

## § 71.137

### § 71.137 Audits.

The licensee, certificate holder, and applicant for a CoC shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program. The audits must be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibilities in the areas being audited. Audited results must be documented and reviewed by management having responsibility in the area audited. Followup action, including reaudit of deficient areas, must be taken where indicated.

### APPENDIX A TO PART 71— DETERMINATION OF A<sub>1</sub> AND A<sub>2</sub>

I. Values of A<sub>1</sub> and A<sub>2</sub> for individual radionuclides, which are the bases for many activity limits elsewhere in these regulations, are given in Table A-1. The curie (Ci) values specified are obtained by converting from the Terabecquerel (TBq) value. The Terabecquerel values are the regulatory standard. The curie values are for information only and are not intended to be the regulatory standard. Where values of A<sub>1</sub> and A<sub>2</sub> 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 A<sub>1</sub> and A<sub>2</sub> values contained in Table A-3 may be used. Otherwise, the licensee shall obtain prior Commission approval of the A<sub>1</sub> and A<sub>2</sub> 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 Commission 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 Commission, in accordance with § 71.1 of this part.

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III. In the calculations of A<sub>1</sub> and A<sub>2</sub> 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 radionuclide has a half-life either longer than 10 days, or longer than that of the parent radionuclide, shall be considered as a single radionuclide, and the activity to be taken into account, and the A<sub>1</sub> and A<sub>2</sub> value to be applied, shall be those corresponding to the parent radionuclide of that chain. In the case of radioactive decay chains in which any daughter radionuclide has a half-life either longer than 10 days, or greater than that of the parent radionuclide, the parent and those daughter radionuclides shall be considered as mixtures of different radionuclides.

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<sub>1</sub>(i) is the A<sub>1</sub> value for radionuclide I.

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

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

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

c. Alternatively, the A<sub>1</sub> value for mixtures of special form material may be determined as follows:

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

where f(i) is the fraction of activity for radionuclide I in the mixture, and A<sub>1</sub>(i) is the appropriate A<sub>1</sub> value for radionuclide I.

d. Alternatively, the A<sub>2</sub> value for mixtures of normal form material may be determined as follows:

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

where f(i) is the fraction of activity for radionuclide I in the mixture, and A<sub>2</sub>(i) is the appropriate A<sub>2</sub> value for radionuclide 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 low-

est  $A_1$  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— $A_1$  AND  $A_2$  VALUES FOR RADIONUCLIDES

Symbol of radionuclide	Element and atomic number	$A_1$ (TBq)	$A_1$ (Ci) <sup>b</sup>	$A_2$ (TBq)	$A_2$ (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Ac-225 (a) .....	Actinium (89) .....	8.0×10 <sup>-1</sup>	2.2×10 <sup>1</sup>	6.0×10 <sup>-3</sup>	1.6×10 <sup>-1</sup>	2.1×10 <sup>3</sup>	5.8×10 <sup>4</sup>
Ac-227 (a) .....	.....	9.0×10 <sup>-1</sup>	2.4×10 <sup>1</sup>	9.0×10 <sup>-5</sup>	2.4×10 <sup>-3</sup>	2.7	7.2×10 <sup>1</sup>
Ac-228 .....	.....	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	8.4×10 <sup>4</sup>	2.2×10 <sup>6</sup>
Ag-105 .....	Silver (47) .....	2.0	5.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.0×10 <sup>4</sup>
Ag-108m (a) .....	.....	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	9.7×10 <sup>-1</sup>	2.6×10 <sup>1</sup>
Ag-110m (a) .....	.....	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	1.8×10 <sup>2</sup>	4.7×10 <sup>3</sup>
Ag-111 .....	.....	2.0	5.4×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	5.8×10 <sup>3</sup>	1.6×10 <sup>5</sup>
Al-26 .....	Aluminum (13) .....	1.0×10 <sup>-1</sup>	2.7	1.0×10 <sup>-1</sup>	2.7	7.0×10 <sup>-4</sup>	1.9×10 <sup>-2</sup>
Am-241 .....	Americium (95) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	1.3×10 <sup>-1</sup>	3.4
Am-242m (a) .....	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	3.6×10 <sup>-1</sup>	1.0×10 <sup>1</sup>
Am-243 (a) .....	.....	5.0	1.4×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	7.4×10 <sup>-3</sup>	2.0×10 <sup>-1</sup>
Ar-37 .....	Argon (18) .....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.7×10 <sup>3</sup>	9.9×10 <sup>4</sup>
Ar-39 .....	.....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	1.3	3.4×10 <sup>1</sup>
Ar-41 .....	.....	3.0×10 <sup>-1</sup>	8.1	3.0×10 <sup>-1</sup>	8.1	1.5×10 <sup>6</sup>	4.2×10 <sup>7</sup>
As-72 .....	Arsenic (33) .....	3.0×10 <sup>-1</sup>	8.1	3.0×10 <sup>-1</sup>	8.1	6.2×10 <sup>4</sup>	1.7×10 <sup>6</sup>
As-73 .....	.....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	8.2×10 <sup>2</sup>	2.2×10 <sup>4</sup>
As-74 .....	.....	1.0	2.7×10 <sup>1</sup>	9.0×10 <sup>-1</sup>	2.4×10 <sup>1</sup>	3.7×10 <sup>3</sup>	9.9×10 <sup>4</sup>
As-76 .....	.....	3.0×10 <sup>-1</sup>	8.1	3.0×10 <sup>-1</sup>	8.1	5.8×10 <sup>4</sup>	1.6×10 <sup>6</sup>
As-77 .....	.....	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	3.9×10 <sup>4</sup>	1.0×10 <sup>6</sup>
At-211 (a) .....	Astatine (85) .....	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	7.6×10 <sup>4</sup>	2.1×10 <sup>6</sup>
Au-193 .....	Gold (79) .....	7.0	1.9×10 <sup>2</sup>	2.0	5.4×10 <sup>1</sup>	3.4×10 <sup>4</sup>	9.2×10 <sup>5</sup>
Au-194 .....	.....	1.0	2.7×10 <sup>1</sup>	1.0	2.7×10 <sup>1</sup>	1.5×10 <sup>4</sup>	4.1×10 <sup>5</sup>
Au-195 .....	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	6.0	1.6×10 <sup>2</sup>	1.4×10 <sup>2</sup>	3.7×10 <sup>3</sup>
Au-198 .....	.....	1.0	2.7×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	9.0×10 <sup>3</sup>	2.4×10 <sup>5</sup>
Au-199 .....	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	7.7×10 <sup>3</sup>	2.1×10 <sup>5</sup>
Ba-131 (a) .....	Barium (56) .....	2.0	5.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>	3.1×10 <sup>3</sup>	8.4×10 <sup>4</sup>
Ba-133 .....	.....	3.0	8.1×10 <sup>1</sup>	3.0	8.1×10 <sup>1</sup>	9.4	2.6×10 <sup>2</sup>
Ba-133m .....	.....	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.2×10 <sup>4</sup>	6.1×10 <sup>5</sup>
Ba-140 (a) .....	.....	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	3.0×10 <sup>-1</sup>	8.1	2.7×10 <sup>3</sup>	7.3×10 <sup>4</sup>
Be-7 .....	Beryllium (4) .....	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	1.3×10 <sup>4</sup>	3.5×10 <sup>5</sup>
Be-10 .....	.....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	8.3×10 <sup>-4</sup>	2.2×10 <sup>-2</sup>
Bi-205 .....	Bismuth (83) .....	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	1.5×10 <sup>-3</sup>	4.2×10 <sup>4</sup>
Bi-206 .....	.....	3.0×10 <sup>-1</sup>	8.1	3.0×10 <sup>-1</sup>	8.1	3.8×10 <sup>3</sup>	1.0×10 <sup>5</sup>
Bi-207 .....	.....	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	1.9	5.2×10 <sup>1</sup>
Bi-210 .....	.....	1.0	2.7×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	4.6×10 <sup>3</sup>	1.2×10 <sup>5</sup>
Bi-210m (a) .....	.....	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.0×10 <sup>-2</sup>	5.4×10 <sup>-1</sup>	2.1×10 <sup>-5</sup>	5.7×10 <sup>-4</sup>
Bi-212 (a) .....	.....	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	5.4×10 <sup>5</sup>	1.5×10 <sup>7</sup>
Bk-247 .....	Berkelium (97) .....	8.0	2.2×10 <sup>2</sup>	8.0×10 <sup>-4</sup>	2.2×10 <sup>-2</sup>	3.8×10 <sup>-2</sup>	1.0
Bk-249 (a) .....	.....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.0×10 <sup>-1</sup>	8.1	6.1×10 <sup>1</sup>	1.6×10 <sup>3</sup>
Br-76 .....	Bromine (35) .....	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	9.4×10 <sup>4</sup>	2.5×10 <sup>6</sup>
Br-77 .....	.....	3.0	8.1×10 <sup>1</sup>	3.0	8.1×10 <sup>1</sup>	2.6×10 <sup>4</sup>	7.1×10 <sup>5</sup>
Br-82 .....	.....	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>4</sup>	1.1×10 <sup>6</sup>
C-11 .....	Carbon (6) .....	1.0	2.7×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	3.1×10 <sup>7</sup>	8.4×10 <sup>8</sup>
C-14 .....	.....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.0	8.1×10 <sup>1</sup>	1.6×10 <sup>-1</sup>	4.5

