
**Committee of Experts on the Transport of Dangerous Goods
and on the Globally Harmonized System of Classification
and Labelling of Chemicals**

Sub-Committee of Experts on the Transport of Dangerous Goods

30 April 2018

Fifty-three session

Geneva, 25 June – 4 July 2018

Item 8 of the provisional agenda

Cooperation with the International Atomic Energy Agency

Harmonization with the IAEA Regulations for the Safe Transport of Radioactive Material

Transmitted by the International Atomic Energy Agency (IAEA)

1. The secretariat reproduces hereafter the text from Parts 1, 2, 4, 5, 6 and 7 of the Model Regulations as amended in accordance with the draft list of amendments in document ST/SG/AC.10/C.3/2018/54.
2. Changes are shown in track-changes mode.
3. Paragraph numbers between square brackets refer to paragraphs in the 2018 Edition of the IAEA Regulations, but not for the editorial changes.

CHAPTER 1.2 DEFINITIONS AND UNITS OF MEASUREMENT

1.2.1 Definitions

[Note by the secretariat: Only definitions for which amendments are proposed are reproduced hereafter. The remainder of the definitions in Chapter 1.2 remain unchanged]

Dose rate shall mean the ambient dose equivalent or the directional dose equivalent, as appropriate, per unit time, measured at the point of interest;

[IAEA: 220A]

Freight container means an article of transport equipment that is of a permanent character and ~~is accordingly~~ strong enough to be suitable for repeated use; specially designed to facilitate the transport of goods, by one or other modes of transport, without intermediate reloading; designed to be secured and/or readily handled, ~~and~~ having fittings for these purposes, and approved in accordance with the International Convention for Safe Containers (CSC), 1972, as amended. The term “freight container” includes neither vehicle nor packaging. However a freight container that is carried on a chassis is included. For freight containers for the transport of radioactive material, a freight container may be used as a packaging.

[IAEA: 223]

In addition: Small freight container means a freight container that has an internal volume of not more than 3 m³. Large freight container means a freight container that has an internal volume of more than 3 m³.

Intermediate Bulk Container (IBC)

IBC means any rigid or flexible portable packaging, other than those specified in Chapter 6.1, that:

- (a) has a capacity of:
 - (i) not more than 3.0 m³ (3 000 litres) for solids and liquids of packing groups II and III;
 - (ii) not more than 1.5 m³ for solids of packing group I when packed in flexible, rigid plastics, composite, fibreboard and wooden IBCs;
 - (iii) not more than 3.0 m³ for solids of packing group I when packed in metal IBCs;
 - (iv) not more than 3.0 m³ for radioactive material of Class 7;
- (b) is designed for mechanical handling;
- (c) is resistant to the stresses produced ~~in~~ during handling and transport, as determined by tests;

[IAEA: 224]

~~*Radiation level, for the transport of radioactive material, means the corresponding dose rate expressed in millisieverts per hour or microsieverts per hour;*~~

[IAEA: 233]

Note: This paragraph was deleted and its content has been transferred to the new definition “dose rate” in this section.

Transport index (TI) assigned to a package, overpack or freight container, or to unpackaged LSA-I, ~~or~~ SCO-I or SCO-III, for the transport of radioactive material, means a number which is used to provide control over radiation exposure;

[IAEA: 244]

CHAPTER 1.5 GENERAL PROVISIONS CONCERNING RADIOACTIVE MATERIAL

1.5.1 Scope and application

1.5.1.1 These Regulations establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to ~~people~~persons, property and the environment that are associated with the transport of radioactive material. These Regulations are based on the IAEA “Regulations for the Safe Transport of Radioactive material, ~~2018~~2012 Edition, IAEA Safety Standards Series No. SSR-6, ~~(Rev.1)~~ IAEA, Vienna ~~2018~~2012). Explanatory material can be found in “Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (~~2018~~2012 Edition)”, Safety Standard Series No. SSG-26, ~~(Rev.1)~~ IAEA, Vienna (~~2019~~2014). The prime responsibility for safety shall rest with the person or organization responsible for facilities and activities that give rise to radiation risk.

[IAEA: 101]

1.5.1.2 The objective of these Regulations is to establish requirements that must be satisfied to ensure safety and to protect ~~people~~persons, property and the environment from ~~harmful~~the effects of ionizing radiation ~~during~~ the transport of radioactive material. This protection is achieved by requiring:

- (a) Containment of the radioactive contents;
- (b) Control of external ~~dose rate~~radiation levels;
- (c) Prevention of criticality; and
- (d) Prevention of damage caused by heat.

These requirements are satisfied firstly by applying a graded approach to contents limits for packages and conveyances and to performance standards applied to package designs depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing conditions on the design and operation of packages and on the maintenance of packagings, including a consideration of the nature of the radioactive contents. ~~Thirdly~~Finally, they are satisfied by requiring administrative controls including, where appropriate, approval by competent authorities. Finally, further protection is provided by making arrangements for planning and preparing emergency response to protect people, property and the environment.

[IAEA: 104]

1.5.1.3 *Unchanged.*

1.5.1.4 *Unchanged.*

1.5.1.5 *Specific provisions for the transport of excepted packages*

1.5.1.5.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles and empty packagings as specified in 2.7.2.4.1 shall be subject only to the following provisions of Parts 5 to 7:

- (a) The applicable provisions specified in 5.1.1.2, 5.1.2, 5.1.3.2, 5.1.5.2.2, 5.1.5.2.3, 5.1.5.4, 5.2.1.7, 5.4.1.5.7.1(f)(i) and (ii), 5.4.1.5.7.1.(i), 7.1.8.3.1, 7.1.8.4.3, 7.1.8.5.1 to 7.1.8.5.4 and 7.1.8.6.1; and
- (b) The requirements for excepted packages specified in 6.4.4;

except when the radioactive material possesses other hazardous properties and has to be classified in a class other than Class 7 in accordance with special provision 290 or 369 of Chapter 3.3, where the provisions listed in (a) and (b) above apply only as relevant and in addition to those relating to the main class or division.

[IAEA: 515]

1.5.1.5.2 Excepted packages shall be subject to the relevant provisions of all other parts of these Regulations.

~~If the excepted package contains fissile material, one of the fissile exceptions provided by 2.7.2.3.5 shall apply and the requirements of 7.1.8.4.3 shall be met.~~

[IAEA: 515]

1.5.2 Radiation protection programme

1.5.2.1 *Unchanged.*

1.5.2.2 *Unchanged.*

1.5.2.3 *Unchanged*

1.5.2.4 For occupational exposures arising from transport activities, where it is assessed that the effective dose either:

- (a) Is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring shall be conducted; or
- (b) Is likely to exceed 6 mSv in a year, individual monitoring shall be conducted.

When ~~individual~~workplace monitoring or ~~workplace~~individual monitoring is conducted, appropriate records shall be kept.

[IAEA: 303]

NOTE: *For occupational exposures arising from transport activities, where it is assessed —that the effective dose is most unlikely to exceed 1mSv in a year, no special work patterns, detailed monitoring, dose assessment programmes or individual record keeping need be required.*

1.5.2.5 In the event of ~~accidents or incidents~~a nuclear or radiological emergency during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, shall be observed to protect ~~people~~persons, property and the environment. ~~Appropriate guidelines for such provisions are contained in “Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material”, IAEA Safety Standard Series No. TS-G-1.2 (ST-3), IAEA, Vienna (2002).~~ Consignors and carriers shall establish, in advance, arrangements for preparedness and response in accordance with the national and/or international requirements and in a consistent and coordinated manner with the national and/or international emergency arrangements.

[IAEA: 304]

1.5.2.6 The arrangements for preparedness and response shall be based on the graded approach and take into consideration the identified hazards and their potential consequences, including the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of a nuclear or radiological emergency. Guidance for the establishment of such arrangements is contained in “Preparedness and Response for a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015); “Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GSG-2, IAEA, Vienna (2011); “Arrangements for Preparedness for a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GS-G-2.1, IAEA, Vienna (2007), and “Arrangements for the Termination of a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GSG-11, IAEA, Vienna [(in press)].

[IAEA: 305]

~~1.5.2.6~~1.5.2.7 Workers shall be appropriately trained in the radiation hazards involved and the precautions to be observed in order to ensure restriction of their exposure and that of other persons who might be affected by their actions.

1.5.3 Management system

1.5.3.1 *Unchanged*

1.5.4 Special arrangement**1.5.4.1 *Unchanged***

1.5.4.2 Consignments for which conformity with any provision applicable to radioactive material is impracticable shall not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the radioactive material provisions of these Regulations is impracticable and that the requisite standards of safety established by these Regulations have been demonstrated through alternative means of these Regulations. the competent authority may approve special arrangement transport operations for a single consignment or a planned series of multiple consignments. The overall level of safety in transport shall be at least equivalent to that which would be provided if all the applicable requirements in these Regulations had been met. For international consignments of this type, multilateral approval shall be required.

[IAEA:310]

1.5.5 Radioactive material possessing other dangerous properties**1.5.5.1 *Unchanged*****1.5.6 Non-compliance**

1.5.6.1 In the event of non-compliance with any limit in these Regulations applicable to dose rate ~~radiation level~~ or contamination:

- (a) The consignor, consignee, carrier and any organization involved during transport, who may be affected, as appropriate, shall be informed of the non-compliance:
 - (i) by the carrier if the non-compliance is identified during transport; or
 - (ii) by the consignee if the non-compliance is identified at receipt;
- (b) The consignor carrier, ~~consignor~~ or consignee, as appropriate, shall:
 - (i) take immediate steps to mitigate the consequences of the non-compliance;
 - (ii) investigate the non-compliance and its causes, circumstances and consequences;
 - (iii) take appropriate action to remedy the causes and circumstances that led to the non-compliance and to prevent a recurrence of the causes and similar circumstances similar to those that led to the non-compliance; and
 - (iv) communicate to the relevant competent authority(ies) ~~on~~ the causes of the non-compliance and ~~the~~ corrective or preventive actions taken or to be taken;
- (c) The communication of the non-compliance to the consignor and relevant competent authority(ies), respectively, shall be made as soon as practicable and it shall be immediate whenever an emergency exposure situation has developed or is developing.

[IAEA:309]

CHAPTER 2.7 CLASS 7 - RADIOACTIVE MATERIAL**2.7.1 *Unchanged.*****2.7.2 Classification****2.7.2.1 *General provisions***

2.7.2.1.1 Radioactive material shall be assigned to one of the UN numbers specified in Table 2.7.2.1.1, in accordance with 2.7.2.4.2 to 2.7.2.5, taking into account the material characteristics determined in 2.7.2.3.

[IAEA: 401]

Table 2.7.2.1.1: Assignment of UN numbers

[Note: only row with changes is reproduced]

UN Nos.	Proper shipping name and description ^a
...	
	Surface contaminated objects
	(2.7.2.3.2)
	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I, <u>SCO-II</u> or SCO-III), non-fissile or fissile-excepted ^b
	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE
...	

^a The proper shipping name is found in the column "proper shipping name and description" and is restricted to that part shown in capital letters. In the cases of UN Nos. 2909, 2911, 2913 and 3326, where alternative proper shipping names are separated by the word "or" only the relevant proper shipping name shall be used;

^b The term "fissile-excepted" refers only to material excepted under 2.7.2.3.5.

^c For UN No. 3507, see also special provision 369 in Chapter 3.3.

[IAEA: Table 1]

2.7.2.2 Determination of basic radionuclide values

2.7.2.2.1 The following basic values for individual radionuclides are given in Table 2.7.2.2.1:

- (a) A1 and A2 in TBq;
- (b) Activity concentration limits for exempt material in Bq/g; and
- (c) Activity limits for exempt consignments in Bq.

