Zn-69 | | 1.0X10 ⁴ | 2.7X10 ⁻⁷ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Zn-69m | | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Zr-88 | Zirconium (40) | 1.0X10 ² | 2.7X10 ⁻⁹ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Zr-93(a) | | 1.0X10 ³ | 2.7X10 ⁻⁸ | 1.0X10 ⁷ | 2.7X10 ⁻⁴ |
| Zr-95 | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁶ | 2.7X10 ⁻⁵ |
| Zr-97 (a) | | 1.0X10 ¹ | 2.7X10 ⁻¹⁰ | 1.0X10 ⁵ | 2.7X10 ⁻⁶ |

NOTES

(a) 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-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, <u>Pb-210, Bi-210, Po-210</u> |
| Np-237 | Pa-233 |
| Am-242m | Am-242 |
| Am-243 | Np-239 |

(b) These values apply only to compounds of uranium that take the chemical form of UF_6 , UO_2F_2 , and $\text{UO}_2(\text{NO}_3)_2$ in both normal and accident conditions of transport.

(c) 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.

(d) These values apply to all compounds of uranium other than those specified in (d) and (e), above.

(e) These values apply to unirradiated uranium only.

TABLE VIII
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 |
| Alpha emitting nuclides, but no neutron emitters, are known to be present. (a) | 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 |
| Neutron emitting nuclides are known to be present or 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 |

(a) If beta or gamma emitting nuclides are known to be present, the A₁ value of 0.1 TBq (2.7 Ci) should be used.

TABLE IX
ACTIVITY–MASS RELATIONSHIPS FOR URANIUM

| Uranium Enrichment* wt % U-235 present | Specific Activity | |
|--|----------------------|----------------------|
| | TBq/g | Ci/g |
| 0.45 | 1.9×10^{-8} | 5.0×10^{-7} |
| 0.72 | 2.6×10^{-8} | 7.1×10^{-7} |
| 1 2. | 8×10^{-8} | 7.6×10^{-7} |
| 1.5 | 3.7×10^{-8} | 1.0×10^{-6} |
| 5 | 1.0×10^{-7} | 2.7×10^{-6} |
| 10 | 1.8×10^{-7} | 4.8×10^{-6} |
| 20 | 3.7×10^{-7} | 1.0×10^{-5} |
| 35 | 7.4×10^{-7} | 2.0×10^{-5} |
| 50 | 9.3×10^{-7} | 2.5×10^{-5} |
| 90 | 2.1×10^{-6} | 5.8×10^{-5} |
| 93 | 2.6×10^{-6} | 7.0×10^{-5} |
| 95 | 3.4×10^{-6} | 9.1×10^{-5} |
| Natural thorium | 8.1×10^{-9} | 2.2×10^{-7} |

Note: The figures for uranium include representative values for the activity of the uranium–234 that is concentrated during the enrichment process.