

4731.3160 QUANTITIES OF LICENSED MATERIAL REQUIRING LABELING FOR DECOMMISSIONING.

Subpart 1. **Table.** The following quantities of licensed material require labeling for decommissioning:

| Materials | Microcuries |
|---------------|-------------|
| Americium-241 | 0.01 |
| Antimony-122 | 100 |
| Antimony-124 | 10 |
| Antimony-125 | 10 |
| Arsenic-73 | 100 |
| Arsenic-74 | 10 |
| Arsenic-76 | 10 |
| Arsenic-77 | 100 |
| Barium-131 | 10 |
| Barium-133 | 10 |
| Barium-140 | 10 |
| Bismuth-210 | 1 |
| Bromine-82 | 10 |
| Cadmium-109 | 10 |
| Cadmium-115m | 10 |
| Cadmium-115 | 100 |
| Calcium-45 | 10 |
| Calcium-47 | 10 |
| Carbon-14 | 100 |
| Cerium-141 | 100 |
| Cerium-143 | 100 |
| Cerium-144 | 1 |
| Cesium-131 | 1,000 |
| Cesium-134m | 100 |

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| Cesium-134 | 1 |
| Cesium-135 | 10 |
| Cesium-136 | 10 |
| Cesium-137 | 10 |
| Chlorine-36 | 10 |
| Chlorine-38 | 10 |
| Chromium-51 | 1,000 |
| Cobalt-58m | 10 |
| Cobalt-58 | 10 |
| Cobalt-60 | 1 |
| Copper-64 | 100 |
| Dysprosium-165 | 10 |
| Dysprosium-166 | 100 |
| Erbium-169 | 100 |
| Erbium-171 | 100 |
| Europium-152 9.2h | 100 |
| Europium-152 13 yr | 1 |
| Europium-154 | 1 |
| Europium-155 | 10 |
| Fluorine-18 | 1,000 |
| Gadolinium-153 | 10 |
| Gadolinium-159 | 100 |
| Gallium-72 | 10 |
| Germanium-71 | 100 |
| Gold-198 | 100 |
| Gold-199 | 100 |
| Hafnium-181 | 10 |
| Holmium-166 | 100 |

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|---------------|-------|
| Hydrogen-3 | 1,000 |
| Indium-113m | 100 |
| Indium-114m | 10 |
| Indium-115m | 100 |
| Indium-115 | 10 |
| Iodine-125 | 1 |
| Iodine-126 | 1 |
| Iodine-129 | 0.1 |
| Iodine-131 | 1 |
| Iodine-132 | 10 |
| Iodine-133 | 1 |
| Iodine-134 | 10 |
| Iodine-135 | 10 |
| Iridium-192 | 10 |
| Iridium-194 | 100 |
| Iron-55 | 100 |
| Iron-59 | 10 |
| Krypton-85 | 100 |
| Krypton-87 | 10 |
| Lanthanum-140 | 10 |
| Lutetium-177 | 100 |
| Manganese-52 | 10 |
| Manganese-54 | 10 |
| Manganese-56 | 10 |
| Mercury-197m | 100 |
| Mercury-197 | 100 |
| Mercury-203 | 10 |
| Molybdenum-99 | 100 |

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| Neodymium-147 | 100 |
| Neodymium-149 | 100 |
| Nickel-59 | 100 |
| Nickel-63 | 10 |
| Nickel-65 | 100 |
| Niobium-93m | 10 |
| Niobium-95 | 10 |
| Niobium-97 | 10 |
| Osmium-185 | 10 |
| Osmium-191m | 100 |
| Osmium-191 | 100 |
| Osmium-193 | 100 |
| Palladium-103 | 100 |
| Palladium-109 | 100 |
| Phosphorus-32 | 10 |
| Platinum-191 | 100 |
| Platinum-193m | 100 |
| Platinum-193 | 100 |
| Platinum-197m | 100 |
| Platinum-197 | 100 |
| Plutonium-239 | 0.01 |
| Polonium-210 | 0.1 |
| Potassium-42 | 10 |
| Praseodymium-142 | 100 |
| Praseodymium-143 | 100 |
| Promethium-147 | 10 |
| Promethium-149 | 10 |
| Radium-226 | 0.01 |
| Rhenium-186 | 100 |

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|----------------|-----|
| Rhenium-188 | 100 |
| Rhodium-103m | 100 |
| Rhodium-105 | 100 |
| Rubidium-86 | 10 |
| Rubidium-87 | 10 |
| Ruthenium-97 | 100 |
| Ruthenium-103 | 10 |
| Ruthenium-105 | 10 |
| Ruthenium-106 | 1 |
| Samarium-151 | 10 |
| Samarium-153 | 100 |
| Scandium-46 | 10 |
| Scandium-47 | 100 |
| Scandium-48 | 10 |
| Selenium-75 | 10 |
| Silicon-31 | 100 |
| Silver-105 | 10 |
| Silver-110m | 1 |
| Silver-111 | 100 |
| Sodium-24 | 10 |
| Strontium-85 | 10 |
| Strontium-89 | 1 |
| Strontium-90 | 0.1 |
| Strontium-91 | 10 |
| Strontium-92 | 10 |
| Sulfur-35 | 100 |
| Tantalum-182 | 10 |
| Technetium-96 | 10 |
| Technetium-97m | 100 |

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|--------------------------------|-------|
| Technetium-97 | 100 |
| Technetium-99m | 100 |
| Technetium-99 | 10 |
| Tellurium-125m | 10 |
| Tellurium-127m | 10 |
| Tellurium-127 | 100 |
| Tellurium-129m | 10 |
| Tellurium-129 | 100 |
| Tellurium-131m | 10 |
| Tellurium-132 | 10 |
| Terbium-160 | 10 |
| Thallium-200 | 100 |
| Thallium-201 | 100 |
| Thallium-202 | 100 |
| Thallium-204 | 10 |
| Thorium (natural) ¹ | 100 |
| Thulium-170 | 10 |
| Thulium-171 | 10 |
| Tin-113 | 10 |
| Tin-125 | 10 |
| Tungsten-181 | 10 |
| Tungsten-185 | 10 |
| Tungsten-187 | 100 |
| Uranium (natural) ² | 100 |
| Uranium-233 | 0.01 |
| Uranium-234 – Uranium-235 | 0.01 |
| Vanadium-48 | 10 |
| Xenon-131m | 1,000 |
| Xenon-133 | 100 |

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| Xenon-135 | 100 |
| Ytterbium-175 | 100 |
| Yttrium-90 | 10 |
| Yttrium-91 | 10 |
| Yttrium-92 | 100 |
| Yttrium-93 | 100 |
| Zinc-65 | 10 |
| Zinc-69m | 100 |
| Zinc-69 | 1,000 |
| Zirconium-93 | 10 |
| Zirconium-95 | 10 |
| Zirconium-97 | 10 |
| Any alpha-emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition | 0.01 |
| Any radionuclide other than alpha-emitting radionuclides not listed above or mixtures of beta emitters of unknown composition | 0.1 |

¹Based on alpha disintegration rate of Th-232, Th-230, and their daughter products.

²Based on alpha disintegration rate of U-238, U-234, and U-235.

Subp. 2. **Combination of isotopes.** For purposes of parts 4731.3000 to 4731.3245, where a combination of isotopes in known amounts is involved, the limit for the combination should be derived as follows: determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination must not exceed one.

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