Table 2.7.2.2.1: Basic radionuclides values for individual radionuclides

[Note: Only radionuclides for which a new entry is added are shown]

Radionuclide (atomic number)	A1	A2	Activity concentration limit for exempt material	Activity limit for an exempt consignment
	(TBq)	(TBq)		
Barium (56)				
Ba-131 (a)	2×10^0	2×10^0	1×10^2	1×10^6
Ba-133	3×10^0	3×10^0	1×10^2	1×10^6
Ba-133m	2×10^1	6×10^{-1}	1×10^2	1×10^6
<u>Ba-135m</u>	<u>2×10^1</u>	<u>6×10^{-1}</u>	<u>1×10^2</u>	<u>1×10^6</u>
Ba-140 (a)	5×10^{-1}	3×10^{-1}	1×10^1 (b)	1×10^5 (b)
...				
Germanium (32)				
Ge-68 (a)	5×10^{-1}	5×10^{-1}	1×10^1	1×10^5

Ge-69	1×10^0	1×10^0	1×10^1	1×10^6
Ge-71	4×10^1	4×10^1	1×10^4	1×10^8
Ge-77	3×10^{-1}	3×10^{-1}	1×10^1	1×10^5
...				
Iridium (77)				
Ir-189 (a)	1×10^1	1×10^1	1×10^2	1×10^7
Ir-190	7×10^{-1}	7×10^{-1}	1×10^1	1×10^6
Ir-192	1×10^0 (c)	6×10^{-1}	1×10^1	1×10^4
Ir-193m	4×10^1	4×10^0	1×10^4	1×10^7
Ir-194	3×10^{-1}	3×10^{-1}	1×10^2	1×10^5
...				
Nickel (28)				
Ni-57	6×10^{-1}	6×10^{-1}	1×10^1	1×10^6
Ni-59	Unlimited	Unlimited	1×10^4	1×10^8
Ni-63	4×10^1	3×10^1	1×10^5	1×10^8
Ni-65	4×10^{-1}	4×10^{-1}	1×10^1	1×10^6
...				
Strontium (38)				
Sr-82 (a)	2×10^{-1}	2×10^{-1}	1×10^1	1×10^5
Sr-83	1×10^0	1×10^0	1×10^1	1×10^6
Sr-85	2×10^0	2×10^0	1×10^2	1×10^6
Sr-85m	5×10^0	5×10^0	1×10^2	1×10^7
Sr-87m	3×10^0	3×10^0	1×10^2	1×10^6
Sr-89	6×10^{-1}	6×10^{-1}	1×10^3	1×10^6
Sr-90 (a)	3×10^{-1}	3×10^{-1}	1×10^2 (b)	1×10^4 (b)
Sr-91 (a)	3×10^{-1}	3×10^{-1}	1×10^1	1×10^5
Sr-92 (a)	1×10^0	3×10^{-1}	1×10^1	1×10^6
...				
Terbium (65)				
Tb-149	8×10^{-1}	8×10^{-1}	1×10^1	1×10^6
Tb-157	4×10^1	4×10^1	1×10^4	1×10^7
Tb-158	1×10^0	1×10^0	1×10^1	1×10^6
Tb-160	1×10^0	6×10^{-1}	1×10^1	1×10^6
Tb-161	3×10^{-1}	7×10^{-1}	1×10^3	1×10^6
...				

(a) **Unchanged.**

(b) Parent nuclides and their progeny included in secular equilibrium are listed in the following (the activity to be taken into account is that of the parent nuclide only) :

Sr-90	Y-90
Zr-93	Nb-93m
Zr-97	Nb-97
Ru-106	Rh-106
Ag-108m	Ag-108

Cs-137	Ba-137m
Ce-144	Pr-144
Ba-140	La-140
Bi-212	Tl-208 (0.36), Po-212 (0.64)
Pb-210	Bi-210, Po-210
Pb-212	Bi-212, Tl-208 (0.36), Po-212 (0.64)
Rn-222	Po-218, Pb-214, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
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-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64) Th-229 Ra-
Th-229	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
Np-237	Pa-233
Am-242m	Am-242
Am-243	Np-239;

* [in the case of Th-natural, the parent nuclide is Th-232. in the case of U-natural the parent nuclide is U-238.](#)

[IAEA: 405]

- (c) The quantity may be determined from a measurement of the rate of decay or a measurement of the ~~radiation level~~ dose rate at a prescribed distance from the source;
- (d) These values apply only to compounds of uranium that take the chemical form of UF₆, UO₂F₂ and UO₂(NO₃)₂ in both normal and accident conditions of transport;
- (e) These values apply only to compounds of uranium that take the chemical form of UO₃, UF₄, UCl₄ and hexavalent compounds in both normal and accident conditions of transport;
- (f) These values apply to all compounds of uranium other than those specified in (d) and (e) above;
- (g) These values apply to unirradiated uranium only.

2.7.2.2.2 For individual radionuclides:

- (a) Which are not listed in Table 2.7.2.2.1 the determination of the basic radionuclide values referred to in 2.7.2.2.1 shall require multilateral approval. For these radionuclides, activity concentration limits for exempt material and activity limits for exempt consignments shall be calculated in accordance with the principles established in [Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna \(2014\)](#) ~~the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna (1996)~~. It is permissible to use an A2 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. Alternatively, the radionuclide values in Table 2.7.2.2.2 may be used without obtaining competent authority approval;

- (b) In instruments or articles in which the radioactive material is enclosed or is included as a component part of the instrument or other manufactured article and which meet 2.7.2.4.1.3 (c), alternative basic radionuclide values to those in Table 2.7.2.2.1 for the activity limit for an exempt consignment are permitted and shall require multilateral approval. Such alternative activity limits for an exempt consignment shall be calculated in accordance with the principles set out in [CSR Part 3](#) ~~the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna (1996).~~

[IAEA:403]

Table 2.7.2.2.2: Basic radionuclide values for unknown radionuclides or mixtures

Unchanged.

2.7.2.2.3 In the calculations of A1 and A2 for a radionuclide not in Table 2.7.2.2.1, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions, and in which no ~~daughter-progeny~~ nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, shall be considered as a single radionuclide; and the activity to be taken into account and the A1 or A2 value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any ~~daughter-progeny~~ nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and such ~~daughter-progeny~~ nuclides shall be considered as mixtures of different nuclides.

[IAEA: 404]

2.7.2.2.4 to 2.7.2.2.6 unchanged.

2.7.2.3 Determination of other material characteristics

2.7.2.3.1 Low specific activity (LSA) material

2.7.2.3.1.1 Reserved.

2.7.2.3.1.2 LSA material shall be in one of three groups:

- (a) LSA-I

Unchanged.

- (b) LSA-II

Unchanged.

- (c) LSA-III - Solids (e.g. consolidated wastes, activated materials), excluding powders, ~~that meet the requirements of 2.7.2.3.1.3,~~ in which:

- (i) the radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen and ceramic);

~~(ii) the radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble matrix, so that, even under loss of packaging, the loss of radioactive material per package by leaching when placed in water for seven days would not exceed 0.1 A₂; and~~

~~(iii)~~ (ii) the estimated average specific activity of the solid, excluding any shielding material, does not exceed 2×10^{-3} A₂/g.

[IAEA: 409]

~~2.7.2.3.1.3 LSA-III material shall be a solid of such a nature that if the entire contents of a package were subjected to the test specified in 2.7.2.3.1.4 the activity in the water would not exceed 0.1 A₂.~~

2.7.2.3.1.3 Deleted.

[IAEA: 601]

2.7.2.3.1.4 and 2.7.2.3.1.5 unchanged.

2.7.2.3.2 *Surface contaminated object (SCO)*

SCO is classified in one of ~~two~~three groups:

- (a) **Unchanged.**
- (b) **Unchanged.**
- (c) SCO-III: A large solid object which, because of its size, cannot be transported in a type of package described in these Regulations and for which:
 - (i) All openings are sealed to prevent release of radioactive material during conditions defined in 4.1.9.2.4.(e))
 - (ii) The inside of the object is as dry as practicable;
 - (iii) The non-fixed contamination on the external surfaces does not exceed the limits specified in 4.1.9.1.2.
The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² does not exceed 8×10^5 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm² for all other alpha emitters.”

[IAEA: 413]

2.7.2.3.3 *Special form radioactive material*

2.7.2.3.3.1 to 2.7.2.3.3.4 unchanged.

2.7.2.3.3.5 The relevant test methods are:

- (a) **Unchanged.**
- (b) Percussion test: The specimen shall be placed on a sheet of lead which is supported by a smooth solid surface and struck by the flat face of a mild steel bar so as to cause an impact equivalent to that resulting from a free drop of 1.4 kg ~~through from a height of~~ 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm. The lead, of hardness number 3.5 to 4.5 on the Vickers scale and not more than 25 mm thick, shall cover an area greater than that covered by the specimen. A fresh surface of lead shall be used for each impact. The bar shall strike the specimen so as to cause maximum damage;

[IAEA: 706]

- (c) Bending test: The test shall apply only to long, slender sources with both a minimum length of 10 cm and a length to minimum width ratio of not less than 10. The specimen shall be rigidly clamped in a horizontal position so that one half of its length protrudes from the face of the clamp. The orientation of the specimen shall be such that the specimen will suffer maximum damage when its free end is struck by the flat face of a steel bar. The bar shall strike the specimen so as to cause an impact equivalent to that resulting from a free vertical drop of 1.4 kg ~~through from a height of~~ 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm;
- (d) **Unchanged.**

[IAEA: 707]

2.7.2.3.3.6 *unchanged.*

2.7.2.3.3.7 For specimens which comprise or simulate indispersible solid material, a leaching assessment shall be performed as follows:

- (a) The specimen shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10% of the volume of the solid test sample itself. The water shall have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20 °C;
- (b) The water ~~with~~ and the specimen shall then be heated to a temperature of (50 ± 5) °C and maintained at this temperature for 4 hours;
- (c) The activity of the water shall then be determined;
- (d) The specimen shall then be kept for at least 7 days in still air at not less than 30 °C and relative humidity not less than 90%;
- (e) The specimen shall then be immersed in water of the same specification as in (a) above and the water ~~with~~ and the specimen heated to (50 ± 5) °C and maintained at this temperature for 4 hours;
- (f) The activity of the water shall then be determined.

[IAEA: 710]

2.7.2.3.3.8 For specimens which comprise or simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment shall be performed as follows:

- (a) The leaching assessment shall consist of the following steps:
 - (i) the specimen shall be immersed in water at ambient temperature. The water shall have an initial pH of 6-8 with a maximum conductivity of 1 mS/m at 20 °C;
 - (ii) the water and specimen shall then be heated to a temperature of (50 ± 5) °C and maintained at this temperature for 4 hours;
 - (iii) the activity of the water shall then be determined;
 - (iv) the specimen shall then be kept for at least 7 days in still air at not less than 30 °C and relative humidity of not less than 90%;
 - (v) the process in (i), (ii) and (iii) shall be repeated;
- (b) The alternative volumetric leakage assessment shall comprise any of the tests prescribed in ISO 9978:1992 “Radiation Protection – Sealed radioactive sources – Leakage test methods”, provided that they are acceptable to the competent authority.

[IAEA: 711]

2.7.2.3.4 *Low dispersible material*

2.7.2.3.4.1 The design for low dispersible radioactive material shall require multilateral approval. Low dispersible radioactive material shall be such that the total amount of this radioactive material in a package, taking into account the provisions of 6.4.8.14, shall meet the following requirements:

- (a) The ~~radiation level~~ dose rate at 3 m from the unshielded radioactive material does not exceed 10 mSv/h;
- (b) If subjected to the tests specified in 6.4.20.3 and 6.4.20.4, the airborne release in gaseous and particulate forms

of up to 100 µm aerodynamic equivalent diameter would not exceed 100 A2. A separate specimen may be used for each test; and

- (c) If subjected to the test specified in 2.7.2.3.1.4 the activity in the water would not exceed 100 A2. In the application of this test, the damaging effects of the tests specified in (b) above shall be taken into account.

[IAEA: 605]

2.7.2.3.4.2 **Unchanged.**

2.7.2.3.4.3 **Unchanged.**

2.7.2.3.5 *Fissile material*

Fissile material and packages containing fissile material shall be classified under the relevant entry as “FISSILE” in accordance with Table 2.7.2.1.1 unless excepted by one of the provisions of sub- paragraphs (a) to (f) below and transported subject to the requirements of 7.1.8.4.3. All provisions apply only to material in packages that meets the requirements of 6.4.7.2 unless unpackaged material is specifically allowed in the provision.

(a) to (d) **unchanged**

- (e) Fissile nuclides with a total mass not greater than 45 g either packaged or unpackaged subject to ~~limits provided in the requirements of~~ 7.1.8.4.3 (e);

- (f) A fissile material that meets the requirements of 7.1.8.4.3 (b), 2.7.2.3.6 and 5.1.5.2.1.

[IAEA: 417]

2.7.2.3.6 ~~A f~~Fissile material excepted from classification as “FISSILE” under 2.7.2.3.5 (f) shall be subcritical without the need for accumulation control under the following conditions:

(a) to (c) **unchanged.**

[IAEA: 606]

2.7.2.4 **Unchanged.**

2.7.2.4.1 *Classification as excepted package*

2.7.2.4.1.1 **Unchanged.**

2.7.2.4.1.2 A package containing radioactive material may be classified as an excepted package provided that the ~~dose rate radiation level~~ at any point on its external surface does not exceed 5 µSv/h.

