

Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208(0.36), Po-212 (0.64)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Ra-228	Ac-228
Th-226	Ra-222, Rn-218, Po-214
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Th-nat	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-234	Pa-234m
U-230	Th-226, Ra-222, Rn-218, Po-214
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-235	Th-231
U-238	Th-234, Pa-234m
U-nat	Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
U-240	Np-240m
Np-237	Pa-233
Am-242m	Am-242
Am-243	Np-239

<sup>c</sup>[Reserved]

<sup>d</sup> These values apply only to compounds of uranium that take the chemical form of UF<sub>6</sub>, UO<sub>2</sub>F<sub>2</sub> and UO<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub> in both normal and accident conditions of transport.

<sup>e</sup> These values apply only to compounds of uranium that take the chemical form of UO<sub>3</sub>, UF<sub>4</sub>, UCl<sub>4</sub> and hexavalent compounds in both normal and accident conditions of transport.

<sup>f</sup> These values apply to all compounds of uranium other than those specified in notes (d) and (e) of this table.

<sup>g</sup> These values apply to unirradiated uranium only.

■ 32. In § 173.441, the section title is revised, paragraph (d) is redesignated as paragraph (e) and revised and a new paragraph (d) is added to read as follows:

**§ 173.441 Radiation level limitations and exclusive use provisions.**

\* \* \* \* \*

(d) Conveyance limits on the sum of package transport indices are as follows:

(1) Except for shipments by cargo aircraft only or by seagoing vessel, the sum of transport indices for a non-exclusive use shipment may not exceed 50.

(2) Where a consignment is transported under exclusive use, there is no limit on the sum of the transport indices aboard a single conveyance. The conditions of paragraphs (b)(2), (b)(3), (b)(4) and (c) must be met.

(3) Provisions for shipments of Class 7 (radioactive) materials by air are described in §§ 175.700–175.705 of this subchapter.

(4) Provisions for shipment of Class 7 (radioactive) materials by vessel are described in §§ 176.700–176.720 of this subchapter.

(e) A package exceeding the maximum surface radiation level or maximum transport index prescribed in paragraph (a) of this section may not be transported by aircraft.

■ 33. In § 173.443, paragraphs (a)(1) and (a)(2) are revised to read as follows:

**§ 173.443 Contamination control.**

(a) \* \* \*

(1) Wiping an area of 300 cm<sup>2</sup> of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. The amount of

radioactivity measured on any single wiping material, divided by the surface area wiped and divided by the efficiency of the wipe procedure (the fraction of removable contamination transferred from the surface to the absorbent material), may not exceed the limits set forth in Table 9 at any time during transport. For this purpose the actual wipe efficiency may be used, or the wipe efficiency may be assumed to be 0.10; or

(2) Alternatively, the level of non-fixed radioactive contamination may be determined by using other methods of equal or greater efficiency.

Table 9 is as follows:

**TABLE 9.—NON-FIXED EXTERNAL RADIOACTIVE CONTAMINATION LIMITS FOR PACKAGES**

Contaminant	Maximum permissible limits		
	Bq/cm <sup>2</sup>	uCi/cm <sup>2</sup>	dpm/cm <sup>2</sup>
1. Beta and gamma emitters and low toxicity alpha emitters	4	10 <sup>-4</sup>	220
2. All other alpha emitting radionuclides	0.4	10 <sup>-5</sup>	22

\* \* \* \* \*

■ 34. In § 173.447, paragraphs (a) and (b) are revised to read as follows:

**§ 173.447 Storage during transportation—general requirements.**

\* \* \* \* \*

(a) The number of packages and overpacks bearing FISSILE labels stored in any one storage area, such as a transit area, terminal building, storeroom, waterfront pier, or assembly yard, must

be limited so that the total sum of the criticality safety indices in any individual group of such packages and overpacks does not exceed 50. Groups of such packages and overpacks must be stored so as to maintain a spacing of at least 6 m (20 feet) from all other groups of such packages and overpacks.

(b) Storage requirements for Class 7 (radioactive) material transported in vessels are described in subpart M of part 176 of this subchapter.

■ 35. Section 173.448 is revised to read as follows:

**§ 173.448 General transportation requirements.**

(a) Each shipment of Class 7 (radioactive) materials must be secured to prevent shifting during normal transportation conditions.

(b) Except as provided in §§ 174.81, 176.83, and 177.848 of this subchapter, or as otherwise required by the Competent Authority in the applicable certificate, a package or overpack of Class 7 (radioactive) materials may be carried among packaged general cargo without special stowage provisions, if—

(1) The heat output in watts does not exceed 0.1 times the minimum package dimension in centimeters; or

(2) The average surface heat flux of the package or overpack does not exceed 15 watts per square meter and the immediately surrounding cargo is not in sacks or bags or otherwise in a form that would seriously impede air circulation for heat removal.

(c) Packages or overpacks bearing labels prescribed in § 172.403 of this subchapter may not be carried in compartments occupied by passengers, except in those compartments exclusively reserved for couriers accompanying those packages.

(d) Mixing of different kinds of packages that include fissile packages is