Ca-41 .....	Calcium (20) .....	Unlimited	Unlimited	Unlimited	$3.1 \times 10^{-3}$	$8.5 \times 10^{-2}$
Ca-45 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$2.7 \times 10^1$	$6.6 \times 10^2$	$1.8 \times 10^4$
Ca-47 (a) .....		3.0	$8.1 \times 10^1$	$3.0 \times 10^{-1}$	$8.1$	$2.3 \times 10^4$
Cd-109 .....	Cadmium (48) .....	$3.0 \times 10^1$	$8.1 \times 10^2$	2.0	$5.4 \times 10^1$	$6.1 \times 10^5$
Cd-113m .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$9.6 \times 10^1$
Cd-115 (a) .....		3.0	$8.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$8.3$
Cd-115m .....		$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$1.9 \times 10^4$
Ce-139 .....	Cerium (58) .....	7.0	$1.9 \times 10^2$	2.0	$5.4 \times 10^1$	$2.5 \times 10^2$
Ce-141 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.1 \times 10^3$
Ce-143 .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$2.5 \times 10^4$
Ce-144 (a) .....		$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$1.2 \times 10^2$
Cf-248 .....	Californium (98) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$6.0 \times 10^{-3}$	$1.6 \times 10^{-1}$	$5.8 \times 10^1$
Cf-249 .....		3.0	$8.1 \times 10^1$	$8.0 \times 10^{-4}$	$2.2 \times 10^{-2}$	$1.5 \times 10^{-1}$
Cf-250 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$2.0 \times 10^{-3}$	$5.4 \times 10^{-2}$	4.0
Cf-251 .....		7.0	$1.9 \times 10^2$	$7.0 \times 10^{-4}$	$1.9 \times 10^{-2}$	$5.9 \times 10^{-2}$
Cf-252 (h) .....		$5.0 \times 10^{-2}$	1.4	$3.0 \times 10^{-3}$	$8.1 \times 10^{-2}$	$2.0 \times 10^1$
Cf-253 (a) .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^{-2}$	1.1	$1.1 \times 10^3$
Cf-254 .....		$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$3.1 \times 10^2$
Cl-36 .....	Chlorine (17) .....	$1.0 \times 10^1$	$2.7 \times 10^2$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.2 \times 10^{-3}$
Cl-38 .....		$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$4.9 \times 10^6$
Cm-240 .....	Curium (96) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$7.5 \times 10^2$
Cm-241 .....		2.0	$5.4 \times 10^1$	1.0	$2.7 \times 10^1$	$6.1 \times 10^2$
Cm-242 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$1.0 \times 10^{-2}$	$2.7 \times 10^{-1}$	$1.2 \times 10^2$
Cm-243 .....		9.0	$2.4 \times 10^2$	$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$3.3 \times 10^3$
Cm-244 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$2.0 \times 10^{-3}$	$5.4 \times 10^{-2}$	$5.2 \times 10^1$
Cm-245 .....		9.0	$2.4 \times 10^2$	$9.0 \times 10^{-4}$	$2.4 \times 10^{-2}$	$6.4 \times 10^{-3}$
Cm-246 .....		9.0	$2.4 \times 10^2$	$9.0 \times 10^{-4}$	$2.4 \times 10^{-2}$	$1.1 \times 10^{-2}$
Cm-247 (a) .....		3.0	$8.1 \times 10^1$	$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$3.4 \times 10^{-6}$
Cm-248 .....		$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$3.0 \times 10^{-4}$	$8.1 \times 10^{-3}$	$1.6 \times 10^{-5}$
Co-55 .....	Cobalt (27) .....	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$1.1 \times 10^5$
Co-56 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$1.1 \times 10^3$
Co-57 .....		$1.0 \times 10^1$	$2.7 \times 10^2$	$1.0 \times 10^1$	$2.7 \times 10^2$	$3.1 \times 10^2$
Co-58 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$1.2 \times 10^3$
Co-58m .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$2.2 \times 10^5$
Co-60 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.2 \times 10^1$
Cr-51 .....	Chromium (24) .....	$3.0 \times 10^1$	$8.1 \times 10^2$	$3.0 \times 10^1$	$8.1 \times 10^2$	$3.4 \times 10^3$
Cs-129 .....	Cesium (55) .....	4.0	$1.1 \times 10^2$	4.0	$1.1 \times 10^2$	$2.8 \times 10^4$
Cs-131 .....		$3.0 \times 10^1$	$8.1 \times 10^2$	$3.0 \times 10^1$	$8.1 \times 10^2$	$3.8 \times 10^3$
Cs-132 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$5.7 \times 10^3$
Cs-134 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$4.8 \times 10^1$
Cs-134m .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$3.0 \times 10^5$
Cs-135 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	1.0	$2.7 \times 10^1$	$4.3 \times 10^{-5}$
Cs-136 .....		$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$2.7 \times 10^3$
Cs-137 (a) .....		2.0	$5.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	3.2
Cu-64 .....	Copper (29) .....	6.0	$1.6 \times 10^2$	1.0	$2.7 \times 10^1$	$1.4 \times 10^5$
Cu-67 .....		$1.0 \times 10^1$	$2.7 \times 10^2$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$2.8 \times 10^4$
Dy-159 .....	Dysprosium (66) .....	$2.0 \times 10^1$	$5.4 \times 10^2$	$2.0 \times 10^1$	$5.4 \times 10^2$	$2.1 \times 10^2$
Dy-165 .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$3.0 \times 10^5$
Dy-166 (a) .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$3.0 \times 10^{-1}$	8.1	$8.6 \times 10^3$
Er-169 .....	Erbium (68) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	1.0	$2.7 \times 10^1$	$3.1 \times 10^3$

TABLE A-1— $A_1$  AND  $A_2$  VALUES FOR RADIONUCLIDES—Continued

Symbol of radionuclide	Element and atomic number	$A_1$ (TBq)	$A_1$ (Ci) <sup>b</sup>	$A_2$ (TBq)	$A_2$ (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Er-171 .....		$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$9.0 \times 10^4$	$2.4 \times 10^6$
Eu-147 .....	Europium (63) .....	2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$1.4 \times 10^3$	$3.7 \times 10^4$
Eu-148 .....		$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$6.0 \times 10^2$	$1.6 \times 10^4$
Eu-149 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$2.0 \times 10^1$	$5.4 \times 10^2$	$3.5 \times 10^2$	$9.4 \times 10^3$
Eu-150 (short lived) .....		2.0	$5.4 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$6.1 \times 10^4$	$1.6 \times 10^6$
Eu-150 (long lived) .....		$7 \times 10^{-1}$	$1.9 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$6.1 \times 10^4$	$1.6 \times 10^6$
Eu-152 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	6.5	$1.8 \times 10^2$
Eu-152m .....		$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$8.2 \times 10^4$	$2.2 \times 10^6$
Eu-154 .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	9.8	$2.6 \times 10^2$
Eu-155 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	3.0	$8.1 \times 10^1$	$1.8 \times 10^1$	$4.9 \times 10^2$
Eu-156 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$2.0 \times 10^3$	$5.5 \times 10^4$
F-18 .....	Fluorine (9) .....	1.0	$2.7 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$3.5 \times 10^6$	$9.5 \times 10^7$
Fe-52 (a) .....	Iron (26) .....	$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$2.7 \times 10^5$	$7.3 \times 10^6$
Fe-55 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$8.8 \times 10^1$	$2.4 \times 10^3$
Fe-59 .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$1.8 \times 10^3$	$5.0 \times 10^4$
Fe-60 (a) .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^{-1}$	5.4	$7.4 \times 10^{-4}$	$2.0 \times 10^{-2}$
Ga-67 .....	Gallium (31) .....	7.0	$1.9 \times 10^2$	3.0	$8.1 \times 10^1$	$2.2 \times 10^4$	$6.0 \times 10^5$
Ga-68 .....		$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$1.5 \times 10^6$	$4.1 \times 10^7$
Ga-72 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$1.1 \times 10^5$	$3.1 \times 10^6$
Gd-146 (a) .....	Gadolinium (64) .....	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$6.9 \times 10^2$	$1.9 \times 10^4$
Gd-148 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$2.0 \times 10^{-3}$	$5.4 \times 10^{-2}$	1.2	$3.2 \times 10^1$
Gd-153 .....		$1.0 \times 10^1$	$2.7 \times 10^2$	9.0	$2.4 \times 10^2$	$1.3 \times 10^2$	$3.5 \times 10^3$
Gd-159 .....		3.0	$8.1 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$3.9 \times 10^4$	$1.1 \times 10^6$
Ge-68 (a) .....	Germanium (32) .....	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$2.6 \times 10^2$	$7.1 \times 10^3$
Ge-71 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$5.8 \times 10^3$	$1.6 \times 10^5$
Ge-77 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$1.3 \times 10^5$	$3.6 \times 10^6$
Hf-172 (a) .....	Hafnium (72) .....	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$4.1 \times 10^1$	$1.1 \times 10^3$
Hf-175 .....		3.0	$8.1 \times 10^1$	3.0	$8.1 \times 10^1$	$3.9 \times 10^2$	$1.1 \times 10^4$
Hf-181 .....		2.0	$5.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$6.3 \times 10^2$	$1.7 \times 10^4$
Hf-182 .....		Unlimited	Unlimited	Unlimited	Unlimited	$8.1 \times 10^{-6}$	$2.2 \times 10^{-4}$
Hg-194 (a) .....	Mercury (80) .....	1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$1.3 \times 10^{-1}$	3.5
Hg-195m (a) .....		3.0	$8.1 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$1.5 \times 10^4$	$4.0 \times 10^5$
Hg-197 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$1.0 \times 10^1$	$2.7 \times 10^2$	$9.2 \times 10^3$	$2.5 \times 10^5$
Hg-197m .....		$1.0 \times 10^1$	$2.7 \times 10^2$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$2.5 \times 10^4$	$6.7 \times 10^5$
Hg-203 .....		5.0	$1.4 \times 10^2$	1.0	$2.7 \times 10^1$	$5.1 \times 10^2$	$1.4 \times 10^4$
Ho-166 .....	Holmium (67) .....	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$2.6 \times 10^4$	$7.0 \times 10^5$
Ho-166m .....		$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$6.6 \times 10^{-2}$	1.8
I-123 .....	Iodine (53) .....	6.0	$1.6 \times 10^2$	3.0	$8.1 \times 10^1$	$7.1 \times 10^4$	$1.9 \times 10^6$
I-124 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$9.3 \times 10^3$	$2.5 \times 10^5$
I-125 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	3.0	$8.1 \times 10^1$	$6.4 \times 10^2$	$1.7 \times 10^4$
I-126 .....		2.0	$5.4 \times 10^1$	1.0	$2.7 \times 10^1$	$2.9 \times 10^3$	$8.0 \times 10^4$
I-129 .....		Unlimited	Unlimited	Unlimited	Unlimited	$6.5 \times 10^{-6}$	$1.8 \times 10^{-4}$
I-131 .....		3.0	$8.1 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$4.6 \times 10^3$	$1.2 \times 10^5$
I-132 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$3.8 \times 10^5$	$1.0 \times 10^7$