Table 2.7.2.4.1.2: Activity limits for excepted packages

Unchanged.

2.7.2.4.1.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article may be classified under UN 2911 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - INSTRUMENTS or ARTICLES provided that:

- (a) The ~~dose rate radiation level~~ at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h; and
- (b) Each instrument or manufactured article bears the mark “RADIOACTIVE” on its external surface except for the following:
- (i) radioluminescent time-pieces or devices;

(ii) consumer products that either have received regulatory approval in accordance with 1.5.1.4 (e) or do not individually exceed the activity limit for an exempt consignment in Table 2.7.2.2.1 (column 5), provided such products are transported in a package that bears the mark “RADIOACTIVE” on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; and

(iii) Other instruments or articles too small to bear the marking “RADIOACTIVE”, provided that they are transported in a package that bears the mark “RADIOACTIVE” on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package;

(c) The active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material shall not be considered to be an instrument or manufactured article); ~~and~~

(d) The limits specified in columns 2 and 3 of Table 2.7.2.4.1.2 are met for each individual item and each package, respectively;

(e) Reserved; and

(f) If the package contains fissile material, one of the provisions of subparagraphs (a)–(f) of paragraph 2.7.2.3.5 shall apply.

[IAEA:423]

2.7.2.4.1.4 Radioactive material in forms other than as specified in 2.7.2.4.1.3 and with an activity not exceeding the limits specified in column 4 of Table 2.7.2.4.1.2, may be classified under UN 2910 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL provided that:

(a) The package retains its radioactive contents under routine conditions of transport; and

(b) The package bears the mark “RADIOACTIVE” on either:

(i) An internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or

(ii) The outside of the package, where it is impractical to mark an internal surface; ~~and-~~

(c) If the package contains fissile material, one of the provisions of subparagraphs (a) to (f) of 2.7.2.3.5 shall apply.

[IAEA: 424]

2.7.2.4.1.5 and 2.7.2.4.1.6 unchanged.

2.7.2.4.1.7 An empty packaging which had previously contained radioactive material may be classified under UN 2908 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - EMPTY PACKAGING, provided that:

(a) It is in a well-maintained condition and securely closed;

(b) 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;

(c) The level of internal non-fixed contamination, when averaged over any 300 cm², does not exceed:

(i) 400 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters; and

(ii) 40 Bq/cm² for all other alpha emitters; ~~and~~

(d) Any labels which may have been displayed on it in conformity with 5.2.2.1.12.1 are no longer visible; ~~and-~~

(e) If the packaging has contained fissile material, one of the provisions of sub-paragraphs (a)–(f) of 2.7.2.3.5 or one

[of the provisions for exclusion in 2.7.1.3 shall apply.](#)

[IAEA: 427]

...

Remainder of Chapter 2.7 unchanged.

CHAPTER 4.1 USE OF PACKAGINGS, INCLUDING INTERMEDIATE BULK CONTAINERS (IBCs) AND LARGE PACKAGINGS

4.1.9 Special packing provisions for radioactive material

4.1.9.1 General

4.1.9.1.1 **Unchanged.**

4.1.9.1.2 **Unchanged.**

4.1.9.1.3 **Unchanged.**

4.1.9.1.4 Except as provided in 7.1.8.5.5, the level of non-fixed contamination on the external and internal surfaces of overpacks, freight containers, tanks, intermediate bulk containers and conveyances shall not exceed the limits specified in 4.1.9.1.2. [This requirement does not apply to the internal surfaces of freight containers being used as packagings, either loaded or empty.](#)

[IAEA: 509]

4.1.9.1.5 **Unchanged.**

4.1.9.1.6 **Unchanged.**

4.1.9.1.7 **Unchanged.**

4.1.9.1.8 Before each shipment of any package, it shall be ensured that all the requirements specified in the relevant provisions of these Regulations and in the applicable certificates of approval have been fulfilled. The following requirements shall also be fulfilled, if applicable:

- (a) It shall be ensured that lifting attachments which do not meet the requirements of 6.4.2.2 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with 6.4.2.3;
- (b) Each Type B(U), Type B(M) and Type C package shall be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval;
- (c) For each Type B(U), Type B(M) and Type C package, it shall be ensured by inspection and/or appropriate tests that all closures, valves and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the requirements of 6.4.8.8 and 6.4.10.3 were made;
- [\(d\) For packages containing fissile material the measurement specified in 6.4.11.5 \(b\) and the tests to demonstrate closure of each package as specified in 6.4.11.8 shall be performed;](#)
- [\(e\) For packages intended to be used for shipment after storage, it shall be ensured that all packaging components and radioactive contents have been maintained during storage in a manner such that all the requirements specified in the relevant provisions of these Regulations and in the applicable certificates of approval have been fulfilled.](#)

[IAEA: 503]

4.1.9.1.9 **Unchanged.**

4.1.9.1.10 **Unchanged.**

4.1.9.1.11 Except for packages or overpacks transported under exclusive use by rail or by road under the conditions specified in 7.2.3.1.2 (a), or under exclusive use and special arrangement by vessel or by air under the conditions specified in 7.2.3.2.1 or 7.2.3.3.3 respectively, the maximum ~~dose rate~~radiation level at any point on any external surface of a package or overpack shall not exceed 2 mSv/h.

4.1.9.1.12 The maximum ~~dose rate~~radiation level at any point on any external surface of a package or overpack under exclusive use shall not exceed 10 mSv/h.

4.1.9.2 Requirements and controls for transport of LSA material and SCO

4.1.9.2.1 The quantity of LSA material or SCO in a single Type IP-1 package, Type IP-2 package, Type IP-3 package, or object or collection of objects, whichever is appropriate, shall be so restricted that the external ~~dose rate~~radiation level at 3 m from the unshielded material or object or collection of objects does not exceed 10 mSv/h.

4.1.9.2.2 **Unchanged.**

4.1.9.2.3 **Unchanged.**

4.1.9.2.4 LSA material and SCO in groups LSA-I, ~~and SCO-I and SCO-III~~ may be transported unpackaged under the following conditions:

- (a) All unpackaged material other than ores containing only naturally occurring radionuclides shall be transported in such a manner that under routine conditions of transport there will be no escape of the radioactive contents from the conveyance nor will there be any loss of shielding;
- (b) Each conveyance shall be under exclusive use, except when only transporting SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than ten times the applicable level specified in 2.7.1.2;
- (c) For SCO-I where it is suspected that non-fixed contamination exists on inaccessible surfaces in excess of the values specified in 2.7.2.3.2 (a)(i), measures shall be taken to ensure that the radioactive material is not released into the conveyance;
- (d) Unpackaged fissile material shall meet the requirements of 2.7.2.3.5 (e).

~~(d)~~(e) For SCO-III:

(i) Transport shall be under exclusive use by road, rail, inland waterway or sea;

(ii) Stacking shall not be permitted;

(iii) All activities associated with the shipment, including radiation protection, emergency response and any special precautions or special administrative or operational controls that are to be employed during transport shall be described in a transport plan. The transport plan shall demonstrate that the overall level of safety in transport is at least equivalent to that which would be provided if the requirements of para. 648 (only for the test specified in para. 724, preceded by the tests specified in paras 720 and 721) had been met.

(iv) The requirements of para. 624 for a Type IP-2 package shall be satisfied, except that the maximum damage referred to in para. 722 may be determined based on provisions in the transport plan, and the requirements of para. 723 are not applicable.

(v) The object and any shielding are secured to the conveyance in accordance with para. 607.

(vi) The shipment shall be subject to multilateral approval.

[IAEA: 520]

Remainder of section 4.1.9 unchanged.

CHAPTER 5.1 GENERAL PROVISIONS

5.1.1 Unchanged.

5.1.2 Unchanged.

5.1.3 Unchanged.

5.1.4 Unchanged.

5.1.5 General provisions for Class 7

5.1.5.1 Approval of shipments and notification

5.1.5.1.1 Unchanged.

5.1.5.1.2 Shipment approvals

Multilateral approval shall be required for:

- (a) The shipment of Type B(M) packages not conforming to the requirements of 6.4.7.5 or designed to allow controlled intermittent venting;
- (b) The shipment of Type B(M) packages containing radioactive material with an activity greater than 3 000 A1 or 3 000 A2, as appropriate, or 1 000 TBq, whichever is the lower;
- (c) The shipment of packages containing fissile materials if the sum of the criticality safety indexes of the packages in a single freight container or in a single conveyance exceeds 50. Excluded from this requirement shall be shipments by seagoing vessels, if the sum of the criticality safety indexes does not exceed 50 for any hold, compartment or defined deck area and the distance of 6 m between groups of packages or overpacks as required in table 7.1.8.4.2 is met; ~~and~~

(d) Radiation protection programmes for shipments by special use vessels in accordance with 7.2.3.2.2; and

~~(d)~~(e) The shipment of SCO-III.

except that a competent authority may authorize transport into or through its country without shipment approval, by a specific provision in its design approval (see 5.1.5.2.1).

[IAEA: 825]

5.1.5.1.3 Unchanged.

5.1.5.1.4 Notifications

Notification to competent authorities is required as follows:

- (a) Before the first shipment of any package requiring competent authority approval, the consignor shall ensure that copies of each applicable competent authority certificate applying to that package design have been submitted to the competent authority of the country of origin of the shipment and to the competent authority of each country through or into which the consignment is to be transported. The consignor is not required to await an acknowledgement from the competent authority, nor is the competent authority required to make such

acknowledgement of receipt of the certificate;

(b) For each of the following types of shipments:

- (i) Type C packages containing radioactive material with an activity greater than 3 000 A1 or 3 000 A2, as appropriate, or 1 000 TBq, whichever is the lower;
- (ii) Type B(U) packages containing radioactive material with an activity greater than 3 000 A1 or 3 000 A2, as appropriate, or 1 000 TBq, whichever is the lower;
- (iii) Type B(M) packages;
- (iv) Shipment under special arrangement,

the consignor shall notify the competent authority of the country of origin of the shipment and the competent authority of each country through or into which the consignment is to be transported. This notification shall be in the ~~hands-possession~~ of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance.

(c) The consignor is not required to send a separate notification if the required information has been included in the application for approval of shipment (see 6.4.23.2);

(d) The consignment notification shall include:

- (i) sufficient information to enable the identification of the package or packages including all applicable certificate numbers and identification marks;
- (ii) information on the date of shipment, the expected date of arrival and proposed routing;
- (iii) the names of the radioactive material or nuclides;
- (iv) descriptions of the physical and chemical forms of the radioactive material, or whether it is special form radioactive material or low dispersible radioactive material; and
- (v) the maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the mass of fissile material (or of each fissile nuclide for mixtures when appropriate) in units of grams (g), or multiples thereof, may be used in place of activity.

[IAEA: 558]

5.1.5.2 Certificates issued by Competent Authority

Unchanged.

5.1.5.3 Determination of transport index (TI) and criticality safety index (CSI)

5.1.5.3.1 The transport index (TI) for a package, overpack or freight container, or for unpackaged LSA-I, ~~SCO-I or SCO-III~~, shall be the number derived in accordance with the following procedure:

- (a) Determine the maximum ~~radiation-level~~dose rate in units of millisieverts per hour (mSv/h) at a distance of 1 m from the external surfaces of the package, overpack, freight container, or unpackaged LSA-I, ~~SCO-I or SCO-III~~. The value determined shall be multiplied by 100 ~~and the resulting number is the transport index~~. For uranium and thorium ores and their concentrates, the maximum ~~radiation-level~~dose rate at any point 1 m from the external surface of the load may be taken as:

0.4 mSv/h for ores and physical concentrates of uranium and thorium;

0.3 mSv/h for chemical concentrates of thorium;

0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride;

- (b) For tanks, freight containers and unpackaged LSA-I, SCO-I and SCO-III, the value determined in step (a) above shall be multiplied by the appropriate factor from Table 5.1.5.3.1;
- (c) The value obtained in steps (a) and (b) above shall be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero and the resulting number is the transport index value (without unit).

[IAEA:523]

Table 5.1.5.3.1 : Multiplication factors for tanks, freight containers and unpackaged LSA-I, SCO-I and SCO-III

Size of load ^a	Multiplication factor
size of load $\leq 1 \text{ m}^2$	1
$1 \text{ m}^2 < \text{size of load} \leq 5 \text{ m}^2$	2
$5 \text{ m}^2 < \text{size of load} \leq 20 \text{ m}^2$	3
$20 \text{ m}^2 < \text{size of load}$	10

^a Largest cross-sectional area of the load being measured.

