

Figure: 25 TAC §289.252(jj)(9)

Category 1 and Category 2 Radioactive Material Thresholds

The terabecquerel (TBq) values are the regulatory standard. The curie (Ci) values specified are obtained by converting from the TBq value. The curie values are provided for practical usefulness only.

<u>Radioactive material</u>	<u>Category 1 (TBq)</u>	<u>Category 1 (Ci)</u>	<u>Category 2 (TBq)</u>	<u>Category 2 (Ci)</u>
<u>Americium-241</u>	<u>60</u>	<u>1,620</u>	<u>0.6</u>	<u>16.2</u>
<u>Americium-241/Be</u>	<u>60</u>	<u>1,620</u>	<u>0.6</u>	<u>16.2</u>
<u>Californium-252</u>	<u>20</u>	<u>540</u>	<u>0.2</u>	<u>5.40</u>
<u>Cobalt-60</u>	<u>30</u>	<u>810</u>	<u>0.3</u>	<u>8.10</u>
<u>Curium-244</u>	<u>50</u>	<u>1,350</u>	<u>0.5</u>	<u>13.5</u>
<u>Cesium-137</u>	<u>100</u>	<u>2,700</u>	<u>1</u>	<u>27.0</u>
<u>Gadolinium-153</u>	<u>1,000</u>	<u>27,000</u>	<u>10</u>	<u>270</u>
<u>Iridium-192</u>	<u>80</u>	<u>2,160</u>	<u>0.8</u>	<u>21.6</u>
<u>Plutonium-238</u>	<u>60</u>	<u>1,620</u>	<u>0.6</u>	<u>16.2</u>
<u>Plutonium-239/Be</u>	<u>60</u>	<u>1,620</u>	<u>0.6</u>	<u>16.2</u>
<u>Promethium-147</u>	<u>40,000</u>	<u>1,080,000</u>	<u>400</u>	<u>10,800</u>
<u>Radium-226</u>	<u>40</u>	<u>1,080</u>	<u>0.4</u>	<u>10.8</u>
<u>Selenium-75</u>	<u>200</u>	<u>5,400</u>	<u>2</u>	<u>54.0</u>
<u>Strontium-90</u>	<u>1,000</u>	<u>27,000</u>	<u>10</u>	<u>270</u>
<u>Thulium-170</u>	<u>20,000</u>	<u>540,000</u>	<u>200</u>	<u>5,400</u>
<u>Ytterbium-169</u>	<u>300</u>	<u>8,100</u>	<u>3</u>	<u>81.0</u>

Note: Calculations Concerning Multiple Sources or Multiple Radionuclides

The "sum of fractions" methodology for evaluating combinations of multiple sources or multiple radionuclides is to be used in determining whether a location meets or exceeds the threshold and is subject to the requirements of §289.252(ii) of this subchapter.

I. If multiple sources of the same radionuclide or multiple radionuclides are aggregated at a location, the sum of the ratios of the total activity of each of the radionuclides must be determined to verify whether the activity at the location is less than the category 1 or category 2 thresholds in Figure: 25 TAC §289.252(jj)(9), as appropriate. If the calculated sum of the ratios, using the equation below, is greater than or equal to 1.0, then the applicable requirements of §289.252(ii) of this subchapter apply.

II. First, determine the total activity for each radionuclide from Figure: 25 TAC §289.252(jj)(9). This is done by adding the activity of each individual source, material in any device, and any loose or bulk material that contains the radionuclide. Then use the equation below to calculate the sum of the ratios by inserting the total activity of the applicable radionuclides in the numerator of the equation and, in the denominator of the equation, the corresponding activity threshold from Figure: 25 TAC §289.252(jj)(9).

Calculations must be performed in regulatory standard values (i.e., TBq) and the numerator and denominator values must be in the same units.

R_1 = total activity for radionuclide 1

R_2 = total activity for radionuclide 2

R_N = total activity for radionuclide n

AR_1 = activity threshold for radionuclide 1

AR_2 = activity threshold for radionuclide 2

AR_N = activity threshold for radionuclide n

$$\frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \dots + \frac{R_n}{AR_n} \geq 1.0$$

Category 1 and Category 2 Radioactive Material Thresholds

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Radioactive material	Category 1 (TBq)	Category 1 (Ci)	Category 2 (TBq)	Category 2 (Ci)
Americium-241	60	1,620	0.6	16.2
Americium-241/Be	60	1,620	0.6	16.2
Californium-252	20	540	0.2	5.40
Cobalt-60	30	810	0.3	8.10
Curium-244	50	1,350	0.5	13.5
Cesium-137	100	2,700	1	27.0
Gadolinium-153	1,000	27,000	10	270
Iridium-192	80	2,160	0.8	21.6
Plutonium-238	60	1,620	0.6	16.2
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Promethium-147	40,000	1,080,000	400	10,800
Radium-226	40	1,080	0.4	10.8
Selenium-75	200	5,400	2	54.0
Strontium-90	1,000	27,000	10	270
Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3	81.0

Note: Calculations Concerning Multiple Sources or Multiple Radionuclides

The "sum of fractions" methodology for evaluating combinations of multiple sources or multiple radionuclides is to be used in determining whether a location meets or exceeds the threshold and is thus subject to the requirements of §289.252(ii) of this title.

I. If multiple sources of the same radionuclide and/or multiple radionuclides are aggregated at a location, the sum of the ratios of the total activity of each of the radionuclides must be determined to verify whether the activity at the location is less than the category 1 or category 2 thresholds in Figure: 25 TAC §289.252(jj)(9), as appropriate. If the calculated sum of the ratios, using the equation below, is greater than or equal to 1.0, then the applicable requirements of §289.252(ii) of this title apply.

II. First determine the total activity for each radionuclide from Figure: 25 TAC §289.252(jj)(9). This is done by adding the activity of each individual source, material in any device, and any loose or bulk material that contains the radionuclide. Then use the equation below to calculate the sum of the ratios by inserting the total activity of the applicable radionuclides in the numerator of the equation and, in the denominator of the equation, the corresponding activity threshold from Figure: 25 TAC §289.252(jj)(9) which is applicable.

Calculations must be performed in metric values (i.e., TBq) and the numerator and denominator values must be in the same units.

R_1 = total activity for radionuclide 1

R_2 = total activity for radionuclide 2

R_N = total activity for radionuclide n

AR_1 = activity threshold for radionuclide 1

AR_2 = activity threshold for radionuclide 2

AR_N = activity threshold for radionuclide n

$$\sum_1^n \left[\frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \frac{R_n}{AR_n} \right] \geq 1.0$$