

Chapter DHS 157
APPENDIX U

Category 1 and Category 2 Quantity of Radioactive Material Thresholds

The sum of fractions methodology for evaluating combinations of multiple sources, aggregated 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 subch. XV of ch. DHS 157. Category 1 and category 2 quantities of radioactive material do not include the radioactive material contained in any fuel assembly, subassembly, fuel rod, or fuel pellet. 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.

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
Plutonium-239/Be.....	60	1,620	0.6	16.2
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 subch. XV.

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 shall be determined to verify whether the activity at the location is less than the category 1 or category 2 thresholds of Appendix U, 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 subch. XV apply.

II. First determine the total activity for each radionuclide from Appendix U. 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 from Appendix U in the numerator of the equation and the corresponding threshold activity from Table 1 in the denominator of the equation. Calculations shall be performed in metric values (i.e., TBq) and the numerator and denominator values shall be in the same units.

- R₁ = total activity for radionuclide 1
- R₂ = total activity for radionuclide 2
- R_N = total activity for radionuclide n
- AR₁ = activity threshold for radionuclide 1
- AR₂ = activity threshold for radionuclide 2
- AR_N = activity threshold for radionuclide n

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