[IAEA: Table 7]

5.1.5.3.2 The transport index for each rigid overpack, freight container or conveyance shall be determined as ~~either~~ the sum of the TIs of all the packages contained therein. ~~For a shipment from a single consignor, the consignor may determine the TI or~~ by direct measurement of ~~radiation level~~ dose rate, ~~except in the case of non-rigid overpacks for which the transport index shall be determined only as the sum of the TIs of all the packages.~~

The TI for a non-rigid overpack shall be determined only as the sum of the TIs of all the packages within the overpack.

[IAEA: 524 and 524A]

5.1.5.3.3 The criticality safety index for each overpack or freight container shall be determined as the sum of the CSIs of all the packages contained. The same procedure shall be followed for determining the total sum of the CSIs in a consignment or aboard a conveyance.

5.1.5.3.4 Packages, overpacks and freight containers shall be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 5.1.5.3.4 and with the following requirements:

- (a) For a package, overpack or freight container, both the transport index and the surface ~~dose rate~~ radiation level conditions shall be taken into account in determining which is the appropriate category. Where the transport index satisfies the condition for one category but the surface ~~dose rate~~ radiation level satisfies the condition for a different category, the package, overpack or freight container shall be assigned to the higher category. For this purpose, category I-WHITE shall be regarded as the lowest category;
- (b) The ~~transport index~~ TI shall be determined following the procedures specified in 5.1.5.3.1 and 5.1.5.3.2.
- (c) If the surface ~~dose rate~~ radiation level is greater than 2 mSv/h, the package or overpack shall be transported under exclusive use and under the provisions of 7.2.3.1.3, 7.2.3.2.1, or 7.2.3.3.3, as appropriate;
- (d) A package transported under a special arrangement shall be assigned to category III-YELLOW except under the provisions of 5.1.5.3.5;
- (e) An overpack or freight container which contains packages transported under special arrangement shall be assigned to category III-YELLOW except under the provisions of 5.1.5.3.5.

Table 5.1.5.3.4: Categories of packages, overpacks and freight containers

Conditions		
Transport index	m dose rate radiation level at any point on external surface	Category
0 ^a	Not more than 0.005 mSv/h	I-WHITE
More than 0 but not more than 1 ^a	More than 0.005 mSv/h but not more than 0.5 mSv/h	II-YELLOW
More than 1 but not more than 10	More than 0.5 mSv/h but not more than 2 mSv/h	III-YELLOW
More than 10	More than 2 mSv/h but not more than 10 mSv/h	III-YELLOW ^b

^a If the measured TI is not greater than 0.05, the value quoted may be zero in accordance with 5.1.5.3.1(c).

^b Shall also be transported under exclusive use except for freight containers (see Table 7.1.8.3.3).


[IAEA Table 8]

Remainder of 5.1.5 unchanged.

CHAPTER 5.2 MARKING AND LABELLING

5.2.1.5 Special marking provisions for radioactive material

...

5.2.1.5.6 Each package which conforms to a Type B(U), Type B(M) or Type C package design shall have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol shown in the figure below: 

Any mark on the package made in accordance with the requirements of 5.2.1.5.4 (a) and (b) and 5.2.1.5.5 (c) relating to the package type that does not relate to the UN number and proper shipping name assigned to the consignment shall be removed or covered.

[IAEA 536A]

Remainder of 5.2.1.5 unchanged.

5.2.2 Labelling

...

5.2.2.1.12 Special provisions for the labelling of radioactive material

5.2.2.1.12.1 **Unchanged.**

5.2.2.1.12.2 Each label conforming to the applicable model No. 7A, 7B or 7C shall be completed with the following information:

(a) to (d) **unchanged**

(d) Transport index: The number determined in accordance with 5.1.5.3.1 and 5.1.5.3.2 (~~no transport index entry is required for~~ except for Category I-WHITE).

[IAEA: 540]

Remainder unchanged.

CHAPTER 5.3 PLACARDING AND MARKING OF CARGO TRANSPORT UNITS AND BULK CONTAINERS

...

5.3.1.1.5 *Special provisions for Class 7*

5.3.1.1.5.1 Large freight containers carrying [unpacked LSA-I material or SCO-I](#) or packages other than excepted packages, and tanks shall bear four placards which conform to the model No.7D given in Figure 5.3.1. The placards shall be affixed in a vertical orientation to each side wall and each end wall of the large freight container or tank. Any placards which do not relate to the contents shall be removed. Instead of using both labels and placards, it is permitted as an alternative to use enlarged labels only, as shown in label models Nos. 7A, 7B and 7C, except having the minimum size shown in Figure 5.3.1.

[IAEA: 543]

...

5.3.2 **Marking**

5.3.2.1 *Display of UN numbers*

5.3.2.1.1 Except for goods of Class 1, the UN number shall be displayed as required by this section on consignments of:

- (a) Solids, liquids or gases transported in tank cargo transport units including on each component of a multicompartment tank cargo transport unit;
- (b) Solids in bulk containers;
- (c) Packaged dangerous goods of a single commodity which constitute a full load for the cargo transport unit;
- (d) Unpackaged ~~LSA-1 or SCO-1 material of Class 7~~ [LSA-I material, SCO-I or SCO-III](#) in or on a vehicle, or in a freight container, or in a tank; and
- (e) Packaged radioactive material with a single UN number in or on a vehicle, or in a freight container, when required to be transported under exclusive use.

[IAEA: 572]

[Note by the secretariat: SCO is not a material but a solid object and the transport for SCO in a tank is questioning and should be deleted.]

CHAPTER 5.4 DOCUMENTATION

...

5.4.1.5.7 *Radioactive material*

5.4.1.5.7.1 The following information shall be included for each consignment of Class 7 material, as applicable, in the order given:

- (a) The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides;
- (b) A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form;

- (c) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the mass of fissile material (or mass of each fissile nuclide for mixtures when appropriate) in units of grams (g), or appropriate multiples thereof, may be used in place of activity;
- (d) The category of the package, overpack or freight container, as assigned per paragraph 5.1.5.3.4, i.e. I-WHITE, II-YELLOW, III-YELLOW;
- (e) The ~~transport index~~TI as determined per paragraphs 5.1.5.3.1 and 5.1.5.3.2 (except for category I-WHITE); (categories II-YELLOW and III-YELLOW only);
- (f) For fissile material:
- (i) Shipped under one exception of 2.7.2.3.5 (a) to (f), reference to that paragraph;
 - (ii) Shipped under 2.7.2.3.5 (c) to (e), the total mass of fissile nuclides;
 - (iii) Contained in a package for which one of 6.4.11.2 (a) to (c) or 6.4.11.3 is applied, reference to that paragraph;
 - (iv) The criticality safety index, where applicable.;
- (g) The identification mark for each competent authority certificate of approval (special form radioactive material, low dispersible radioactive material, fissile material excepted under 2.7.2.3.5 (f), special arrangement, package design, or shipment) applicable to the consignment;
- (h) For consignments of more than one package, the information contained in 5.4.1.4.1 (a) to (c) and 5.4.1.5.7.1 (a) to (g) shall be given for each package. For packages in an overpack, freight container, or conveyance, a detailed statement of the contents of each package within the overpack, freight container, or conveyance and, where appropriate, of each overpack, freight container, or conveyance shall be included. If packages are to be removed from the overpack, freight container, or conveyance at a point of intermediate unloading, appropriate transport documents shall be made available;
- (i) Where a consignment is required to be shipped under exclusive use, the statement “EXCLUSIVE USE SHIPMENT”; and
- (j) For LSA-II, LSA-III, SCO-I, SCO-II and SCO-III, the total activity of the consignment as a multiple of A2. For radioactive material for which the A2 value is unlimited, the multiple of A2 shall be zero.

[IAEA: 546]

5.4.2 Container/vehicle packing certificate

5.4.2.1 *Unchanged.*

5.4.2.2 The information required in the dangerous goods transport document and the container/vehicle packing certificate may be incorporated into a single document, if not, these documents shall be attached ~~one to the other~~. If the information is incorporated into a single document, the document shall include a signed declaration such as “It is declared that the packing of the goods into the container/vehicle has been carried out in accordance with the applicable provisions”. This declaration shall be dated and the person signing this declaration shall be identified on the document. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

[IAEA: 552]

...

CHAPTER 6.4 REQUIREMENTS FOR THE CONSTRUCTION, TESTING AND APPROVAL OF PACKAGES FOR RADIOACTIVE MATERIAL AND FOR THE APPROVAL OF SUCH MATERIAL

6.4.1 *Reserved.*

6.4.2 **General requirements**

6.4.2.1 to 6.4.2.3 **unchanged.**

6.4.2.4 As far as practicable, the packaging shall be so designed ~~and finished~~ that the external surfaces are free from protruding features and can be easily decontaminated.

[IAEA: 610]

6.4.2.5 to 6.4.2.7 **unchanged.**

6.4.2.8 The design of the package shall take into account ageing mechanism

[IAEA 613A]

6.4.2.~~8~~⁹ The materials of the packaging and any components or structures shall be physically and chemically compatible with each other and with the radioactive contents. Account shall be taken of their behaviour under irradiation.

6.4.2.~~9~~¹⁰ All valves through which the radioactive contents could escape shall be protected against unauthorized operation.

6.4.2.~~10~~¹¹ The design of the package shall take into account ambient temperatures and pressures that are likely to be encountered in routine conditions of transport.

6.4.2.~~11~~¹² A package shall be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum radioactive contents that the package is designed to contain, the dose rate~~radiation level~~ at any point on the external surface of the package would not exceed the values specified in 2.7.2.4.1.2, 4.1.9.1.11 and 4.1.9.1.12, as applicable, with account taken of 7.1.8.3.3 (b) and 7.2.3.1.2.

6.4.2.~~12~~¹³ For radioactive material having other dangerous properties the package design shall take into account those properties; see 2.0.3.1, 2.0.3.2 and 4.1.9.1.5.

6.4.2.~~13~~¹⁴ Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for transport are capable of passing the applicable performance tests of this Chapter.

6.4.3 **Additional requirements for packages transported by air**

Unchanged.

6.4.4 **Requirements for excepted packages**

An excepted package shall be designed to meet the requirements specified in 6.4.2.1-6.4.2.12 and, in addition, the requirements of 6.4.7.2 if it contains fissile material allowed by one of the provisions of sub-paragraphs (a)–(f) of 2.7.2.3.5, and the requirements of 6.4.3 if carried by air.

[IAEA: 622]

6.4.5 **Requirements for industrial packages**

6.4.5.1 **Unchanged.**

6.4.5.2 A Type IP-2 package shall, if it were subjected to the tests specified in 6.4.15.4 and 6.4.15.5, prevent:

- (a) Loss or dispersal of the radioactive contents; and
- (b) More than a 20% increase in the maximum dose rate~~radiation level~~ at any external surface of the package.

6.4.5.3 Unchanged.

6.4.5.4 *Alternative requirements for Type IP-2 and IP-3 packages*

6.4.5.4.1 Packages may be used as Type IP-2 package provided that:

- (a) They satisfy the requirements of 6.4.5.1;
- (b) They are designed to satisfy the requirements prescribed for packing group I or II in Chapter 6.1 of these Regulations; and
- (c) When subjected to the tests required for packing group I or II in Chapter 6.1, they would prevent:
 - (i) loss or dispersal of the radioactive contents; and
 - (ii) more than a 20% increase in the maximum ~~dose rate~~radiation level at any external surface of the package.

6.4.5.4.2 Portable tanks may also be used as Type IP-2 or IP-3 packages, provided that:

- (a) They satisfy the requirements of 6.4.5.1;
- (b) They are designed to satisfy the requirements prescribed in Chapter 6.7 of these Regulations and are capable of withstanding a test pressure of 265 kPa; and
- (c) They are designed so that any additional shielding which is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20% increase in the maximum ~~dose rate~~radiation level at any external surface of the portable tanks.

6.4.5.4.3 Tanks, other than portable tanks, may also be used as Type IP-2 or IP-3 package for transporting LSA-I and LSA-II ~~liquids and gases~~ as prescribed in Table 4.1.9.2.54, provided that:

- (a) They satisfy the requirements of 6.4.5.1;
- (b) They are designed to satisfy the requirements prescribed in regional or national regulations for the transport of dangerous goods and are capable of withstanding a test pressure of 265 kPa; and
- (c) They are designed so that any additional shielding which is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20% increase in the maximum ~~dose rate~~radiation level at any external surface of the tanks.

