

**Chapter HFS 157**

**APPENDIX B**

<b>EXEMPT QUANTITIES</b>			
<b>RADIOACTIVE MATERIAL</b>	<b>MICROCURIES</b>	<b>RADIOACTIVE MATERIAL</b>	<b>MICROCURIES</b>
Antimony-122 (Sb 122)	100	Europium-155 (Eu 155)	10
Antimony-124 (Sb 124)	10	Fluorine-18 (F 18)	1,000
Antimony-125 (Sb 125)	10	Gadolinium-153 (Gd 153)	10
Arsenic-73 (As 73)	100	Gadolinium-159 (Gd 159)	100
Arsenic-74 (As 74)	10	Gallium-67 (Ga 67)	100
Arsenic-76 (As 76)	10	Gallium-72 (Ga 72)	10
Arsenic-77 (As 77)	100	Germanium-68 (Ge 68)	10
Barium-131 (Ba 131)	10	Germanium-71 (Ge 71)	100
Barium-133 (Ba 133)	10	Gold-195 (Au 195)	10
Barium-140 (Ba 140)	10	Gold-198 (Au 198)	100
Bismuth-210 (Bi 210)	1	Gold-199 (Au 199)	100
Bromine-82 (Br 82)	10	Hafnium-181 (Hf 181)	10
Cadmium-109 (Cd 109)	10	Holmium-166 (Ho 166)	100
Cadmium-115m (Cd 115m)	10	Hydrogen-3 (H 3)	1,000
Cadmium-115 (Cd 115)	100	Indium-111 (In 111)	100
Calcium-45 (Ca 45)	10	Indium-113m (In 113m)	100
Calcium-47 (Ca 47)	10	Indium-114m (In 114m)	10
Carbon-14 (C 14)	100	Indium-115m (In 115m)	100
Cerium-141 (Ce 141)	100	Indium-115 (In 115)	10
Cerium-143 (Ce 143)	100	Iodine-123 (I 123)	100
Cerium-144 (Ce 144)	1	Iodine-125 (I 125)	1
Cesium-129 (Cs 129)	100	Iodine-126 (I 126)	1
Cesium-131 (Cs 131)	1,000	Iodine-129 (I 129)	0.1
Cesium-134m (Cs 134m)	100	Iodine-131 (I 131)	1
Cesium-134 (Cs 134)	1	Iodine-132 (I 132)	10
Cesium-135 (Cs 135)	10	Iodine-133 (I 133)	1
Cesium-136 (Cs 136)	10	Iodine-134 (I 134)	10
Cesium-137 (Cs 137)	10	Iodine-135 (I 135)	10
Chlorine-36 (Cl 36)	10	Iridium-192 (Ir 192)	10
Chlorine-38 (Cl 38)	10	Iridium-194 (Ir 194)	100
Chromium-51 (Cr 51)	1,000	Iron-52 (Fe 52)	10
Cobalt-57 (Co 57)	100	Iron-55 (Fe 55)	100
Cobalt-58m (Co 58m)	10	Iron-59 (Fe 59)	10
Cobalt-58 (Co 58)	10	Krypton-85 (Kr 85)	100
Cobalt-60 (Co 60)	1	Krypton-87 (Kr 87)	10
Copper-64 (Cu 64)	100	Lanthanum-140 (La 140)	10
Dysprosium-165 (Dy 165)	10	Lutetium-177 (Lu 177)	100
Dysprosium-166 (Dy 166)	100	Manganese-52 (Mn 52)	10
Erbium-169 (Er 169)	100	Manganese-54 (Mn 54)	10
Erbium-171 (Er 171)	100	Manganese-56 (Mn 56)	10
Europium-152 (Eu 152)9.2h	100	Mercury-197m (Hg 197m)	100
Europium-152 (Eu 152)13 yr	1	Mercury-197 (Hg 197)	100
Europium-154 (Eu 154)	1	Mercury-203 (Hg 203)	10
		Molybdenum-99 (Mo 99)	100