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I-133 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$4.2 \times 10^4$	$1.1 \times 10^6$
I-134 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$9.9 \times 10^5$	$2.7 \times 10^7$
I-135 (a) .....		$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.3 \times 10^5$	$3.5 \times 10^6$
In-111 .....	Indium (49) .....	3.0	$8.1 \times 10^1$	3.0	$8.1 \times 10^1$	$1.5 \times 10^4$	$4.2 \times 10^5$
In-113m .....		4.0	$1.1 \times 10^2$	2.0	$5.4 \times 10^1$	$6.2 \times 10^5$	$1.7 \times 10^7$
In-114m (a) .....		$1.0 \times 10^1$	$2.7 \times 10^2$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$8.6 \times 10^2$	$2.3 \times 10^4$
In-115m .....		7.0	$1.9 \times 10^2$	1.0	$2.7 \times 10^1$	$2.2 \times 10^5$	$6.1 \times 10^6$
Ir-189 (a) .....	Iridium (77) .....	$1.0 \times 10^1$	$2.7 \times 10^2$	$1.0 \times 10^1$	$2.7 \times 10^2$	$1.9 \times 10^3$	$5.2 \times 10^4$
Ir-190 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$2.3 \times 10^3$	$6.2 \times 10^4$
Ir-192 (c) .....		1.0	$2.7 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$3.4 \times 10^2$	$9.2 \times 10^3$
Ir-194 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$3.1 \times 10^4$	$8.4 \times 10^5$
K-40 .....	Potassium (19) .....	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$2.4 \times 10^{-7}$	$6.4 \times 10^{-6}$
K-42 .....		$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$2.2 \times 10^5$	$6.0 \times 10^6$
K-43 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.2 \times 10^5$	$3.3 \times 10^6$
Kr-81 .....	Krypton (36) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$7.8 \times 10^{-4}$	$2.1 \times 10^{-2}$
Kr-85 .....		$1.0 \times 10^1$	$2.7 \times 10^2$	$1.0 \times 10^1$	$2.7 \times 10^2$	$1.5 \times 10^1$	$3.9 \times 10^2$
Kr-85m .....		8.0	$2.2 \times 10^2$	3.0	$8.1 \times 10^1$	$3.0 \times 10^5$	$8.2 \times 10^6$
Kr-87 .....		$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$1.0 \times 10^6$	$2.8 \times 10^7$
La-137 .....	Lanthanum (57) .....	$3.0 \times 10^1$	$8.1 \times 10^2$	6.0	$1.6 \times 10^2$	$1.6 \times 10^{-3}$	$4.4 \times 10^{-2}$
La-140 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$2.1 \times 10^4$	$5.6 \times 10^5$
Lu-172 .....	Lutetium (71) .....	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$4.2 \times 10^3$	$1.1 \times 10^5$
Lu-173 .....		8.0	$2.2 \times 10^2$	8.0	$2.2 \times 10^2$	$5.6 \times 10^1$	$1.5 \times 10^3$
Lu-174 .....		9.0	$2.4 \times 10^2$	9.0	$2.4 \times 10^2$	$2.3 \times 10^1$	$6.2 \times 10^2$
Lu-174m .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$1.0 \times 10^1$	$2.7 \times 10^2$	$2.0 \times 10^2$	$5.3 \times 10^3$
Lu-177 .....		$3.0 \times 10^1$	$8.1 \times 10^2$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$4.1 \times 10^3$	$1.1 \times 10^5$
Mg-28 (a) .....	Magnesium (12) .....	$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$2.0 \times 10^5$	$5.4 \times 10^6$
Mn-52 .....	Manganese (25) .....	$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$1.6 \times 10^4$	$4.4 \times 10^5$
Mn-53 .....		Unlimited	Unlimited	Unlimited	Unlimited	$6.8 \times 10^{-5}$	$1.8 \times 10^{-3}$
Mn-54 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$2.9 \times 10^2$	$7.7 \times 10^3$
Mn-56 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$8.0 \times 10^5$	$2.2 \times 10^7$
Mo-93 .....	Molybdenum (42) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^1$	$5.4 \times 10^2$	$4.1 \times 10^{-2}$	1.1
Mo-99 (a) (i) .....		1.0	$2.7 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.8 \times 10^4$	$4.8 \times 10^5$
N-13 .....	Nitrogen (7) .....	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$5.4 \times 10^7$	$1.5 \times 10^9$
Na-22 .....	Sodium (11) .....	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$2.3 \times 10^2$	$6.3 \times 10^3$
Na-24 .....		$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$3.2 \times 10^5$	$8.7 \times 10^6$
Nb-93m .....	Niobium (41) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$3.0 \times 10^1$	$8.1 \times 10^2$	8.8	$2.4 \times 10^2$
Nb-94 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$6.9 \times 10^{-3}$	$1.9 \times 10^{-1}$
Nb-95 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$1.5 \times 10^3$	$3.9 \times 10^4$
Nb-97 .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$9.9 \times 10^5$	$2.7 \times 10^7$
Nd-147 .....	Neodymium (60) .....	6.0	$1.6 \times 10^2$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$3.0 \times 10^3$	$8.1 \times 10^4$
Nd-149 .....		$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$4.5 \times 10^5$	$1.2 \times 10^7$
Ni-59 .....	Nickel (28) .....	Unlimited	Unlimited	Unlimited	Unlimited	$3.0 \times 10^{-3}$	$8.0 \times 10^{-2}$
Ni-63 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$3.0 \times 10^1$	$8.1 \times 10^2$	2.1	$5.7 \times 10^1$
Ni-65 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$7.1 \times 10^5$	$1.9 \times 10^7$
Np-235 .....	Neptunium (93) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$5.2 \times 10^1$	$1.4 \times 10^3$
Np-236 (short-lived) .....		$2.0 \times 10^1$	$5.4 \times 10^2$	2.0	$5.4 \times 10^1$	$4.7 \times 10^{-4}$	$1.3 \times 10^{-2}$
Np-236 (long-lived) .....		$9.0 \times 10^0$	$2.4 \times 10^2$	$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$4.7 \times 10^{-4}$	$1.3 \times 10^{-2}$
Np-237 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$2.0 \times 10^{-3}$	$5.4 \times 10^{-2}$	$2.6 \times 10^{-5}$	$7.1 \times 10^{-4}$
Np-239 .....		7.0	$1.9 \times 10^2$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$8.6 \times 10^3$	$2.3 \times 10^5$
Os-185 .....	Osmium (76) .....	1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$2.8 \times 10^2$	$7.5 \times 10^3$