[IAEA: 628]

6.4.5.4.4 Freight containers with the characteristics of a permanent enclosure may also be used as Type IP-2 or IP-3 package, provided that:

- (a) The radioactive contents are restricted to solid materials;
- (b) They satisfy the requirements of 6.4.5.1; and
- (c) They are designed to conform to ISO 1496-1:1990 “Series 1 Freight Containers – Specifications and Testing – Part 1: General Cargo Containers” and subsequent amendments 1:1993, 2:1998, 3:2005, 4:2006 and 5:2006, excluding dimensions and ratings. They shall be designed such that if subjected to the tests prescribed in that document and the accelerations occurring during routine conditions of transport they would prevent:
 - (i) loss or dispersal of the radioactive contents; and
 - (ii) more than a 20% increase in the maximum ~~dose rate~~radiation level at any external surface of the freight containers.

6.4.5.4.5 Metal intermediate bulk containers may also be used as Type IP-2 or IP-3 package provided that:

- (a) They satisfy the requirements of 6.4.5.1; and

- (b) They are designed to satisfy the requirements prescribed in Chapter 6.5 of these Regulations for packing group I or II, and if they were subjected to the tests prescribed in that Chapter, but with the drop test conducted in the most damaging orientation, they would prevent:
- (i) loss or dispersal of the radioactive contents; and
 - (ii) more than a 20% increase in the maximum ~~dose rate~~radiation level at any external surface of the intermediate bulk container.

6.4.6 Requirements for packages containing uranium hexafluoride

6.4.6.1 Unchanged.

6.4.6.2 Each package designed to contain 0.1 kg or more of uranium hexafluoride shall be designed so that ~~the package~~ would meet the following requirements:

- (a) Withstand without leakage and without unacceptable stress, as specified in ISO 7195:2005, the structural test as specified in 6.4.21 except as allowed in 6.4.6.4;
- (b) Withstand without loss or dispersal of the uranium hexafluoride the free drop test specified in 6.4.15.4; and
- (c) Withstand without rupture of the containment system the thermal test specified in 6.4.17.3 except as allowed in 6.4.6.4.

[IAEA: 632]

6.4.6.3 and 6.4.6.4 unchanged.

6.4.7 Requirements for Type A packages

6.4.7.1 to 6.4.7.8 unchanged.

6.4.7.9 If the containment system forms a separate unit of the package, ~~the containment system~~ shall be capable of being securely closed by a positive fastening device which is independent of any other part of the packaging.

[IAEA: 643]

6.7.4.10 o 6.7.4.13 unchanged.

6.4.7.14 A package shall be so designed that if it were subjected to the tests specified in 6.4.15, it would prevent:

- (a) Loss or dispersal of the radioactive contents; and
- (b) More than a 20% increase in the maximum ~~dose rate~~radiation level at any external surface of the package.

6.4.7.15 Unchanged.

Type A packages to contain liquids

6.4.7.16 Unchanged.

Type A packages to contain gas

6.4.7.17 A Type A package designed for gases shall prevent loss or dispersal of the radioactive contents if the package were subjected to the tests specified in 6.4.16 except for a ~~A~~ Type A package designed for tritium gas or for noble gases ~~shall be excepted from this requirement.~~

[IAEA: 651]

6.4.8 Requirements for Type B(U) packages

6.4.8.1 Unchanged.

6.4.8.2 A package shall be so designed that, under the ambient conditions specified in 6.4.8.5 and 6.4.8.6 heat generated within the package by the radioactive contents shall not, under normal conditions of transport, as demonstrated by the tests in 6.4.15, adversely affect the package in such a way that it would fail to meet the applicable requirements for containment and shielding if left unattended for a period of one week. Particular attention shall be paid to the effects of heat, which may cause one or more of the following:

- (a) Alter the arrangement, the geometrical form or the physical state of the radioactive contents or, if the radioactive material is enclosed in a can or receptacle (for example, clad fuel elements), cause the can, receptacle or radioactive material to deform or melt;
- (b) Lessening of the efficiency of the packaging through differential thermal expansion or cracking or melting of the radiation shielding material;
- (c) In combination with moisture, accelerate corrosion.

[IAEA: 653]

6.4.8.3 to 6.4.8.7 unchanged.

6.4.8.8 A package shall be so designed that, if it were subjected to:

- (a) The tests specified in 6.4.15, it would restrict the loss of radioactive contents to not more than 10^{-6} A2 per hour; and
- (b) The tests specified in 6.4.17.1, 6.4.17.2 (b), 6.4.17.3, and 6.4.17.4 and either the test in:
 - (i) 6.4.17.2 (c), when the package has a mass not greater than 500 kg, an overall density not greater than 1 000 kg/m³ based on the external dimensions, and radioactive contents greater than 1 000 A2 not as special form radioactive material; or
 - (ii) 6.4.17.2 (a), for all other packages; it would meet the following requirements:
 - Retain sufficient shielding to ensure that the ~~dose rate~~ radiation level at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and
 - Restrict the accumulated loss of radioactive contents in a period of one week to not more than 10 A2 for krypton-85 and not more than A2 for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2.7.2.2.4 to 2.7.2.2.6 shall apply except that for krypton-85 an effective A2(i) value equal to 10 A2 may be used. For case (a) above, the assessment shall take into account the external non-fixed contamination limits of 4.1.9.1.2.

[IAEA: 659]

6.4.8.9 to 6.4.8.15 unchanged.

6.4.9 Requirements for Type B(M) packages

6.4.9.1 Type B(M) packages shall meet the requirements for Type B(U) packages specified in 6.4.8.1, except that for packages to be transported solely within a specified country or solely between specified countries, conditions other than those given in 6.4.7.5, 6.4.8.4 to 6.4.8.6, and 6.4.8.9 to 6.4.8.15 above may be assumed with the approval of the competent authorities of these countries. ~~Notwithstanding,~~ The requirements for Type B(U) packages specified in 6.4.8.4, 6.4.8.9 to 6.4.8.15 shall be met as far as practicable.

[IAEA: 667]

6.4.9.2 Unchanged.

6.4.10 Requirements for Type C packages6.4.10.1 **Unchanged.**6.4.10.2 **Unchanged.**

6.4.10.3 A package shall be so designed that, if it were at the maximum normal operating pressure and subjected to:

- (a) The tests specified in 6.4.15, it would restrict the loss of radioactive contents to not more than 10^{-6} A2 per hour; and
- (b) The test sequences in 6.4.20.1,
 - (i) it would retain sufficient shielding to ensure that the ~~dose rate~~ ~~radiation level~~ at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and
 - (ii) it would restrict the accumulated loss of radioactive contents in a period of 1 week to not more than 10 A2 for krypton-85 and not more than A2 for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2.7.2.2.4 to 2.7.2.2.6 shall apply except that for krypton-85 an effective A2(i) value equal to 10 A2 may be used. For case (a) above, the assessment shall take into account the external contamination limits of 4.1.9.1.2.

6.4.10.4 **Unchanged.****6.4.11 Requirements for packages containing fissile material**6.4.11.1 **Unchanged.**

6.4.11.2 Packages containing fissile material that meet the provisions of subparagraph (d) and one of the provisions of (a) to (c) below are excepted from the requirements of 6.4.11.4 to 6.4.11.14.

(a) and (b) unchanged.

- (c) Packages containing fissile material in any form provided that:
 - (i) The smallest external dimension of the package is not less than 10 cm;
 - (ii) The package, after being subjected to the tests specified in 6.4.15.1 to 6.4.15.6;
 - Retains its fissile material contents;
 - Preserves the minimum overall outside dimensions of the package to at least 10 cm;
 - Prevents the entry of a 10 cm cube.
 - (iii) The CSI of the package is calculated using the following formula:

$$CSI = 50 \times 2 \times \left(\frac{\text{Mass of U - 235 in package (g)}}{450} + \frac{\text{Mass of other fissile nuclides* in package (g)}}{280} \right)$$

* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

- (iv) The ~~total~~ ~~maximum~~ mass of fissile nuclides in any package does not exceed 15 g;
- (d) The total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package shall not be greater than the mass of fissile nuclides in the package except where ~~the~~ ~~their~~ total concentration of these materials does not exceed 1 g in any 1 000 g of material. Beryllium

incorporated in copper alloys up to 4% in weight of the alloy does not need to be considered.

[IAEA: 674]

Table 6.4.11.2: Values of Z for calculation of criticality safety index in accordance with 6.4.11.2

Enrichement ^a	Z
Uranium enriched up to 1.5%	2200
Uranium enriched up to 5 %	850
Uranium enriched up to 10 %	660
Uranium enriched up to 20 %	580
Uranium enriched up to 100 %	450

^a *If a package contains uranium with varying enrichments of U-235, then the value corresponding to the highest enrichment shall be used for Z.*

6.4.11.3 to 6.4.11.7 unchanged.

6.4.11.8 For a package in isolation, it shall be assumed that water can leak into or out of all void spaces of the package, including those within the containment system. However, if the design incorporates special features to prevent such leakage of water into or out of certain void spaces, even as a result of error, absence of leakage may be assumed in respect of those void spaces. Special features shall include either of the following:

- (a) Multiple high standard water barriers, not less than two of which would remain watertight if the package were subject to the tests prescribed in 6.4.11.13 (b), a high degree of quality control in the manufacture, maintenance and repair of packagings and tests to demonstrate the closure of each package before each shipment; or
- (b) For packages containing uranium hexafluoride only, with maximum enrichment of 5 mass percent uranium-235:
 - (i) packages where, following the tests prescribed in 6.4.11.13 (b), there is no physical contact between the valve or the plug and any other component of the packaging other than at its original point of attachment and where, in addition, following the test prescribed in 6.4.17.3 the valves and the plug remain leaktight; and
 - (ii) a high degree of quality control in the manufacture, maintenance and repair of packagings coupled with tests to demonstrate closure of each package before each shipment.

[IAEA: 680]

6.4.11.9 **Unchanged.**

6.4.11.10 **Unchanged.**

6.4.11.11 For packages to be transported by air:

- (a) The package shall be subcritical under conditions consistent with the Type C package tests specified in 6.4.20.1 assuming reflection by at least 20 cm of water but no water inleakage; and
- (b) ~~In the assessment of 6.4.11.10 allowance shall not be made for special features of 6.4.11.8 unless, following the Type C package tests specified in 6.4.20.1 and, subsequently, the water in-leakage test of 6.4.19.3, leakage of water into or out of the void spaces is prevented.~~ In the assessment of 6.4.11.10, use of special features as specified in 6.4.11.8 is allowed provided that leakage of water into or out of the void spaces is prevented when the package is submitted to the Type C package tests specified in 6.4.20.1 followed by the water leakage test specified in 6.4.19.3.

[IAEA:683]

6.4.11.12 to 6.4.11.14 unchanged.

6.4.12 Test procedures and demonstration of compliance

6.4.12.1 Demonstration of compliance with the performance standards required in 2.7.2.3.1.3, 2.7.2.3.1.4, 2.7.2.3.3.1, 2.7.2.3.3.2, 2.7.2.3.4.1, 2.7.2.3.4.2 and 6.4.2 to 6.4.11 must be accomplished by any of the methods listed below or by a combination thereof.

- (a) Performance of tests with specimens representing ~~LSA-III material, or~~ special form radioactive material, or low dispersible radioactive material or with prototypes or samples of the packaging, where the contents of the specimen or the packaging for the tests shall simulate as closely as practicable the expected range of radioactive contents and the specimen or packaging to be tested shall be prepared as presented for transport;

(b) to (d) unchanged.

[IAEA: 701]

6.4.12.2 and 6.4.12.3 unchanged.

6.4.13 Testing the integrity of the containment system and shielding and evaluating criticality safety

After each [test or group of tests or sequence](#) of the applicable tests, [as appropriate](#), specified in 6.4.15 to 6.4.21:

- (a) Faults and damage shall be identified and recorded;
- (b) It shall be determined whether the integrity of the containment system and shielding has been retained to the extent required in 6.4.2 to 6.4.11 for the package under test; and
- (c) For packages containing fissile material, it shall be determined whether the assumptions and conditions used in the assessments required by 6.4.11.1 to 6.4.11.14 for one or more packages are valid.

[IAEA: 716]

6.4.14 Target for drop tests

Unchanged.

6.4.15 Test for demonstrating ability to withstand normal conditions of transport

6.4.15.1 to 6.4.15.3 unchanged.

6.4.15.4 Free drop test: The specimen shall drop onto the target so as to suffer maximum damage in respect of the safety features to be tested.