**EXEMPT QUANTITIES (Cont.)**

<b>RADIOACTIVE MATERIAL</b>	<b>MICROCURIES</b>	<b>RADIOACTIVE MATERIAL</b>	<b>MICROCURIES</b>
Neodymium-147 (Nd 147)	100	Strontium-90 (Sr 90)	0.1
Neodymium-149 (Nd 149)	100	Strontium-91 (Sr 91)	10
Nickel-59 (Ni 59)	100	Strontium-92 (Sr 92)	10
Nickel-63 (Ni 63)	10	Sulphur-35 (S 35)	100
Nickel-65 (Ni 65)	100	Tantalum-182 (Ta 182)	10
Niobium-93m (Nb 93m)	10	Techneium-96 (Tc 96)	10
Niobium-95 (Nb 95)	10	Techneium-97m (Tc 97m)	100
Niobium-97 (Nb 97)	10	Techneium-97 (Tc 97)	100
Osmium-185 (Os 185)	10	Techneium-99m (Tc 99m)	100
Osmium-191m (Os 191m)	100	Techneium-99 (Tc 99)	10
Osmium-191 (Os 191)	100	Tellurium-125m (Te 125m)	10
Osmium-193 (Os 193)	100	Tellurium-127m (Te 127m)	10
Palladium-103 (Pd 103)	100	Tellurium-127 (Te 127)	100
Palladium-109 (Pd 109)	100	Tellurium-129m (Te 129m)	10
Phosphorus-32 (P 32)	10	Tellurium-129 (Te 129)	100
Platinum-191 (Pt 191)	100	Tellurium-131m (Te 131m)	10
Platinum-193m (Pt 193m)	100	Tellurium-132 (Te 132)	10
Platinum-193 (Pt 193)	100	Terbium-160 (Tb 160)	10
Platinum-197m (Pt 197m)	100	Thallium-200 (Tl 200)	100
Platinum-197 (Pt 197)	100	Thallium-201 (Tl 201)	100
Polonium-210 (Po 210)	0.1	Thallium-202 (Tl 202)	100
Potassium-42 (K 42)	10	Thallium-204 (Tl 204)	10
Potassium-43 (K 43)	10	Thulium-170 (Tm 170)	10
Praseodymium-142 (Pr 142)	100	Thulium-171 (Tm 171)	10
Praseodymium-143 (Pr 143)	100	Tin-113 (Sn 113)	10
Promethium-147 (Pm 147)	10	Tin-125 (Sn 125)	10
Promethium-149 (Pm 149)	10	Tungsten-181 (W 181)	10
Rhenium-186 (Re 186)	100	Tungsten-185 (W 185)	10
Rhenium-188 (Re 188)	100	Tungsten-187 (W 187)	100
Rhodium-103m (Rh 103m)	100	Vanadium-48 (V 48)	10
Rhodium-105 (Rh 105)	100	Xenon-131m (Xe 131m)	1,000
Rubidium-81 (Rb 81)	10	Xenon-133 (Xe 133)	100
Rubidium-86 (Rb 86)	10	Xenon-135 (Xe 135)	100
Rubidium-87 (Rb 87)	10	Ytterbium-175 (Yb 175)	100
Ruthenium-97 (Ru 97)	100	Yttrium-87 (Y 87)	10
Ruthenium-103 (Ru 103)	10	Yttrium-88 (Y 88)	10
Ruthenium-105 (Ru 105)	10	Yttrium-90 (Y 90)	10
Ruthenium-106 (Ru 106)	1	Yttrium-91 (Y 91)	10
Samarium-151 (Sm 151)	10	Yttrium-92 (Y 92)	100
Samarium-153 (Sm 153)	100	Yttrium-93 (Y 93)	100
Scandium-46 (Sc 46)	10	Zinc-65 (Zn 65)	10
Scandium-47 (Sc 47)	100	Zinc-69m (Zn 69m)	100
Scandium-48 (Sc 48)	10	Zinc-69 (Zn 69)	1,000
Selenium-75 (Se 75)	10	Zirconium-93 (Zr 93)	10
Silicon-31 (Si 31)	100	Zirconium-95 (Zr 95)	10
Silver-105 (Ag 105)	10	Zirconium-97 (Zr 97)	10
Silver-110m (Ag 110m)	1	Any radioactive material not listed above other than	
Silver-111 (Ag 111)	100	alpha-emitting radioactive material	0.1
Sodium-22 (Na 22)	10	Any alpha-emitting radioactive material not listed	
Sodium-24 (Na 24)	10	above other than transuranic radioactive material	0.01
Strontium-85 (Sr 85)	10		
Strontium-89 (Sr 89)	1		

**Note 1:** Where there is a combination of radionuclides, the limit for the combination should be derived as follows:

Determine the amount of each radionuclide possessed and 1,000 times the amount in Appendix B for each of those radionuclides when not in combination. The sum of the ratios of those quantities may not exceed 1.

Example:

$$\frac{\text{Amt. of Radionuclide A possessed}}{1000 \times \text{Appendix B quantity for Radionuclide A}} + \frac{\text{Amt. of Radionuclide B possessed}}{1000 \times \text{Appendix B quantity for Radionuclide B}} \leq 1$$

**Note 2:** To convert microcuries (μCi) to SI units of kilobecquerels (kBq), multiply the above values by 37.

Example: Zirconium-97 (10 μCi multiplied by 37 is equivalent to 370 kBq).