TABLE A-1— $A_1$  AND  $A_2$  VALUES FOR RADIONUCLIDES—Continued

Symbol of radionuclide	Element and atomic number	$A_1$ (TBq)	$A_1$ (Ci) <sup>b</sup>	$A_2$ (TBq)	$A_2$ (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
Os-191 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	2.0	5.4×10 <sup>1</sup>	1.6×10 <sup>3</sup>	4.4×10 <sup>4</sup>
Os-191m .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.0×10 <sup>1</sup>	8.1×10 <sup>2</sup>	4.6×10 <sup>4</sup>	1.3×10 <sup>6</sup>
Os-193 .....		2.0	5.4×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.0×10 <sup>4</sup>	5.3×10 <sup>5</sup>
Os-194 (a) .....		3.0×10 <sup>-1</sup>	8.1	3.0×10 <sup>-1</sup>	8.1	1.1×10 <sup>1</sup>	3.1×10 <sup>2</sup>
P-32 .....	Phosphorus (15) .....	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	1.1×10 <sup>4</sup>	2.9×10 <sup>5</sup>
P-33 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	1.0	2.7×10 <sup>1</sup>	5.8×10 <sup>3</sup>	1.6×10 <sup>5</sup>
Pa-230 (a) .....	Protactinium (91) .....	2.0	5.4×10 <sup>1</sup>	7.0×10 <sup>-2</sup>	1.9	1.2×10 <sup>3</sup>	3.3×10 <sup>4</sup>
Pa-231 .....		4.0	1.1×10 <sup>2</sup>	4.0×10 <sup>-4</sup>	1.1×10 <sup>-2</sup>	1.7×10 <sup>-3</sup>	4.7×10 <sup>-2</sup>
Pa-233 .....		5.0	1.4×10 <sup>2</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	7.7×10 <sup>2</sup>	2.1×10 <sup>4</sup>
Pb-201 .....	Lead (82) .....	1.0	2.7×10 <sup>1</sup>	1.0	2.7×10 <sup>1</sup>	6.2×10 <sup>4</sup>	1.7×10 <sup>6</sup>
Pb-202 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	1.2×10 <sup>-4</sup>	3.4×10 <sup>-3</sup>
Pb-203 .....		4.0	1.1×10 <sup>2</sup>	3.0	8.1×10 <sup>1</sup>	1.1×10 <sup>4</sup>	3.0×10 <sup>5</sup>
Pb-205 .....		Unlimited	Unlimited	Unlimited	Unlimited	4.5×10 <sup>-6</sup>	1.2×10 <sup>-4</sup>
Pb-210 (a) .....		1.0	2.7×10 <sup>1</sup>	5.0×10 <sup>-2</sup>	1.4	2.8	7.6×10 <sup>1</sup>
Pb-212 (a) .....		7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	2.0×10 <sup>-1</sup>	5.4	5.1×10 <sup>4</sup>	1.4×10 <sup>6</sup>
Pd-103 (a) .....	Palladium (46) .....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	2.8×10 <sup>3</sup>	7.5×10 <sup>4</sup>
Pd-107 .....		Unlimited	Unlimited	Unlimited	Unlimited	1.9×10 <sup>-5</sup>	5.1×10 <sup>-4</sup>
Pd-109 .....		2.0	5.4×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	7.9×10 <sup>4</sup>	2.1×10 <sup>6</sup>
Pm-143 .....	Promethium (61) .....	3.0	8.1×10 <sup>1</sup>	3.0	8.1×10 <sup>1</sup>	1.3×10 <sup>2</sup>	3.4×10 <sup>3</sup>
Pm-144 .....		7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	9.2×10 <sup>1</sup>	2.5×10 <sup>3</sup>
Pm-145 .....		3.0×10 <sup>1</sup>	8.1×10 <sup>2</sup>	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	5.2	1.4×10 <sup>2</sup>
Pm-147 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	2.0	5.4×10 <sup>1</sup>	3.4×10 <sup>1</sup>	9.3×10 <sup>2</sup>
Pm-148m (a) .....		8.0×10 <sup>-1</sup>	2.2×10 <sup>1</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	7.9×10 <sup>2</sup>	2.1×10 <sup>4</sup>
Pm-149 .....		2.0	5.4×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	1.5×10 <sup>4</sup>	4.0×10 <sup>5</sup>
Pm-151 .....		2.0	5.4×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.7×10 <sup>4</sup>	7.3×10 <sup>5</sup>
Po-210 .....	Polonium (84) .....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	2.0×10 <sup>-2</sup>	5.4×10 <sup>-1</sup>	1.7×10 <sup>2</sup>	4.5×10 <sup>3</sup>
Pr-142 .....	Praseodymium (59) .....	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.3×10 <sup>4</sup>	1.2×10 <sup>6</sup>
Pr-143 .....		3.0	8.1×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.5×10 <sup>3</sup>	6.7×10 <sup>4</sup>
Pt-188 (a) .....	Platinum (78) .....	1.0	2.7×10 <sup>1</sup>	8.0×10 <sup>-1</sup>	2.2×10 <sup>1</sup>	2.5×10 <sup>3</sup>	6.8×10 <sup>4</sup>
Pt-191 .....		4.0	1.1×10 <sup>2</sup>	3.0	8.1×10 <sup>1</sup>	8.7×10 <sup>3</sup>	2.4×10 <sup>5</sup>
Pt-193 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	1.4	3.7×10 <sup>1</sup>
Pt-193m .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	5.8×10 <sup>3</sup>	1.6×10 <sup>5</sup>
Pt-195m .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	6.2×10 <sup>3</sup>	1.7×10 <sup>5</sup>
Pt-197 .....		2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	3.2×10 <sup>4</sup>	8.7×10 <sup>5</sup>
Pt-197m .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	3.7×10 <sup>5</sup>	1.0×10 <sup>7</sup>
Pu-236 .....	Plutonium (94) .....	3.0×10 <sup>1</sup>	8.1×10 <sup>2</sup>	3.0×10 <sup>-3</sup>	8.1×10 <sup>-2</sup>	2.0×10 <sup>1</sup>	5.3×10 <sup>2</sup>
Pu-237 .....		2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	2.0×10 <sup>1</sup>	5.4×10 <sup>2</sup>	4.5×10 <sup>2</sup>	1.2×10 <sup>4</sup>
Pu-238 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	6.3×10 <sup>-1</sup>	1.7×10 <sup>1</sup>
Pu-239 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	2.3×10 <sup>-3</sup>	6.2×10 <sup>-2</sup>
Pu-240 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	8.4×10 <sup>-3</sup>	2.3×10 <sup>-1</sup>
Pu-241 (a) .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	6.0×10 <sup>-2</sup>	1.6	3.8	1.0×10 <sup>2</sup>
Pu-242 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	1.5×10 <sup>-4</sup>	3.9×10 <sup>-3</sup>
Pu-244 (a) .....		4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	1.0×10 <sup>-3</sup>	2.7×10 <sup>-2</sup>	6.7×10 <sup>-7</sup>	1.8×10 <sup>-5</sup>
Ra-223 (a) .....	Radium (88) .....	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	7.0×10 <sup>-3</sup>	1.9×10 <sup>-1</sup>	1.9×10 <sup>3</sup>	5.1×10 <sup>4</sup>