- (a) The height of [the](#) drop measured from the lowest point of the specimen to the upper surface of the target shall be not less than the distance specified in Table 6.4.15.4 for the applicable mass. The target shall be as defined in 6.4.14;
- (b) For rectangular fibreboard or wood packages not exceeding a mass of 50 kg, a separate specimen shall be subjected to a free drop onto each corner from a height of 0.3 m;
- (c) For cylindrical fibreboard packages not exceeding a mass of 100 kg, a separate specimen shall be subjected to a free drop onto each of the quarters of each rim from a height of 0.3 m.

[IAEA: 722]

Table 6.4.15.4: Free drop distance for testing packages to normal conditions of transport

Package Mass (kg)	Free drop distance (m)
Package mass < 5 000	1.2

5 000 ≤ Package mass < 10 000	0.9
10 000 ≤ Package mass < 15 000	0.6
15 000 ≤ Package mass	0.3

6.4.15.5 **Unchanged.**

6.4.15.6 Penetration test: The specimen shall be placed on a rigid, flat, horizontal surface which will not move significantly while the test is being carried out.

- (a) A bar of 3.2 cm in diameter with a hemispherical end and a mass of 6 kg shall be dropped and directed to fall, with its longitudinal axis vertical, onto the centre of the weakest part of the specimen, so that, if it penetrates sufficiently far, it will hit the containment system. The bar shall not be significantly deformed by the test performance;
- (b) The height of the drop of the bar, measured from its lower end to the intended point of impact on the upper surface of the specimen, shall be 1 m.

[IAEA: 724]

6.4.16 Additional tests for Type A packages designed for liquids and gases

Unchanged.

6.4.17 Tests for demonstrating ability to withstand accident conditions in transport

6.4.17.1 **Unchanged.**

6.4.17.2 *Mechanical test:* The mechanical test consists of three different drop tests. Each specimen shall be subjected to the applicable drops as specified in 6.4.8.8 or 6.4.11.13. The order in which the specimen is subjected to the drops shall be such that, on completion of the mechanical test, the specimen shall have suffered such damage as will lead to the maximum damage in the thermal test which follows.

(a) **Unchanged**

- (b) For drop II, the specimen shall drop onto a bar rigidly mounted perpendicularly on the target so as to suffer the maximum damage. The height of the drop measured from the intended point of impact of the specimen to the upper surface of the bar shall be 1 m. The bar shall be of solid mild steel of circular cross-section, (15.0 ± 0.5) cm in diameter and 20 cm long unless a longer bar would cause greater damage, in which case a bar of sufficient length to cause maximum damage shall be used. The upper end of the bar shall be flat and horizontal with its edge rounded off to a radius of not more than 6 mm. The target on which the bar is mounted shall be as described in 6.4.14;

(c) **Unchanged.**

[IAEA: 727]

6.4.17.3 *Thermal test:* The specimen shall be in thermal equilibrium under conditions of an ambient temperature of 38 °C, subject to the solar insolation conditions specified in Table 6.4.8.6 and subject to the design maximum rate of internal heat generation within the package from the radioactive contents. Alternatively, any of these parameters are allowed to have different values prior to and during the test, providing due account is taken of them in the subsequent assessment of package response.

The thermal test shall then consist of:

- (a) **Unchanged;**

- (b) Exposure of the specimen to an ambient temperature of 38 °C, subject to the solar insolation conditions specified in Table 6.4.8.6 and subject to the design maximum rate of internal heat generation within the package by the radioactive contents for a sufficient period to ensure that temperatures in the specimen are ~~everywhere~~ decreasing in all parts of the specimen and/or are approaching initial steady state conditions. Alternatively, any of these parameters are allowed to have different values following cessation of heating, providing due account is taken of them in the subsequent assessment of package response.

During and following the test the specimen shall not be artificially cooled and any combustion of materials of the specimen shall be permitted to proceed naturally.

[IAEA: 728]

6.4.17.4 to 6.4.22.7 Unchanged.

6.4.23 Applications and approvals for radioactive material transport

6.4.23.1 *Reserved.*

6.4.23.2 **Unchanged.**

6.4.23.2.1 An application for approval of SCO-III shipments shall include:

(a) A statement of the respects in which, and of the reasons why, the consignment is considered SCO-III.

(b) Justification for choosing SCO-III by demonstrating that:

(i) No suitable packaging currently exists;

(ii) Designing and/or constructing a packaging or segmenting the object is not practically, technically or economically feasible;

(iii) No other viable alternative exists.

(c) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted.

(d) A detailed statement of the design of the SCO-III, including complete engineering drawings and schedules of materials and methods of manufacture.

(e) All information necessary to satisfy the competent authority that the requirements of 4.1.9.2.4(e) and the requirements of 7.1.8.2, if applicable, are satisfied.

(f) A transport plan.

(g) A specification of the applicable management system as required in 1.5.3.1 .

[IAEA: 827A]

6.4.23.3 **Unchanged.**

6.4.23.4 An application for approval of Type B(U) or Type C package design shall include:

- (a) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted;
- (b) A detailed statement of the design, including complete engineering drawings and schedules of materials and methods of manufacture;
- (c) A statement of the tests which have been done and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable requirements;
- (d) The proposed operating and maintenance instructions for the use of the packaging;

- (e) If the package is designed to have a maximum normal operating pressure in excess of 100 kPa gauge, a specification of the materials of manufacture of the containment system, the samples to be taken, and the tests to be made;
- ~~(e)~~(f) If the package is to be used for shipment after storage, a justification of considerations to ageing mechanisms in the safety analysis and within the proposed operating and maintenance instructions;
- ~~(f)~~(g) Where the proposed radioactive contents are irradiated nuclear fuel, a statement and a justification of any assumption in the safety analysis relating to the characteristics of the fuel and a description of any pre-shipment measurement as required by 6.4.11.5 (b);
- ~~(g)~~(h) Any special stowage provisions necessary to ensure the safe dissipation of heat from the package considering the various modes of transport to be used and type of conveyance or freight container;
- ~~(h)~~(i) A reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package; ~~and~~
- (j) A specification of the applicable management system as required by 1.5.3.1; ~~and~~
- ~~(i)~~(k) For packages which are to be used for shipment after storage, a gap analysis programme describing a systematic procedure for a periodic evaluation of changes of Regulations, changes in technical knowledge and changes of the state of the package design during storage.

[IAEA: 809]

6.4.23.5 **Unchanged.**

6.4.23.6 **Unchanged.**

6.4.23.7 **Unchanged.**

6.4.23.8 An application for approval of design for special form radioactive material and design for low dispersible radioactive material shall include:

- (a) A detailed description of the radioactive material or, if a capsule, the contents; particular reference shall be made to both physical and chemical states;
- (b) A detailed statement of the design of any capsule to be used;
- (c) A statement of the tests which have been done and their results, or evidence based on calculations~~calculative methods~~ to show that the radioactive material is capable of meeting the performance standards, or other evidence that the special form radioactive material or low dispersible radioactive material meets the applicable requirements of these Regulations;
- (d) A specification of the applicable management system as required in 1.5.3.1; and
- (e) Any proposed pre-shipment actions for use in the consignment of special form radioactive material or low dispersible radioactive material.

[IAEA: 803]

6.4.23.9 **Unchanged.**

6.4.23.10 An application for approval of alternative activity limits for an exempt consignment of instruments or articles shall include:

- (a) An identification and detailed description of the instrument or article, its intended uses and the radionuclide(s) incorporated;
- (b) The maximum activity of the radionuclide(s) in the instrument or article;
- (c) Maximum external dose rate~~radiation levels~~ arising from the instrument or article;

- (d) The chemical and physical forms of the radionuclide(s) contained in the instrument or article;
- (e) Details of the construction and design of the instrument or article, particularly as related to the containment and shielding of the radionuclide in routine, normal and accident conditions of transport;
- (f) The applicable management system, including the quality testing and verification procedures to be applied to radioactive sources, components and finished products to ensure that the maximum specified activity of radioactive material or the maximum ~~dose rate~~ radiation levels specified for the instrument or article are not exceeded, and that the instruments or articles are constructed according to the design specifications;
- (g) The maximum number of instruments or articles expected to be shipped per consignment and annually;
- (h) Dose assessments in accordance with the principles and methodologies set out in the [Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna \(2014\)](#) ~~[2]International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna (1996)~~, including individual doses to transport workers and members of the public and, if appropriate, collective doses arising from routine, normal and accident conditions of transport, based on representative transport scenarios the consignments are subject to.

[IAEA: 817]

6.4.23.11 Each certificate of approval issued by a competent authority shall be assigned an identification mark. The mark shall be of the following generalized type: VRI/Number/Type Code

(a) to (c) unchanged

- (d) ~~For certificates of approval of package design and special form radioactive material, other than those issued under transitional packaging the provisions of 6.4.24.2 to 6.4.24.5, and for low dispersible radioactive material, the symbols “96” shall be added to the type code.~~

[IAEA: 832]

6.4.23.12 These identification marks shall be applied as follows:

- (a) Each certificate and each package shall bear the appropriate identification mark, comprising the symbols prescribed in 6.4.23.11 (a), (b) ~~and~~, (c) ~~and (d)~~ above, except that, for packages, only the applicable design type codes ~~including, if applicable, the symbols “96”~~, shall appear following the second stroke, that is, the “T” or “X” shall not appear in the identification marks on the package. Where the approval of design and the approval of shipment are combined, the applicable type codes do not need to be repeated. For example:

... Remainder unchanged.

[IAEA: 833]

6.4.23.13 **Unchanged.**

6.4.23.14 **Unchanged.**

6.4.23.15 Each certificate of approval issued by a competent authority for a special arrangement shall include the following information:

...

- (k) Additionally, for packages containing fissile material:
 - (i) a detailed description of the authorized radioactive contents;
 - (ii) the value of the criticality safety index;
 - (iii) reference to the documentation that demonstrates the criticality safety of the [package contents](#);

- (iv) any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;
- (v) any allowance (based on 6.4.11.5 (b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and
- (vi) the ambient temperature range for which the special arrangement has been approved;

Remainder unchanged.

[IAEA: 836]

6.4.23.16 **Unchanged.**

6.4.23.17 Each certificate of approval of the design of a package issued by a competent authority shall include the following information:

(a) to (m) unchanged.

- (n) For package designs containing fissile material which require multilateral approval of the package design in accordance with 6.4.22.4:
 - (i) a detailed description of the authorized radioactive contents;
 - (ii) a description of the confinement system;
 - (iii) the value of the criticality safety index;
 - (iv) reference to the documentation that demonstrates the criticality safety of the package contents;
 - (v) any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;
 - (vi) any allowance (based on 6.4.11.5 (b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and
 - (vii) the ambient temperature range for which the package design has been approved;

(o) For Type B(M) packages, a statement specifying those prescriptions of 6.4.7.5, 6.4.8.4, 6.4.8.5, 6.4.8.6 and 6.4.8.9 to 6.4.8.15 with which the package does not conform and any amplifying information which may be useful to other competent authorities;

(p) For package designs subject to para. 6.4.24.2, a statement specifying those requirements of the current regulations with which the package does not conform;

(q) For packages containing more than 0.1 kg of uranium hexafluoride, a statement specifying those prescriptions of 6.4.6.4 which apply if any and any amplifying information which may be useful to other competent authorities;

(r) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;

(s) Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to shipment;

(t) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in 6.4.8.5, 6.4.8.6 and 6.4.8.15, as applicable;

(u) A specification of the applicable management system as required in 1.5.3.1;

- (u)(v) _____ Any emergency arrangements deemed necessary by the competent authority;
- (v)(w) _____ If deemed appropriate by the competent authority, reference to the identity of the applicant;
- (w)(x) _____ Signature and identification of the certifying official.

[IAEA: 838]

6.4.23.18 to 6.4.23.20 unchanged.

6.4.24 Transitional measures for Class 7

~~Packages not requiring competent authority approval of design under the 1985 and 1985 (as amended 1990) editions of IAEA Safety Series No. 6~~

Packages not requiring competent authority approval of design under the 1985, 1985 (As Amended 1990), 1996 Edition, 1996 Edition (Revised), 1996 (As Amended 2003), 2005, 2009 Editions of IAEA Safety Series No. 6 and 2012 Edition of IAEA Safety Standards Serie No. SSR-6.

