

**Chapter DHS 157**

**APPENDIX P**

**Quantities of Radioactive Materials Requiring Consideration of the  
 Need for a Contingency Plan for Responding to a Release**

<b>Radioactive Material<sup>1/2</sup></b>	<b>Release Fraction</b>	<b>Quantity (GBq)</b>	<b>Quantity (Ci)</b>
Actinium-228.....	0.001.....	148,000.....	4,000
Americium-241.....	0.001.....	74.....	2
Americium-242.....	0.001.....	74.....	2
Americium-243.....	0.001.....	74.....	2
Antimony-124.....	0.01.....	148,000.....	4,000
Antimony-126.....	0.01.....	222,000.....	6,000
Barium-133.....	0.01.....	370,000.....	10,000
Barium-140.....	0.01.....	1,110,000.....	30,000
Bismuth-207.....	0.01.....	185,000.....	5,000
Bismuth-210.....	0.01.....	22,200.....	600
Cadmium-109.....	0.01.....	37,000.....	1,000
Cadmium-113.....	0.01.....	2,960.....	80
Calcium-45.....	0.01.....	740,000.....	20,000
Californium-252.....	0.001.....	333.....	9 (20 mg)
Carbon-14 (Non-CO <sub>2</sub> ).....	0.01.....	1,850,000.....	50,000
Cerium-141.....	0.01.....	370,000.....	10,000
Cerium-144.....	0.01.....	11,100.....	300
Cesium-134.....	0.01.....	74,000.....	2,000
Cesium-137.....	0.01.....	111,000.....	3,000
Chlorine-36.....	0.5.....	3,700.....	100
Chromium-51.....	0.01.....	11,100,000.....	300,000
Cobalt-60.....	0.001.....	185,000.....	5,000
Copper-64.....	0.01.....	7,400,000.....	200,000
Curium-242.....	0.001.....	2,220.....	60
Curium-243.....	0.001.....	110.....	3
Curium-244.....	0.001.....	148.....	4
Curium-245.....	0.001.....	74.....	2
Europium-152.....	0.01.....	18,500.....	500
Europium-154.....	0.01.....	14,800.....	400
Europium-155.....	0.01.....	111,000.....	3,000
Gadolinium-153.....	0.01.....	185,000.....	5,000
Germanium-68.....	0.01.....	74,000.....	2,000
Gold-198.....	0.01.....	1,110,000.....	30,000
Hafnium-172.....	0.01.....	14,800.....	400
Hafnium-181.....	0.01.....	259,000.....	7,000
Holmium-166m.....	0.01.....	3,700.....	100
Hydrogen-3.....	0.5.....	740,000.....	20,000
Indium-114m.....	0.01.....	37,000.....	1,000
Iodine-125.....	0.5.....	370.....	10
Iodine-131.....	0.5.....	370.....	10
Iridium-192.....	0.001.....	1,480,000.....	40,000
Iron-55.....	0.01.....	1,480,000.....	40,000
Iron-59.....	0.01.....	259,000.....	7,000

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Krypton-85.....	1.0.....	222,000,000.....	6,000,000
Lead-210.....	0.01.....	296.....	8
Manganese-56.....	0.01.....	2,220,000.....	60,000
Mercury-203.....	0.01.....	370,000.....	10,000
Molybdenum-99.....	0.01.....	1,110,000.....	30,000
Neptunium-237.....	0.001.....	74.....	2
Nickel-63.....	0.01.....	740,000.....	20,000
Niobium-94.....	0.01.....	11,100.....	300
Phosphorus-32.....	0.5.....	3,700.....	100
Phosphorus-33.....	0.5.....	37,000.....	1,000
Polonium-210.....	0.01.....	370.....	10
Potassium-42.....	0.01.....	333,000.....	9,000
Promethium-145.....	0.01.....	148,000.....	4,000
Promethium-147.....	0.01.....	148,000.....	4,000
Radium-226.....	0.001.....	3,700.....	100
Ruthenium-106.....	0.01.....	7,400.....	200
Samarium-151.....	0.01.....	148,000.....	4,000
Scandium-46.....	0.01.....	111,000.....	3,000
Selenium-75.....	0.01.....	370,000.....	10,000
Silver-110m.....	0.01.....	37,000.....	1,000
Sodium-22.....	0.01.....	333,000.....	9,000
Sodium-24.....	0.01.....	370,000.....	10,000
Strontium-89.....	0.01.....	111,000.....	3,000
Strontium-90.....	0.01.....	3,330.....	90
Sulfur-35.....	0.5.....	33,300.....	900
Technetium-99.....	0.01.....	370,000.....	10,000
Technetium-99m.....	0.01.....	14,800,000.....	400,000
Tellurium-127m.....	0.01.....	185,000.....	5,000
Tellurium-129m.....	0.01.....	185,000.....	5,000
Terbium-160.....	0.01.....	148,000.....	4,000
Thulium-170.....	0.01.....	148,000.....	4,000
Tin-113.....	0.01.....	370,000.....	10,000
Tin-123.....	0.01.....	111,000.....	3,000
Tin-126.....	0.01.....	37,000.....	1,000
Titanium-44.....	0.01.....	3,700.....	100
Vanadium-48.....	0.01.....	259,000.....	7,000
Xenon-133.....	1.0.....	33,300,000.....	900,000
Yttrium-91.....	0.01.....	74,000.....	2,000
Zinc-65.....	0.01.....	185,000.....	5,000
Zirconium-93.....	0.01.....	14,800.....	400
Zirconium-95.....	0.01.....	185,000.....	5,000
Any other beta-gamma emitter.....	0.01.....	370,000.....	10,000
Mixed fission products.....	0.01.....	37,000.....	1,000
Mixed corrosion products.....	0.01.....	370,000.....	10,000
Contaminated equipment, beta-gamma.....	0.001.....	370,000.....	10,000
Irradiated material, any form other than solid noncombustible.....	0.01.....	37,000.....	1,000
Irradiated material, solid noncombustible.....	0.001.....	370,000.....	10,000
Mixed radioactive waste, beta-gamma.....	0.01.....	37,000.....	1,000
Packaged mixed waste, <sup>2/</sup> beta-gamma.....	0.001.....	370,000.....	10,000
Any other alpha emitter.....	0.001.....	74.....	2
Contaminated equipment, alpha.....	0.0001.....	740.....	20

Packaged waste, alpha<sup>2/</sup> .....0.0001.....740.....20

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<sup>1/</sup> For combinations of radioactive materials, the licensee is required to consider whether an emergency plan is needed if the sum of the ratios of the quantity of each radioactive material authorized to the quantity listed for that material above exceeds one.

<sup>2/</sup> Waste packaged in Type B containers does not require an emergency plan.