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Ra-224 (a) .....		4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	2.0×10 <sup>-2</sup>	5.4×10 <sup>-1</sup>	5.9×10 <sup>3</sup>	1.6×10 <sup>5</sup>
Ra-225 (a) .....		2.0×10 <sup>-1</sup>	5.4	4.0×10 <sup>-3</sup>	1.1×10 <sup>-1</sup>	1.5×10 <sup>3</sup>	3.9×10 <sup>4</sup>
Ra-226 (a) .....		2.0×10 <sup>-1</sup>	5.4	3.0×10 <sup>-3</sup>	8.1×10 <sup>-2</sup>	3.7×10 <sup>-2</sup>	1.0
Ra-228 (a) .....		6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.0×10 <sup>-2</sup>	5.4×10 <sup>-1</sup>	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>
Rb-81 .....	Rubidium (37) .....	2.0	5.4×10 <sup>1</sup>	8.0×10 <sup>-1</sup>	2.2×10 <sup>1</sup>	3.1×10 <sup>5</sup>	8.4×10 <sup>6</sup>
Rb-83 (a) .....		2.0	5.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>	6.8×10 <sup>2</sup>	1.8×10 <sup>4</sup>
Rb-84 .....		1.0	2.7×10 <sup>1</sup>	1.0	2.7×10 <sup>1</sup>	1.8×10 <sup>3</sup>	4.7×10 <sup>4</sup>
Rb-86 .....		5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	3.0×10 <sup>3</sup>	8.1×10 <sup>4</sup>
Rb-87 .....		Unlimited	Unlimited	Unlimited	Unlimited	3.2×10 <sup>-9</sup>	8.6×10 <sup>-8</sup>
Rb(nat) .....		Unlimited	Unlimited	Unlimited	Unlimited	6.7×10 <sup>6</sup>	1.8×10 <sup>8</sup>
Re-184 .....	Rhenium (75) .....	1.0	2.7×10 <sup>1</sup>	1.0	2.7×10 <sup>1</sup>	6.9×10 <sup>2</sup>	1.9×10 <sup>4</sup>
Re-184m .....		3.0	8.1×10 <sup>1</sup>	1.0	2.7×10 <sup>1</sup>	1.6×10 <sup>2</sup>	4.3×10 <sup>3</sup>
Re-186 .....		2.0	5.4×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	6.9×10 <sup>3</sup>	1.9×10 <sup>5</sup>
Re-187 .....		Unlimited	Unlimited	Unlimited	Unlimited	1.4×10 <sup>-9</sup>	3.8×10 <sup>-8</sup>
Re-188 .....		4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	3.6×10 <sup>4</sup>	9.8×10 <sup>5</sup>
Re-189 (a) .....		3.0	8.1×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.5×10 <sup>4</sup>	6.8×10 <sup>5</sup>
Re(nat) .....		Unlimited	Unlimited	Unlimited	Unlimited	0.0	2.4×10 <sup>-8</sup>
Rh-99 .....	Rhodium (45) .....	2.0	5.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>	3.0×10 <sup>3</sup>	8.2×10 <sup>4</sup>
Rh-101 .....		4.0	1.1×10 <sup>2</sup>	3.0	8.1×10 <sup>1</sup>	4.1×10 <sup>1</sup>	1.1×10 <sup>3</sup>
Rh-102 .....		5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	4.5×10 <sup>1</sup>	1.2×10 <sup>3</sup>
Rh-102m .....		2.0	5.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>	2.3×10 <sup>2</sup>	6.2×10 <sup>3</sup>
Rh-103m .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	1.2×10 <sup>6</sup>	3.3×10 <sup>7</sup>
Rh-105 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	8.0×10 <sup>-1</sup>	2.2×10 <sup>1</sup>	3.1×10 <sup>4</sup>	8.4×10 <sup>5</sup>
Rn-222 (a) .....	Radon (86) .....	3.0×10 <sup>-1</sup>	8.1	4.0×10 <sup>-3</sup>	1.1×10 <sup>-1</sup>	5.7×10 <sup>3</sup>	1.5×10 <sup>5</sup>
Ru-97 .....	Ruthenium (44) .....	5.0	1.4×10 <sup>2</sup>	5.0	1.4×10 <sup>2</sup>	1.7×10 <sup>4</sup>	4.6×10 <sup>5</sup>
Ru-103 (a) .....		2.0	5.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>	1.2×10 <sup>3</sup>	3.2×10 <sup>4</sup>
Ru-105 .....		1.0	2.7×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	2.5×10 <sup>5</sup>	6.7×10 <sup>6</sup>
Ru-106 (a) .....		2.0×10 <sup>-1</sup>	5.4	2.0×10 <sup>-1</sup>	5.4	1.2×10 <sup>2</sup>	3.3×10 <sup>3</sup>
S-35 .....	Sulphur (16) .....	4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.0	8.1×10 <sup>1</sup>	1.6×10 <sup>3</sup>	4.3×10 <sup>4</sup>
Sb-122 .....	Antimony (51) .....	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	1.5×10 <sup>4</sup>	4.0×10 <sup>5</sup>
Sb-124 .....		6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	6.5×10 <sup>2</sup>	1.7×10 <sup>4</sup>
Sb-125 .....		2.0	5.4×10 <sup>1</sup>	1.0	2.7×10 <sup>1</sup>	3.9×10 <sup>1</sup>	1.0×10 <sup>3</sup>
Sb-126 .....		4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	3.1×10 <sup>3</sup>	8.4×10 <sup>4</sup>
Sc-44 .....	Scandium (21) .....	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	6.7×10 <sup>5</sup>	1.8×10 <sup>7</sup>
Sc-46 .....		5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	1.3×10 <sup>3</sup>	3.4×10 <sup>4</sup>
Sc-47 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	7.0×10 <sup>-1</sup>	1.9×10 <sup>1</sup>	3.1×10 <sup>4</sup>	8.3×10 <sup>5</sup>
Sc-48 .....		3.0×10 <sup>-1</sup>	8.1	3.0×10 <sup>-1</sup>	8.1	5.5×10 <sup>4</sup>	1.5×10 <sup>6</sup>
Se-75 .....	Selenium (34) .....	3.0	8.1×10 <sup>1</sup>	3.0	8.1×10 <sup>1</sup>	5.4×10 <sup>2</sup>	1.5×10 <sup>4</sup>
Se-79 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	2.0	5.4×10 <sup>1</sup>	2.6×10 <sup>-3</sup>	7.0×10 <sup>-2</sup>
Si-31 .....	Silicon (14) .....	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	1.4×10 <sup>6</sup>	3.9×10 <sup>7</sup>
Si-32 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	5.0×10 <sup>-1</sup>	1.4×10 <sup>1</sup>	3.9	1.1×10 <sup>2</sup>
Sm-145 .....	Samarium (62) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	9.8×10 <sup>1</sup>	2.6×10 <sup>3</sup>
Sm-147 .....		Unlimited	Unlimited	Unlimited	Unlimited	8.5×10 <sup>-1</sup>	2.3×10 <sup>-8</sup>
Sm-151 .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	1.0×10 <sup>1</sup>	2.7×10 <sup>2</sup>	9.7×10 <sup>-1</sup>	2.6×10 <sup>1</sup>
Sm-153 .....		9.0	2.4×10 <sup>2</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	1.6×10 <sup>4</sup>	4.4×10 <sup>5</sup>
Sn-113 (a) .....	Tin (50) .....	4.0	1.1×10 <sup>2</sup>	2.0	5.4×10 <sup>1</sup>	3.7×10 <sup>2</sup>	1.0×10 <sup>4</sup>
Sn-117m .....		7.0	1.9×10 <sup>2</sup>	4.0×10 <sup>-1</sup>	1.1×10 <sup>1</sup>	3.0×10 <sup>3</sup>	8.2×10 <sup>4</sup>
Sn-119m .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	3.0×10 <sup>1</sup>	8.1×10 <sup>2</sup>	1.4×10 <sup>2</sup>	3.7×10 <sup>3</sup>
Sn-121m (a) .....		4.0×10 <sup>1</sup>	1.1×10 <sup>3</sup>	9.0×10 <sup>-1</sup>	2.4×10 <sup>1</sup>	2.0	5.4×10 <sup>1</sup>
Sn-123 .....		8.0×10 <sup>-1</sup>	2.2×10 <sup>1</sup>	6.0×10 <sup>-1</sup>	1.6×10 <sup>1</sup>	3.0×10 <sup>2</sup>	8.2×10 <sup>3</sup>

TABLE A-1— $A_1$  AND  $A_2$  VALUES FOR RADIONUCLIDES—Continued

Symbol of radionuclide	Element and atomic number	$A_1$ (TBq)	$A_1$ (Ci) <sup>b</sup>	$A_2$ (TBq)	$A_2$ (Ci) <sup>b</sup>	Specific activity	
		(TBq)	(Ci/g)	(TBq/g)	(Ci/g)		
Sn-125 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^3$	$1.1 \times 10^5$
Sn-126 (a) .....		$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$1.0 \times 10^{-3}$	$2.8 \times 10^{-2}$
Sr-82 (a) .....	Strontium (38)	$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$2.3 \times 10^3$	$6.2 \times 10^4$
Sr-85 .....		2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$8.8 \times 10^2$	$2.4 \times 10^4$
Sr-85m .....		5.0	$1.4 \times 10^2$	5.0	$1.4 \times 10^2$	$1.2 \times 10^6$	$3.3 \times 10^7$
Sr-87m .....		3.0	$8.1 \times 10^1$	3.0	$8.1 \times 10^1$	$4.8 \times 10^5$	$1.3 \times 10^7$
Sr-89 .....		$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.1 \times 10^3$	$2.9 \times 10^4$
Sr-90 (a) .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	5.1	$1.4 \times 10^2$
Sr-91 (a) .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$1.3 \times 10^5$	$3.6 \times 10^6$
Sr-92 (a) .....		1.0	$2.7 \times 10^1$	$3.0 \times 10^{-1}$	8.1	$4.7 \times 10^5$	$1.3 \times 10^7$
T(H-3) .....	Tritium (1)	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$3.6 \times 10^2$	$9.7 \times 10^3$
Ta-178 (long-lived) .....	Tantalum (73)	1.0	$2.7 \times 10^1$	$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$4.2 \times 10^6$	$1.1 \times 10^8$
Ta-179 .....		$3.0 \times 10^1$	$8.1 \times 10^2$	$3.0 \times 10^1$	$8.1 \times 10^2$	$4.1 \times 10^1$	$1.1 \times 10^3$
Ta-182 .....		$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$2.3 \times 10^2$	$6.2 \times 10^3$
Tb-157 .....	Terbium (65)	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$5.6 \times 10^{-1}$	$1.5 \times 10^1$
Tb-158 .....		1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$5.6 \times 10^{-1}$	$1.5 \times 10^1$
Tb-160 .....		1.0	$2.7 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$4.2 \times 10^2$	$1.1 \times 10^4$
Tc-95m (a) .....	Technetium (43)	2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$8.3 \times 10^2$	$2.2 \times 10^4$
Tc-96 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$1.2 \times 10^4$	$3.2 \times 10^5$
Tc-96m (a) .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$1.4 \times 10^6$	$3.8 \times 10^7$
Tc-97 .....		Unlimited	Unlimited	Unlimited	Unlimited	$5.2 \times 10^{-5}$	$1.4 \times 10^{-3}$
Tc-97m .....		$4.0 \times 10^1$	$1.1 \times 10^3$	1.0	$2.7 \times 10^1$	$5.6 \times 10^2$	$1.5 \times 10^4$
Tc-98 .....		$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$3.2 \times 10^{-5}$	$8.7 \times 10^{-4}$
Tc-99 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.3 \times 10^{-4}$	$1.7 \times 10^{-2}$
Tc-99m .....		$1.0 \times 10^1$	$2.7 \times 10^2$	4.0	$1.1 \times 10^2$	$1.9 \times 10^5$	$5.3 \times 10^6$
Te-121 .....	Tellurium (52)	2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$2.4 \times 10^3$	$6.4 \times 10^4$
Te-121m .....		5.0	$1.4 \times 10^2$	3.0	$8.1 \times 10^1$	$2.6 \times 10^2$	$7.0 \times 10^3$
Te-123m .....		8.0	$2.2 \times 10^2$	1.0	$2.7 \times 10^1$	$3.3 \times 10^2$	$8.9 \times 10^3$
Te-125m .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.7 \times 10^2$	$1.8 \times 10^4$
Te-127 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$9.8 \times 10^4$	$2.6 \times 10^6$
Te-127m (a) .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$3.5 \times 10^2$	$9.4 \times 10^3$
Te-129 .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$7.7 \times 10^5$	$2.1 \times 10^7$
Te-129m (a) .....		$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$1.1 \times 10^3$	$3.0 \times 10^4$
Te-131m (a) .....		$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$3.0 \times 10^4$	$8.0 \times 10^5$
Te-132 (a) .....		$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$1.1 \times 10^4$	$8.0 \times 10^5$
Th-227 .....	Thorium (90)	$1.0 \times 10^1$	$2.7 \times 10^2$	$5.0 \times 10^{-3}$	$1.4 \times 10^{-1}$	$1.1 \times 10^3$	$3.1 \times 10^4$
Th-228 (a) .....		$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$3.0 \times 10^1$	$8.2 \times 10^2$
Th-229 .....		5.0	$1.4 \times 10^2$	$5.0 \times 10^{-4}$	$1.4 \times 10^{-2}$	$7.9 \times 10^{-3}$	$2.1 \times 10^{-1}$
Th-230 .....		$1.0 \times 10^1$	$2.7 \times 10^2$	$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$7.6 \times 10^{-4}$	$2.1 \times 10^{-2}$
Th-231 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$2.0 \times 10^4$	$5.3 \times 10^5$
Th-232 .....		Unlimited	Unlimited	Unlimited	Unlimited	$4.0 \times 10^{-9}$	$1.1 \times 10^{-7}$
Th-234 (a) .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$8.6 \times 10^2$	$2.3 \times 10^4$
Th(nat) .....		Unlimited	Unlimited	Unlimited	Unlimited	$8.1 \times 10^{-9}$	$2.2 \times 10^{-7}$
Ti-44 (a) .....	Titanium (22)	$5.0 \times 10^{-1}$	$1.4 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	6.4	$1.7 \times 10^2$