6.4.24.1 Packages not requiring competent authority approval of design (excepted packages, Type IP- 1, Type IP-2, Type IP-3 and Type A packages) shall meet this Edition of these Regulations in full, except that:

- (a) Packages that meet the requirements of the 1985 or 1985 (As Amended 1990) Editions of IAEA Regulations:
- (i) May continue in transport provided that they were prepared for transport prior to 31 December 2003 and are subject to the requirements of 6.4.24.4, if applicable; or
 - (ii) May continue to be used, provided that all the following conditions are met:
 - They were not designed to contain uranium hexafluoride;
 - The applicable requirements of 1.5.3.1 of this Edition of these Regulations are applied;
 - The activity limits and classification in Section IV of this Edition of these Regulations are applied;
 - The requirements and controls for transport in Section V of this Edition of these Regulations are applied;
 - The *packaging* was not manufactured or modified after 31 December 2003;
- (b) *Packages* that meet the requirements of the 1996 Edition, 1996 Edition (Revised), 1996 (As Amended 2003), 2005, 2009 or 2012 Editions of these Regulations:
- (i) May continue in transport provided that they were prepared for transport prior to 31 December 2025 and are subject to the requirements of 6.4.24.4, if applicable; or
 - (ii) May continue to be used, provided that all the following conditions are met:
 - The applicable requirements of 1.5.3.1 of this Edition of these Regulations are applied;
 - The activity limits and classification in Section IV of this Edition of these Regulations are applied;
 - The requirements and controls for transport in Section V of this Edition of these Regulations are applied; and
 - The *packaging* was not manufactured or modified after 31 December 2025.”.

[IAEA: 819]

~~packages that meet the requirements of the 1985 or 1985 (as amended 1990) Editions of IAEA~~

Regulations for the Safe Transport of Radioactive Material (IAEA Safety Series No.6):

~~May continue in transport provided that they were prepared for transport prior to 31 December 2003, and subject to the requirements of 6.4.24.4, if applicable;~~

~~May continue to be used provided that:~~

Package designs approved under the 1985, 1985 (As Amended 1990), 1996 Edition, 1996 Edition (Revised), 1996 (As Amended 2003), 2005, 2009 Editions of IAEA Safety Series No. 6 and 2012 Edition of IAEA Safety Standards Serie No. SSR-6”

6.4.24.2 Packages requiring competent authority approval of the design shall meet this Edition of these Regulations in full ~~except that unless the following conditions are met:~~

~~(a)-~~ Packagings that were manufactured to a package design approved by the competent authority under the provisions of 1985 or 1985 (As Amended 1990) Editions of IAEA Regulations may continue to be used provided that all of the following conditions are met:

- (i) The package design is subject to multilateral approval;
- (ii) The applicable requirements of 1.5.3.1 of this Edition of these Regulations are applied;
- (iii) The activity limits and classification in Section IV of this Edition of these Regulations are applied;
- (iv) The requirements and controls for transport in Section V of this Edition of these Regulations are applied;
- (v) For a package containing fissile material and transported by air, the requirement of 6.4.11.11 is met;

(b) Packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1996 Edition, 1996 Edition (Revised), 1996 (As Amended 2003), 2005, 2009 and 2012 Editions of these Regulations may continue to be used provided that all of the following conditions are met:

- (i) The package design is subject to multilateral approval after 31 December 2025;
- (ii) The applicable requirements of 1.5.3.1 of this Edition of the Regulations are applied;
- (iii) The activity limits and material restrictions of Section IV of this Edition of these Regulations are applied;
- (iv) The requirements and controls for transport in Section V of this Edition of these Regulations are applied.”.

[IAEA: 820]

~~(n) The packagings were manufactured to a package design approved by the competent authority under the provisions of the 1973 or 1973 (as amended) or the 1985 or 1985 (as amended 1990) Editions of IAEA Safety Series No.6;~~

~~(o) The package design is subject to multilateral approval;~~

~~(p) The applicable requirements of 1.5.3.1 of these Regulations are applied;~~

~~(q) The activity limits and classification in Chapter 2.7 of these Regulations are applied;~~

~~(r) The requirements and controls for transport in in Parts 1, 3, 4, 5 and 7 of these Regulations are applied;~~

~~(s) For a package containing fissile material and transported by air, the requirement of~~

~~6.4.11.11 is met;~~

- ~~(t) For packages that meet the requirements of the 1973 or 1973 (as amended) Editions of IAEA Safety Series No. 6:~~
- ~~(i) The packages retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h in the accident conditions of transport defined in the 1973 Revised or 1973 Revised (as amended) Editions of IAEA Safety Series No.6 with the maximum radioactive contents which the package is authorized to contain;~~
- ~~(ii) The packages do not utilize continuous venting;~~
- ~~(iii) A serial number in accordance with the provision of 5.2.1.5.5 is assigned to and marked on the outside of each packaging.~~

6.4.24.3 No new manufacture of packagings to a package design meeting the provisions of the ~~1973, 1973 (as amended)~~, 1985, and 1985 (as amended 1990) Editions of IAEA Safety Series No.6 shall be permitted to commence.

[IAEA: 821]

6.4.24.4 [No new manufacture of packagings of a package design meeting the provisions of the 1996 Edition, 1996 Edition \(Revised\), 1996 \(As Amended 2003\), 2005, 2009 and 2012 Editions of these Regulations shall be permitted to commence after 31 December 2028.](#)

[IAEA: 821A]

Packages excepted from the requirements for fissile materials under the Regulations annexed to the 16th revised edition or the seventeenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods (2009 Edition of IAEA Safety Standard Series No.TS-R-1)

6.4.24.4-5 Packages containing fissile material that is excepted from classification as “FISSILE” according to 2.7.2.3.5 (a)(i) or (iii) of the Regulations annexed to the sixteenth revised edition or the seventeenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods (paras. 417 (a) (i) or (iii) of the 2009 Edition of IAEA Regulations for the Safe Transport of Radioactive Material) prepared for transport before 31 December 2014 may continue in transport and may continue to be classified as non-fissile or fissile-excepted except that the consignment limits in Table 2.7.2.3.5 of these editions shall apply to the conveyance. The consignment shall be transported under exclusive use.

~~Special form radioactive material approved under the 1973, 1973 (as Amended), 1985 and 1985 (as Amended 1990) Editions of these Regulations editions of IAEA Safety Series No. 6~~

[Special form radioactive material approved under the 1985, 1985 \(As Amended 1990\), 1996 Edition, 1996 Edition \(Revised\), 1996 \(As Amended 2003\), 2005, 2009 Editions of IAEA Safety Series No. 6 and 2012 Edition of IAEA Safety Standards Serie No. SSR-6](#)

~~Special form radioactive material manufactured to a design which had received unilateral approval by the competent authority under the 1973, 1973 (as amended), 1985 or 1985 (as amended 1990) Editions of IAEA Safety Series No. 6 may continue to be used when in compliance with the mandatory management system in accordance with the applicable requirements of 1.1.5.1. No new manufacture of such special form radioactive material shall be permitted to commence.~~

6.4.24.65 [Special form radioactive material manufactured to a design that had received unilateral approval by the competent authority under the 1985, 1985 \(As Amended 1990\), 1996 Edition, 1996 Edition \(Revised\), 1996 \(As Amended 2003\), 2005, 2009 and 2012 Editions of IAEA Regulations may continue to be used when in compliance with the mandatory management system in accordance with the applicable requirements of 1.5.3.1 . There shall be no new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1985 or 1985 \(As Amended 1990\) Editions of these Regulations. No new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1996 Edition, 1996 Edition \(Revised\),](#)

1996 (As Amended 2003), 2005, 2009 and 2012 Editions of these Regulations shall be permitted to commence after 31 December 2025.

[IAEA: 823]

CHAPTER 7.1 PROVISIONS CONCERNING TRANSPORT OPERATIONS BY ALL MODES OF TRANSPORT

...

7.1.8 Segregation

7.1.8.1.1 **Unchanged.**

7.1.8.1.2 **Unchanged.**

7.1.8.2 Activity limits

The total activity in a single hold or compartment of an inland waterway craft, or in another conveyance, for carriage of LSA material or SCO in Type IP-1, Type IP-2, Type IP-3 or unpackaged, shall not exceed the limits shown in Table 7.1.8.2. For SCO-III, the limits in Table 7.1.8.2 may be exceeded provided that the transport plan contains precautions which are to be employed during transport to obtain an overall level of safety at least equivalent to that which would be provided if the limits had been applied.

[IAEA: 522]

Table 7.1.8.2: Conveyance activity limits for LSA material and SCO in industrial packages or unpackaged

Unchanged.

7.1.8.3 Stowage during transport and storage in transit

7.1.8.3.1 **Unchanged.**

7.1.8.3.2 **Unchanged.**

7.1.8.3.3 Loading of freight containers and accumulation of packages, overpacks and freight containers shall be controlled as follows:

- (a) Except under the condition of exclusive use, and for consignments of LSA-I material, the total number of packages, overpacks and freight containers aboard a single conveyance shall be so limited that the total sum of the transport indexes aboard the conveyance does not exceed the values shown in Table 7.1.8.3.3;
- (b) The ~~radiation level~~dose rate under routine conditions of transport shall not exceed 2 mSv/h at any point on the external surface of the vehicle or freight container, and 0.1 mSv/h at 2 m from the external surface of the vehicle or freight container, ~~and 0.1 mSv/h at 2 m from the external surface of the conveyance,~~ except for consignments transported under exclusive use by road or rail, for which the radiation limits around the vehicle are set forth in 7.2.3.1.2 (b) and (c);
- (c) The total sum of the criticality safety indexes in a freight container and aboard a conveyance shall not exceed the values shown in Table 7.1.8.4.2.

[IAEA: 566]

Table 7.1.8.3.3: TI limits for freight containers and conveyances not under exclusive use

Unchanged.

7.1.8.3.4 **Unchanged.**

7.1.8.4 *Additional requirements relating to transport and storage in transit of fissile material*

Unchanged.

7.1.8.5 Damaged or leaking packages, contaminated packagings

7.1.8.5.1 If it is evident that a package is damaged or leaking, or if it is suspected that the package may have leaked or been damaged, access to the package shall be restricted and a qualified person shall, as soon as possible, assess the extent of contamination and the resultant ~~dose rate~~radiation level of the package. The scope of the assessment shall include the package, the conveyance, the adjacent loading and unloading areas, and, if necessary, all other material which has been carried in the conveyance. When necessary, additional steps for the protection of ~~people~~ persons property and the environment, in accordance with provisions established by the relevant competent authority, shall be taken to overcome and minimize the consequences of such leakage or damage.

7.1.8.5.2 **Unchanged.**

7.1.8.5.3 **Unchanged.**

7.1.8.5.4 Except as provided in 7.1.8.5.5, any conveyance, or equipment or part thereof which has become contaminated above the limits specified in 4.1.9.1.2 in the course of the transport of radioactive material, or which shows a ~~dose rate~~radiation level in excess of 5 µSv/h at the surface, shall be decontaminated as soon as possible by a qualified person and shall not be re-used unless the following conditions are fulfilled:

- (a) the non-fixed contamination shall not exceed the limits specified in 4.1.9.1.2;
- (b) the ~~dose rate~~radiation level resulting from the fixed contamination shall not exceed 5 µSv/h at the surface.

7.1.8.5.5 A freight container, ~~tank, intermediate bulk container~~ or conveyance dedicated to the transport of unpackaged radioactive material under exclusive use shall be excepted from the requirements of 4.1.9.1.4 and 7.1.8.5.4 solely with regard to its internal surfaces and only for as long as it remains under that specific exclusive use.

[IAEA: 514]

Remainder unchanged.

CHAPTER 7.2 MODAL PROVISIONS

...

7.2.3.1.1 Rail and road vehicles carrying packages, overpacks or freight containers labelled with any of the labels shown in 5.2.2.2.2 as models No. 7A, 7B, 7C or 7E or carrying ~~unpacked LSA-I material, SCO-I or SCO-III consignments under exclusive use~~, shall display the placard shown in Figure 5.3.1 (Model 7D) on each of:

- (a) The two external lateral walls in the case of a rail vehicle;
- (b) The two external lateral walls and the external rear wall in the case of a road vehicle.

In the case of a vehicle without sides the placards may be affixed directly on the cargo-carrying unit provided that they are readily visible; in the case of physically large tanks or freight containers, the placards on the tanks or freight containers shall suffice. In the case of vehicles which have insufficient area to allow the fixing of larger placards, the dimensions of the placard as described in Figure 5.3.1 may be reduced to 100 mm. Any placards which do not relate to the contents shall be removed.

[IAEA: 571]

7.2.3.1.2 For consignments under exclusive use, the ~~dose rate~~radiation level shall not exceed:

- (a) 10 mSv/h at any point on the external surface of any package or overpack, and may only exceed 2 mSv/h provided that:
 - (i) The vehicle is equipped with an enclosure which, during routine conditions of transport, prevents the

access of unauthorized persons to the interior of the enclosure, and

- (ii) Provisions are made to secure the package or overpack so that its position within the vehicle enclosure remains fixed during routine conditions of transport, and
 - (iii) There is no loading or unloading during the shipment;
- (b) 2 mSv/h at any point on the outer surfaces of the vehicle, including the upper and lower surfaces, or, in the case of an open vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle; and
- (c) 0.1 mSv/h at any point 2 m from the vertical planes represented by the outer lateral surfaces of the vehicle, or, if the load is transported in an open vehicle, at any point 2 m from the vertical planes projected from the outer edges of the vehicle.

