

in excess of the values specified in paragraph (c)(2) of this section, measures shall be taken to ensure that the radioactive material is not released into the conveyance or to the environment; and

(4) The highway or rail conveyance must be placarded in accordance with

subpart F of part 172 of this subchapter.

(d) LSA material and SCO that exceed the packaging limits in this section must be packaged in accordance with 10 CFR part 71.

(e) Tables 5 and 6 are as follows:

TABLE 5—CONVEYANCE ACTIVITY LIMITS FOR LSA MATERIAL AND SCO

Nature of material	Activity limit for conveyances other than by inland waterway	Activity limit for hold or compartment of an inland waterway conveyance
1. LSA-I	No limit	No limit.
2. LSA-II and LSA-III; Non-combustible solids	No limit	100 A ₂ .
3. LSA-II and LSA-III; Combustible solids and all liquids and gases.	100 A ₂	10 A ₂ .
4. SCO	100 A ₂	10 A ₂ .

TABLE 6—INDUSTRIAL PACKAGE INTEGRITY REQUIREMENTS FOR LSA MATERIAL AND SCO

Contents	Industrial packaging type	
	Exclusive use shipment	Non exclusive use shipment
1. LSA-I:		
Solid	Type IP-1	Type IP-1.
Liquid	Type IP-1	Type IP-2.
2. LSA-II:		
Solid	Type IP-2	Type IP-2.
Liquid and gas	Type IP-2	Type IP-3.
3. LSA-III	Type IP-2	Type IP-3.
4. SCO-I	Type IP-1	Type IP-1.
5. SCO-II	Type IP-2	Type IP-2.

[79 FR 40613, July 11, 2014]

§ 173.428 Empty Class 7 (radioactive) materials packaging.

A packaging which previously contained Class 7 (radioactive) materials and has been emptied of contents as far as practical, is excepted from the shipping paper and marking (except for the UN identification number marking requirement described in § 173.422(a)) requirements of this subchapter, provided that—

(a) The packaging meets the requirements of § 173.421 (b), (c), and (e) of this subpart;

(b) The packaging is in unimpaired condition and is securely closed so that there will be no leakage of Class 7 (radioactive) material under conditions normally incident to transportation;

(c) The outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material;

(d) Internal contamination does not exceed 100 times the limits in § 173.443(a);

(e) Any labels previously applied in conformance with subpart E of part 172 of this subchapter are removed, obliterated, or covered and the “Empty” label prescribed in § 172.450 of this subchapter is affixed to the packaging; and

(f) The packaging is prepared for shipment as specified in § 173.422.

[Amdt. 173-244, 60 FR 50307, Sept. 28, 1995, as amended by Amdt. 173-244, 61 FR 20752, May 8, 1996; 64 FR 51919, Sept. 27, 1999; 69 FR 3677, Jan. 26, 2004; 80 FR 72928, Nov. 23, 2015]

§ 173.431 Activity limits for Type A and Type B packages.

(a) Except for LSA material and SCO, a Type A package may not contain a quantity of Class 7 (radioactive) materials greater than A₁ for special form Class 7 (radioactive) material or A₂ for

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normal form Class 7 (radioactive) material as listed in §173.435, or, for Class 7 (radioactive) materials not listed in §173.435, as determined in accordance with §173.433.

(b) The limits on activity contained in a Type B(U) or Type B(M) package are those prescribed in §§173.416 and 173.417, or in the applicable approval certificate under §173.471, §173.472 or §173.473.

[Amdt. 173-244, 60 FR 50307, Sept. 28, 1995, as amended at 69 FR 3677, Jan. 26, 2004]

§ 173.433 Requirements for determining basic radionuclide values, and for the listing of radionuclides on shipping papers and labels.

(a) For individual radionuclides listed in the table in §173.435 and §173.436:

(1) A_1 and A_2 values are given in the table in §173.435; and

(2) Activity concentration exemption values and consignment activity exemption values are given in the table in §173.436.

(b) For individual radionuclides which are not listed in the tables in §173.435 or §173.436 or for which no relevant data are available:

(1) the radionuclide values in Tables 7 or 8 of this section may be used; or

(2) other basic radionuclide values may be used provided they are first approved by the Associate Administrator or, for international transport, multi-lateral approval is obtained from the pertinent Competent Authorities.

(c) In calculating A_1 and A_2 values for approval in accordance with paragraph (b)(2) of this section:

(1) It is permissible to use an A_2 value calculated using a dose coefficient for the appropriate lung absorption type, as recommended by the International Commission on Radiological Protection, if the chemical forms of each radionuclide under both normal and accident conditions of transport are taken into consideration.

(2) A single radioactive decay chain in which the radionuclides are present in their naturally-occurring proportions, and in which no daughter nuclide has a half life either longer than 10 days or longer than that of the parent nuclide, will be considered as a single radionuclide, and the activity to be taken into account and the A_1 or A_2

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value to be applied will be those corresponding to the parent nuclide of that chain. Otherwise, the parent and daughter nuclides will be considered as a mixture of different nuclides.

(d) Mixtures of radionuclides whose identities and respective activities are known must conform to the following conditions:

(1) For special form Class 7 (radioactive) material, the activity which may be transported in a Type A package must satisfy:

$$\sum_i \frac{B(i)}{A_1(i)} \leq 1$$

Where:

$B(i)$ is the activity of radionuclide i in special form; and

$A_1(i)$ is the A_1 value for radionuclide i .

(2) For normal form Class 7 (radioactive) material, the activity which may be transported in a Type A package must satisfy:

$$\sum_j \frac{C(j)}{A_2(j)} \leq 1$$

Where:

$C(j)$ is the activity of radionuclide j in normal form; and

$A_2(j)$ is the A_2 value for radionuclide j .

(3) If the package contains both special and normal form Class 7 (radioactive) material, the activity which may be transported in a Type A package must satisfy:

$$\sum_i \frac{B(i)}{A_1(i)} + \sum_j \frac{C(j)}{A_2(j)} \leq 1$$

Where:

The symbols are defined as in paragraphs (d)(1) and (d)(2) of this section.

(4) Alternatively, the A_1 value for a mixture of special form material may be determined as follows:

$$A_1 \text{ for mixture} = \frac{1}{\sum_i \frac{f(i)}{A_1(i)}}$$

Where:

$f(i)$ is the fraction of activity for radionuclide i in the mixture; and

$A_1(i)$ is the appropriate A_1 value for radionuclide i .