TI-200 .....	Thallium (81) .....	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$2.2 \times 10^4$	$6.0 \times 10^5$
TI-201 .....	.....	$1.0 \times 10^1$	$2.7 \times 10^2$	4.0	$1.1 \times 10^2$	$7.9 \times 10^3$	$2.1 \times 10^5$
TI-202 .....	.....	2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$2.0 \times 10^3$	$5.3 \times 10^4$
TI-204 .....	.....	$1.0 \times 10^1$	$2.7 \times 10^2$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$1.7 \times 10^1$	$4.6 \times 10^2$
Tm-167 .....	Thulium (69) .....	7.0	$1.9 \times 10^2$	$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$3.1 \times 10^3$	$8.5 \times 10^4$
Tm-170 .....	.....	3.0	$8.1 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$2.2 \times 10^2$	$6.0 \times 10^3$
Tm-171 .....	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$
U-230 (fast lung absorption) (a)(d).	Uranium (92) .....	$4.0 \times 10^1$	$1.1 \times 10^3$	$1.0 \times 10^{-1}$	2.7	$1.0 \times 10^3$	$2.7 \times 10^4$
U-230 (medium lung absorption) (a)(e).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^{-3}$	$1.1 \times 10^{-1}$	$1.0 \times 10^3$	$2.7 \times 10^4$
U-230 (slow lung absorption) (a)(f).	.....	$3.0 \times 10^1$	$8.1 \times 10^2$	$3.0 \times 10^{-3}$	$8.1 \times 10^{-2}$	$1.0 \times 10^3$	$2.7 \times 10^4$
U-232 (fast lung absorption) (d).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$1.0 \times 10^{-2}$	$2.7 \times 10^{-1}$	$8.3 \times 10^{-1}$	$2.2 \times 10^1$
U-232 (medium lung absorption) (e).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$7.0 \times 10^{-3}$	$1.9 \times 10^{-1}$	$8.3 \times 10^{-1}$	$2.2 \times 10^1$
U-232 (slow lung absorption) (f).	.....	$1.0 \times 10^1$	$2.7 \times 10^2$	$1.0 \times 10^{-3}$	$2.7 \times 10^{-2}$	$8.3 \times 10^{-1}$	$2.2 \times 10^1$
U-233 (fast lung absorption) (d).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$9.0 \times 10^{-2}$	2.4	$3.6 \times 10^{-4}$	$9.7 \times 10^{-3}$
U-233 (medium lung absorption) (e).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$3.6 \times 10^{-4}$	$9.7 \times 10^{-3}$
U-233 (slow lung absorption) (f).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$6.0 \times 10^{-3}$	$1.6 \times 10^{-1}$	$3.6 \times 10^{-4}$	$9.7 \times 10^{-3}$
U-234 (fast lung absorption) (d).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$9.0 \times 10^{-2}$	2.4	$2.3 \times 10^{-4}$	$6.2 \times 10^{-3}$
U-234 (medium lung absorption) (e).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$2.3 \times 10^{-4}$	$6.2 \times 10^{-3}$
U-234 (slow lung absorption) (f).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$6.0 \times 10^{-3}$	$1.6 \times 10^{-1}$	$2.3 \times 10^{-4}$	$6.2 \times 10^{-3}$
U-235 (all lung absorption types) (a),(d),(e),(f).	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	$8.0 \times 10^{-8}$	$2.2 \times 10^{-6}$
U-236 (fast lung absorption) (d).	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	$2.4 \times 10^{-6}$	$6.5 \times 10^{-5}$
U-236 (medium lung absorption) (e).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$2.0 \times 10^{-2}$	$5.4 \times 10^{-1}$	$2.4 \times 10^{-6}$	$6.5 \times 10^{-5}$
U-236 (slow lung absorption) (f).	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$6.0 \times 10^{-3}$	$1.6 \times 10^{-1}$	$2.4 \times 10^{-6}$	$6.5 \times 10^{-5}$
U-238 (all lung absorption types) (d),(e),(f).	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	$1.2 \times 10^{-8}$	$3.4 \times 10^{-7}$
U (nat) .....	.....	Unlimited	Unlimited	Unlimited	Unlimited	$2.6 \times 10^{-8}$	$7.1 \times 10^{-7}$
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) .....	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$6.3 \times 10^3$	$1.7 \times 10^5$
V-49 .....	.....	$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$3.0 \times 10^2$	$8.1 \times 10^3$
W-178 (a) .....	Tungsten (74) .....	9.0	$2.4 \times 10^2$	5.0	$1.4 \times 10^2$	$1.3 \times 10^3$	$3.4 \times 10^4$

TABLE A-1— $A_1$  AND  $A_2$  VALUES FOR RADIONUCLIDES—Continued

Symbol of radionuclide	Element and atomic number	$A_1$ (TBq)	$A_1$ (Ci) <sup>b</sup>	$A_2$ (TBq)	$A_2$ (Ci) <sup>b</sup>	Specific activity	
						(TBq/g)	(Ci/g)
W-181 .....		$3.0 \times 10^1$	$8.1 \times 10^2$	$3.0 \times 10^1$	$8.1 \times 10^2$	$2.2 \times 10^2$	$6.0 \times 10^3$
W-185 .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$3.5 \times 10^2$	$9.4 \times 10^3$
W-187 .....		2.0	$5.4 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$2.6 \times 10^4$	$7.0 \times 10^5$
W-188 (a) .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$3.0 \times 10^{-1}$	8.1	$3.7 \times 10^2$	$1.0 \times 10^4$
Xe-122 (a) .....	Xenon (54)	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.8 \times 10^4$	$1.3 \times 10^6$
Xe-123 .....		2.0	$5.4 \times 10^1$	$7.0 \times 10^{-1}$	$1.9 \times 10^1$	$4.4 \times 10^5$	$1.2 \times 10^7$
Xe-127 .....		4.0	$1.1 \times 10^2$	2.0	$5.4 \times 10^1$	$1.0 \times 10^3$	$2.8 \times 10^4$
Xe-131m .....		$4.0 \times 10^1$	$1.1 \times 10^3$	$4.0 \times 10^1$	$1.1 \times 10^3$	$3.1 \times 10^3$	$8.4 \times 10^4$
Xe-133 .....		$2.0 \times 10^1$	$5.4 \times 10^2$	$1.0 \times 10^1$	$2.7 \times 10^2$	$6.9 \times 10^3$	$1.9 \times 10^5$
Xe-135 .....		3.0	$8.1 \times 10^1$	2.0	$5.4 \times 10^1$	$9.5 \times 10^4$	$2.6 \times 10^6$
Y-87 (a) .....	Yttrium (39)	1.0	$2.7 \times 10^1$	1.0	$2.7 \times 10^1$	$1.7 \times 10^4$	$4.5 \times 10^5$
Y-88 .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$5.2 \times 10^2$	$1.4 \times 10^4$
Y-90 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$2.0 \times 10^4$	$5.4 \times 10^5$
Y-91 .....		$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$9.1 \times 10^2$	$2.5 \times 10^4$
Y-91m .....		2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$1.5 \times 10^6$	$4.2 \times 10^7$
Y-92 .....		$2.0 \times 10^{-1}$	5.4	$2.0 \times 10^{-1}$	5.4	$3.6 \times 10^5$	$9.6 \times 10^6$
Y-93 .....		$3.0 \times 10^{-1}$	8.1	$3.0 \times 10^{-1}$	8.1	$1.2 \times 10^5$	$3.3 \times 10^6$
Yb-169 .....	Ytterbium (70)	4.0	$1.1 \times 10^2$	1.0	$2.7 \times 10^1$	$8.9 \times 10^2$	$2.4 \times 10^4$
Yb-175 .....		$3.0 \times 10^1$	$8.1 \times 10^2$	$9.0 \times 10^{-1}$	$2.4 \times 10^1$	$6.6 \times 10^3$	$1.8 \times 10^5$
Zn-65 .....	Zinc (30)	2.0	$5.4 \times 10^1$	2.0	$5.4 \times 10^1$	$3.0 \times 10^2$	$8.2 \times 10^3$
Zn-69 .....		3.0	$8.1 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.8 \times 10^6$	$4.9 \times 10^7$
Zn-69m (a) .....		3.0	$8.1 \times 10^1$	$6.0 \times 10^{-1}$	$1.6 \times 10^1$	$1.2 \times 10^5$	$3.3 \times 10^6$
Zr-88 .....	Zirconium (40)	3.0	$8.1 \times 10^1$	3.0	$8.1 \times 10^1$	$6.6 \times 10^2$	$1.8 \times 10^4$
Zr-93 .....		Unlimited	Unlimited	Unlimited	Unlimited	$9.3 \times 10^{-5}$	$2.5 \times 10^{-3}$
Zr-95 (a) .....		2.0	$5.4 \times 10^1$	$8.0 \times 10^{-1}$	$2.2 \times 10^1$	$7.9 \times 10^2$	$2.1 \times 10^4$
Zr-97 (a) .....		$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$4.0 \times 10^{-1}$	$1.1 \times 10^1$	$7.1 \times 10^4$	$1.9 \times 10^6$

<sup>a</sup>  $A_1$  and/or  $A_2$  values include contributions from daughter nuclides with half-lives less than 10 days.<sup>b</sup> The values of  $A_1$  and  $A_2$  in Curies (Ci) are approximate and for information only; the regulatory standard units are Terabecquerels (TBq), (see Appendix A to part 71—Determination of  $A_1$  and  $A_2$ , Section I.). For radionuclide Bi-205, the specific activity is corrected to  $1.5 \times 10^3$  TBq/g. For radionuclide Cr-248, the specific activity is corrected to  $1.6 \times 10^{-4}$  TBq/g. For radionuclide Eu-150 (long lived), the  $A_1$  value is corrected to  $7.0 \times 10^{-1}$  TBq. For radionuclide Te-132(a), the specific activity is corrected to  $3.0 \times 10^5$  Ci/g.<sup>c</sup> 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.<sup>d</sup> These values apply only to compounds of uranium that take the chemical form of  $\text{UF}_6$ ,  $\text{UO}_2\text{F}_2$  and  $\text{UO}_2(\text{NO}_3)_2$  in both normal and accident conditions of transport.<sup>e</sup> These values apply only to compounds of uranium that take the chemical form of  $\text{UO}_3$ ,  $\text{UF}_4$ ,  $\text{UCl}_4$  and hexavalent compounds in both normal and accident conditions of transport.<sup>f</sup> These values apply to all compounds of uranium other than those specified in notes (d) and (e) of this table.<sup>g</sup> These values apply to unirradiated uranium only.<sup>h</sup>  $A_1 = 0.1$  TBq (2.7 Ci) and  $A_2 = 0.001$  TBq (0.027 Ci) for Cf-252 for domestic use.<sup>i</sup>  $A_2 = 0.74$  TBq (20 Ci) for Mo-99 for domestic use.

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TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Ac-225 .....	Actinium (89) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Ac-227 .....	.....	1.0x10 <sup>-1</sup>	2.7x10 <sup>-12</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Ac-228 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ag-105 .....	Silver (47) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ag-108m (b) .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ag-110m .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ag-111 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Al-26 .....	Aluminum (13) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Am-241 .....	Americium (95) .....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Am-242m (b) .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Am-243 (b) .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Ar-37 .....	Argon (18) .....	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Ar-39 .....	.....	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Ar-41 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
As-72 .....	Arsenic (33) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
As-73 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
As-74 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
As-76 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
As-77 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
At-211 .....	Astatine (85) .....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Au-193 .....	Gold (79) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Au-194 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Au-195 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Au-198 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Au-199 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ba-131 .....	Barium (56) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ba-133 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ba-133m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ba-140 (b) .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Be-7 .....	Beryllium (4) .....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Be-10 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Bi-205 .....	Bismuth (83) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Bi-206 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Bi-207 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Bi-210 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Bi-210m .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Bi-212 (b) .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Bk-247 .....	Berkelium (97) .....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Bk-249 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Br-76 .....	Bromine (35) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Br-77 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Br-82 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
C-11 .....	Carbon (6) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
C-14 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ca-41 .....	Calcium (20) .....	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ca-45 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ca-47 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Cd-109 .....	Cadmium (48) .....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Cd-113m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Cd-115 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Cd-115m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ce-139 .....	Cerium (58) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ce-141 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ce-143 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ce-144 (b) .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Cf-248 .....	Californium (98) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Cf-249 .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Cf-250 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Cf-251 .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Cf-252 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Cf-253 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Cf-254 .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Cl-36 .....	Chlorine (17) .....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Cl-38 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Cm-240 .....	Curium (96) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Cm-241 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Cm-242 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Cm-243 .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>

TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES—Continued

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)
Cm-244 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Cm-245 .....		1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
Cm-246 .....		1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
Cm-247 .....		1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Cm-248 .....		1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
Co-55 .....	Cobalt (27) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Co-56 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Co-57 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Co-58 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Co-58m .....		1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Co-60 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Cr-51 .....	Chromium (24) .....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Cs-129 .....	Cesium (55) .....	1.0×10 <sup>3</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Cs-131 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Cs-132 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Cs-134 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Cs-134m .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Cs-135 .....		1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Cs-136 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Cs-137 (b) .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Cu-64 .....	Copper (29) .....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Cu-67 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Dy-159 .....	Dysprosium (66) .....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Dy-165 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Dy-166 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Er-169 .....	Erbium (68) .....	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Er-171 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-147 .....	Europium (63) .....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-148 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-149 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Eu-150 (short lived) .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-150 (long lived) .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-152 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-152m .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-154 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Eu-155 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Eu-156 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
F-18 .....	Fluorine (9) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Fe-52 .....	Iron (26) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Fe-55 .....		1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Fe-59 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Fe-60 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Ga-67 .....	Gallium (31) .....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Ga-68 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Ga-72 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Gd-146 .....	Gadolinium (64) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Gd-148 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Gd-153 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Gd-159 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Ge-68 .....	Germanium (32) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Ge-71 .....		1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>8</sup>	2.7×10 <sup>-3</sup>
Ge-77 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Hf-172 .....	Hafnium (72) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hf-175 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hf-181 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hf-182 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hg-194 .....	Mercury (80) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hg-195m .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hg-197 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
Hg-197m .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
Hg-203 .....		1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Ho-166 .....	Holmium (67) .....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Ho-166m .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
I-123 .....	Iodine (53) .....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
I-124 .....		1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
I-125 .....		1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>

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TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES—Continued

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)
I-126 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
I-129 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
I-131 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
I-132 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
I-133 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
I-134 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
I-135 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
In-111 .....	Indium (49)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
In-113m .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
In-114m .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
In-115m .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ir-189 .....	Indium (77)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ir-190 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ir-192 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Ir-194 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
K-40 .....	Potassium (19)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
K-42 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
K-43 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Kr-81 .....	Krypton (36)	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Kr-85 .....		1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Kr-85m .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>10</sup>	2.7x10 <sup>-1</sup>
Kr-87 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
La-137 .....	Lanthanum (57)	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
La-140 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Lu-172 .....	Lutetium (71)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Lu-173 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Lu-174 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Lu-174m .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Lu-177 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Mg-28 .....	Magnesium (12)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Mn-52 .....	Manganese (25)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Mn-53 .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
Mn-54 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Mn-56 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Mo-93 .....	Molybdenum (42)	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Mo-99 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
N-13 .....	Nitrogen (7)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
Na-22 .....	Sodium (11)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Na-24 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Nb-93m .....	Niobium (41)	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Nb-94 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Nb-95 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Nb-97 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Nd-147 .....	Neodymium (60)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Nd-149 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ni-59 .....	Nickel (28)	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Ni-63 .....		1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Ni-65 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Np-235 .....	Neptunium (93)	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Np-236 (short-lived).		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Np-236 (long-lived).		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Np-237 (b) .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Np-239 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Os-185 .....	Osmium (76)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Os-191 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Os-191m .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Os-193 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Os-194 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
P-32 .....	Phosphorus (15)	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
P-33 .....		1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Pa-230 .....	Protactinium (91)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pa-231 .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Pa-233 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pb-201 .....	Lead (82)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pb-202 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pb-203 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>

TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES—Continued

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Pb-205 .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pb-210 (b) .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Pb-212 (b) .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Pd-103 .....	Palladium (46)	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Pd-107 .....		1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Pd-109 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pm-143 .....	Promethium (61)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pm-144 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pm-145 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pm-147 .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pm-148m .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pm-149 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pm-151 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Po-210 .....	Polonium (84)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Pr-142 .....	Praseodymium (59)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Pr-143 .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pt-188 .....	Platinum (78)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pt-191 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pt-193 .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pt-193m .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pt-195m .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pt-197 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pt-197m .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Pu-236 .....	Plutonium (94)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Pu-237 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Pu-238 .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Pu-239 .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Pu-240 .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Pu-241 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Pu-242 .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Pu-244 .....		1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Ra-223 (b) .....	Radium (88)	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Ra-224 (b) .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Ra-225 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Ra-226 (b) .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Ra-228 (b) .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Rb-81 .....	Rubidium (37)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Rb-83 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Rb-84 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Rb-86 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Rb-87 .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Rb(nat) .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Re-184 .....	Rhenium (75)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Re-184m .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Re-186 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Re-187 .....		1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
Re-188 .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Re-189 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Re(nat) .....		1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
Rh-99 .....	Rhodium (45)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Rh-101 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Rh-102 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Rh-102m .....		1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Rh-103m .....		1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Rh-105 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Rn-222 (b) .....	Radon (86)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Ru-97 .....	Ruthenium (44)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ru-103 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ru-105 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ru-106 (b) .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
S-35 .....	Sulphur (16)	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Sb-122 .....	Antimony (51)	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Sb-124 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sb-125 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sb-126 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Sc-44 .....	Scandium (21)	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Sc-46 .....		1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sc-47 .....		1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>

TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES—Continued

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)
Sc-48 .....	Selenium (34) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Se-75 .....	Selenium (34) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Se-79 .....	Selenium (34) .....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Si-31 .....	Silicon (14) .....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Si-32 .....	Silicon (14) .....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sm-145 .....	Samarium (62) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Sm-147 .....	Samarium (62) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Sm-151 .....	Samarium (62) .....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Sm-153 .....	Samarium (62) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sn-113 .....	Tin (50) .....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Sn-117m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sn-119m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Sn-121m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Sn-123 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sn-125 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Sn-126 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Sr-82 .....	Strontium (38) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Sr-85 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sr-85m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Sr-87m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sr-89 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Sr-90 (b) .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Sr-91 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Sr-92 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
T(H-3) .....	Tritium (1) .....	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>	1.0x10 <sup>9</sup>	2.7x10 <sup>-2</sup>
Ta-178 (long-lived) .....	Tantalum (73) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Ta-179 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Ta-182 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Tb-157 .....	Terbium (65) .....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Tb-158 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tb-160 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tc-95m .....	Technetium (43) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tc-96 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tc-96m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Tc-97 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
Tc-97m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Tc-98 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tc-99 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Tc-99m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Te-121 .....	Tellurium (52) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Te-121m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Te-123m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Te-125m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Te-127 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Te-127m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Te-129 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Te-129m .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Te-131m .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Te-132 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Th-227 .....	Thorium (90) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Th-228 (b) .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Th-229 (b) .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Th-230 .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Th-231 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Th-232 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Th-234 (b) .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Th (nat) (b) .....	.....	1.0	2.7x10 <sup>-11</sup>	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>
Ti-44 .....	Titanium (22) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Tl-200 .....	Thallium (81) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tl-201 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tl-202 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tl-204 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>
Tm-167 .....	Thulium (69) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tm-170 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Tm-171 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>8</sup>	2.7x10 <sup>-3</sup>
U-230 (fast lung absorption) (b),(d) .....	Uranium (92) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>

TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES—Continued

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
U-230 (medium lung absorption) (e).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-230 (slow lung absorption) (f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-232 (fast lung absorption) (b),(d).	.....	1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
U-232 (medium lung absorption) (e).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-232 (slow lung absorption) (f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-233 (fast lung absorption) (d).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-233 (medium lung absorption) (e).	.....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
U-233 (slow lung absorption) (f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
U-234 (fast lung absorption) (d).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-234 (medium lung absorption) (e).	.....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
U-234 (slow lung absorption) (f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
U-235 (all lung absorption types) (b),(d),(e),(f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-236 (fast lung absorption) (d).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-236 (medium lung absorption) (e).	.....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
U-236 (slow lung absorption) (f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U-238 (all lung absorption types) (b),(d),(e),(f).	.....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
U (nat) (b) .....	.....	1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
U (enriched to 20% or less)(g).	.....	1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
U (dep) .....	.....	1.0	2.7×10 <sup>-11</sup>	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>
V-48 .....	Vanadium (23) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
V-49 .....	.....	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
W-178 .....	Tungsten (74) .....	1.0×10 <sup>1</sup>	2.7×10 <sup>-10</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
W-181 .....	.....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
W-185 .....	.....	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>7</sup>	2.7×10 <sup>-4</sup>
W-187 .....	.....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>6</sup>	2.7×10 <sup>-5</sup>
W-188 .....	.....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Xe-122 .....	Xenon (54) .....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>9</sup>	2.7×10 <sup>-2</sup>
Xe-123 .....	.....	1.0×10 <sup>2</sup>	2.7×10 <sup>-9</sup>	1.0×10 <sup>9</sup>	2.7×10 <sup>-2</sup>
Xe-127 .....	.....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>5</sup>	2.7×10 <sup>-6</sup>
Xe-131m .....	.....	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Xe-133 .....	.....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>4</sup>	2.7×10 <sup>-7</sup>
Xe-135 .....	.....	1.0×10 <sup>3</sup>	2.7×10 <sup>-8</sup>	1.0×10 <sup>10</sup>	2.7×10 <sup>-1</sup>

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TABLE A-2—EXEMPT MATERIAL ACTIVITY CONCENTRATIONS AND EXEMPT CONSIGNMENT ACTIVITY LIMITS FOR RADIONUCLIDES—Continued

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)
Y-87 .....	Yttrium (39) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Y-88 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Y-90 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Y-91 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Y-91m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Y-92 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Y-93 .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>
Yb-169 .....	Ytterbium (70) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Yb-175 .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Zn-65 .....	Zinc (30) .....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Zn-69 .....	.....	1.0x10 <sup>4</sup>	2.7x10 <sup>-7</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Zn-69m .....	.....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Zr-88 .....	Zirconium (40) .....	1.0x10 <sup>2</sup>	2.7x10 <sup>-9</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Zr-93 (b) .....	.....	1.0x10 <sup>3</sup>	2.7x10 <sup>-8</sup>	1.0x10 <sup>7</sup>	2.7x10 <sup>-4</sup>
Zr-95 .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>6</sup>	2.7x10 <sup>-5</sup>
Zr-97 (b) .....	.....	1.0x10 <sup>1</sup>	2.7x10 <sup>-10</sup>	1.0x10 <sup>5</sup>	2.7x10 <sup>-6</sup>

<sup>a</sup>[Reserved]

<sup>b</sup>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

Ih-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-234 Pa-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

<sup>c</sup>[Reserved]

<sup>d</sup>These values apply only to compounds of uranium that take the chemical form of UF<sub>6</sub>, UO<sub>2</sub>F<sub>2</sub> and UO<sub>2</sub>(NO<sub>3</sub>)<sub>3</sub> in both normal and accident conditions of transport.

<sup>e</sup>These values apply only to compounds of uranium that take the chemical form of UO<sub>3</sub>, UF<sub>4</sub>, UCl<sub>4</sub> and hexavalent compounds in both normal and accident conditions of transport.

<sup>f</sup>These values apply to all compounds of uranium other than those specified in notes (d) and (e) of this table.

<sup>g</sup>These values apply to unirradiated uranium only.

TABLE A-3—GENERAL VALUES FOR  $A_1$  AND  $A_2$ 

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.	$1 \times 10^{-1}$	$2.7 \times 10^0$	$2 \times 10^{-2}$	$5.4 \times 10^{-1}$	$1 \times 10^1$	$2.7 \times 10^{-10}$	$1 \times 10^4$	$2.7 \times 10^{-7}$
Only alpha emitting radionuclides are known to be present.	$2 \times 10^{-1}$	$5.4 \times 10^0$	$9 \times 10^{-5}$	$2.4 \times 10^{-3}$	$1 \times 10^{-1}$	$2.7 \times 10^{-12}$	$1 \times 10^3$	$2.7 \times 10^{-8}$
No relevant data are available .....	$1 \times 10^{-3}$	$2.7 \times 10^{-2}$	$9 \times 10^{-5}$	$2.4 \times 10^{-3}$	$1 \times 10^{-1}$	$2.7 \times 10^{-12}$	$1 \times 10^3$	$2.7 \times 10^{-8}$

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TABLE A-4—ACTIVITY-MASS RELATIONSHIPS  
FOR URANIUM

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

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

[69 FR 3800, Jan. 26, 2004; 69 FR 58039, Sept. 29, 2004]

## PART 72—LICENSING REQUIREMENTS FOR THE INDEPENDENT STORAGE OF SPENT NUCLEAR FUEL, HIGH-LEVEL RADIOACTIVE WASTE, AND REACTOR-RELATED GREATER THAN CLASS C WASTE

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