7.2.3.1.3 **Unchanged.**

7.2.3.2 *Transport by vessels*

7.2.3.2.1 Packages or overpacks having a surface ~~dose rate~~~~radiation level~~ greater than 2 mSv/h, unless being carried in or on a vehicle under exclusive use in accordance with Table 7.1.8.3.3, footnote (a), shall not be transported by vessel except under special arrangement.

7.2.3.2.2 to 7.2.3.3.2 unchanged.

7.2.3.3.3 Packages or overpacks having a surface ~~dose rate~~~~radiation level~~ greater than 2 mSv/h shall not be transported by air except by special arrangement.

...

Remainder unchanged.

TABLE OF CORRESPONDENCE BETWEEN

PARAGRAPH NUMBERS IN

THE IAEA REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL
(201~~8~~² EDITION) (SSR-6) AND

THE TWENTY ~~FIRST~~^{ETH} REVISED EDITION OF THE RECOMMENDATIONS ON THE
TRANSPORT

OF DANGEROUS GOODS (MODEL REGULATIONS)

*Note: Any revision of this Table of correspondence may be found on the UNECE Transport Division website:
<http://www.unece.org/trans/danger/danger.htm>.*

SSR-6	UN	SSR-6	UN	SSR-6	UN
101	1.5.1.1	234	1.5.2.1	412	2.7.2.4.3
102	X	235	1.2.1	413	2.7.2.3.2
103	1.1.1.3	236	2.7.1.1	414	4.1.9.2.1, 7.1.8.2
104	1.5.1.2	237	1.2.1	415	2.7.2.3.3
105	1.1.1.4	238	1.5.4.1	416	2.7.2.3.4
106	1.5.1.3	239	2.7.1.3	417	2.7.2.3.5
107	1.5.1.4	240	2.7.1.3	418	4.1.9.3
108	X	241	2.7.1.3	419	2.7.2.4.5
109	X (Chapter 1.4)	242	1.2.1	420	2.7.2.4.5.1
110	1.5.5.1, 4.1.9.1.5	243	1.2.1	421	2.7.2.4
111	X	244	1.2.1	422	2.7.2.4.1.1
201	2.7.1.3	245	2.7.1.3	423	2.7.2.4.1.3
202	1.2.1	246	2.7.1.3	423 (e):	1.1.1.6 (b)
203	1.2.1	247	2.7.1.3	424	2.7.2.4.1.4
204	1.2.1	248	1.2.1	424 (c):	1.1.1.6 (b)
205	1.2.1	249	1.2.1	425	2.7.2.4.1.5
206	1.2.1	301	1.5.2.2	426	2.7.2.4.1.6
207	1.2.1	302	1.5.2.3	427	2.7.2.4.1.7
208	1.2.1	303	1.5.2.4	428	2.7.2.4.4
209	1.2.1	304	1.5.2.5	429	2.7.2.4.4
210	1.2.1	305	1.5.2.6	430	2.7.2.4.4
211	1.2.1	306	1.5.3.1	431	2.7.2.4.6.1
212	1.2.1	307	Par. 17, Recommendations	432	2.7.2.4.6.2
213	1.2.1	308	Par. 18, Recommendations	433	3.3.1, SP337
214	2.7.1.2	309	1.5.6.1	434	2.7.2.5
215	2.7.1.2	310	1.5.4.2	501	4.1.9.1.6
216	2.7.1.2	311	1.5.2.7	502	4.1.9.1.7
217	1.2.1	312	1.3.1	503	4.1.9.1.8
218	1.2.1	313	1.3.2	504	4.1.9.1.3
219	1.2.1	314	1.3.3	505	5.1.3.2
220, 220A	1.2.1	315	1.3.4	506	7.1.2
221	1.2.1	401	2.7.2.1.1	507	1.5.5.1
222	2.7.1.3	402	2.7.2.2.1	508	4.1.9.1.2
223	1.2.1	403	2.7.2.2.2	509	4.1.9.1.4
224	1.2.1	404	2.7.2.2.3	510	7.1.8.5.1
225	2.7.1.3	405	2.7.2.2.4	511	7.1.8.5.2
226	2.7.1.3	406	2.7.2.2.5	512	7.1.8.5.3
227	2.7.1.3	407	2.7.2.2.6	513	7.1.8.5.4
228	1.2.1	408	2.7.2.4.2	514	7.1.8.5.5
229	1.2.1	409	2.7.2.3.1.2	515	1.5.1.5.1, 1.5.1.5.2
230	1.2.1	410	3.3.1 SP336	516	2.7.2.4.1.2
231	1.2.1, 4.1.9.1.1	411	4.1.9.2.1, 7.1.8.2	517	4.1.9.2.1
232	1.2.1			518	4.1.9.2.2
233	1.2.1			519	4.1.9.2.3

SSR-6	UN	SSR-6	UN	SSR-6	UN
520	4.1.9.2.4	561	4.1.9.1.9, 5.1.5.2.2	617	6.4.2.11
521	4.1.9.2.5	562	7.1.8.1.1	618	6.4.2.12
522	7.1.8.2	563	7.1.8.1.2	619	6.4.3.1
523	5.1.5.3.1	564	7.1.8.3.1	620	6.4.3.2
524, 524A	5.1.5.3.2	565	7.1.8.3.2	621	6.4.3.3
525	5.1.5.3.3	566	7.1.8.3.3	622	6.4.4
526	4.1.9.1.10	567	7.1.8.3.4	623	6.4.5.1
527	4.1.9.1.11	568	7.1.8.4.1	624	6.4.5.1, 6.4.5.2
528	4.1.9.1.12	569	7.1.8.4.2	625	6.4.5.1, 6.4.5.3
529	5.1.5.3.4	570	7.1.8.4.3	626	6.4.5.4.1
530	5.1.5.3.5, 5.2.1.5.8, 5.2.2.1.12.5, 5.4.1.5.7.3	571	7.2.3.1.1	627	6.4.5.4.2
531	5.2.1.5.1	572	5.3.2.1.1, 5.3.2.1.2	628	6.4.5.4.3
532	5.2.1.1, 5.2.1.2, 5.1.2.1	573	7.2.3.1.2	629	6.4.5.4.4
533	5.2.1.5.3	574	7.2.3.1.3	630	6.4.5.4.5
534	5.2.1.5.4	575	7.2.3.2.1	631	6.4.6.1
535	5.2.1.5.5	576	7.2.3.2.2	632	6.4.6.2
536, 536A	5.2.1.5.6	577	7.2.3.3.1	633	6.4.6.3
537	5.2.1.5.7	578	7.2.3.3.2	634	6.4.6.4
538	5.2.2.1.12.1	579	7.2.3.3.3	635	6.4.7.1
539	5.2.2.1.12.1	580	1.1.1.6	636	6.4.7.2
540	5.2.2.1.12.2	581	1.1.1.6	637	6.4.7.3
541	5.2.2.1.12.3	582	X	638	6.4.7.4
542	5.2.2.1.12.4	583	7.1.8.6.1	639	6.4.7.5
543	5.3.1.1.5.1	584	≠5.4.1.1.1/5.4.1.1.2	640	6.4.7.6
544	5.3.2.1.1, 5.3.2.1.2	585	X	641	6.4.7.7
545	5.1.1.2	586	≠5.4.1.1.3	642	6.4.7.8
546	5.4.1.3, 5.4.1.4.1, 5.4.1.5.7.1	587	X	643	6.4.7.9
547	5.4.1.6.1	588	X	644	6.4.7.10
548	X	601	2.7.2.3.1.3	645	6.4.7.11
549	5.4.1.6	602	2.7.2.3.3.1	646	6.4.7.12
550	5.4.1.6.2	603	2.7.2.3.3.2	647	6.4.7.13
551	5.4.2.1	604	2.7.2.3.3.1	648	6.4.7.14
552	5.4.2.2	605	2.7.2.3.4.1	649	6.4.7.15
553	X	606	2.7.2.3.6	650	6.4.7.16
554	5.4.1.5.7.2	607	6.4.2.1	651	6.4.7.17
555	5.4.4	608	6.4.2.2	652	6.4.8.1
556 614	5.4.1.5.7.4	609	6.4.2.3	653	6.4.8.2
557	5.1.5.1.4 (a)	610	6.4.2.4	654	6.4.8.3
558	5.1.5.1.4 (b)	611	6.4.2.5	655	6.4.8.4
559	5.1.5.1.4 (d)	612	6.4.2.6	656	6.4.8.5
560	5.1.5.1.4 (c)	613 613A	6.4.2.7- 6.4.2.8	657	6.4.8.6
		614	6.4.2.8	658	6.4.8.7
		615	6.4.2.9	659	6.4.8.8
		616	6.4.2.10	660	6.4.8.9

SSR-6	UN	SSR-6	UN	SSR-6	UN
661	6.4.8.10	719	6.4.15.1	818	5.1.5.2.1
662	6.4.8.11	720	6.4.15.2	819	6.4.24.1
663	6.4.8.12	721	6.4.15.3	820	6.4.24.2
664	6.4.8.13	722	6.4.15.4	821-821A	6.4.24.3-6.4.24.4
665	6.4.8.14	723	6.4.15.5	822	6.4.24.4
666	6.4.8.15	724	6.4.15.6	823	6.4.24.5
667	6.4.9.1	725	6.4.16	824	6.4.23.19
668	6.4.9.2	726	6.4.17.1	825	5.1.5.1.2
669	6.4.10.1	727	6.4.17.2	826	5.1.5.1.2
670	6.4.10.2	728	6.4.17.3	827-827A	6.4.23.2-6.4.23.1
671	6.4.10.3	729	6.4.17.4	828	5.1.5.2.1
672	6.4.10.4	730	6.4.18	829	1.5.4.2
673	6.4.11.1	731	6.4.19.1	830	6.4.23.3
674	6.4.11.2	732	6.4.19.2	831	5.1.5.2.1
675	6.4.11.3	733	6.4.19.3	832	6.4.23.11
676	6.4.11.4	734	6.4.20.1	833	6.4.23.12
677	6.4.11.5	735	6.4.20.2	834	6.4.23.13
378	6.4.11.6	736	6.4.20.3	835	6.4.23.14
679	6.4.11.7	737	6.4.20.4	836	6.4.23.15
680	6.4.11.8	801	5.1.5.2.3	837	6.4.23.16
681	6.4.11.9	802 (a)	5.1.5.2.1	838	6.4.23.17
682	6.4.11.10	(b) (c)		839	6.4.23.18
683	6.4.11.11	802 (d)	7.2.3.2.2	840	6.4.23.20
684	6.4.11.12	802 (e)	2.7.2.2.2		
685	6.4.11.13	803	2.7.2.3.3.1, 2.7.2.3.4.1, 6.4.22.5, 6.4.23.8		
686	6.4.11.14	804	5.1.5.2.1		
701	6.4.12.1	805	6.4.22.6, 6.4.23.9		
702	6.4.12.2	806	5.1.5.2.1		
703	2.7.2.3.1.4	807 (a)	6.4.22.1 (a)		
704	2.7.2.3.3.4	807 (b)	6.4.22.1 (b)		
705	2.7.2.3.3.5 (a)	807 (c)	6.4.23.6		
706	2.7.2.3.3.5 (b)	807 (d)	5.1.5.2.1		
707	2.7.2.3.3.5 (c)	808	6.4.22.2		
708	2.7.2.3.3.5 (d)	809	6.4.23.4		
709	2.7.2.3.3.6	810	5.1.5.2.1		
710	2.7.2.3.3.7	811	6.4.22.3		
711	2.7.2.3.3.8	812	6.4.23.5		
712	2.7.2.3.4.2	813	5.1.5.2.1		
713	6.4.12.3	814	6.4.22.4		
714	6.4.12.3	815	6.4.23.7		
715	6.4.12.3	816	5.1.5.2.1		
716	6.4.13	817	6.4.22.7, 6.4.23.10		
717	6.4.14				
718	6.4.21				

Correspondence between IAEA SSR-6 table and figure numbers and
**table and figure numbers in the UN Model Regulations on the Transport of Dangerous
 Goods**

SSR-6 Table	UN Model Regulations
1	included in 2.7.2.1.1
2	2.7.2.2.1
3	2.7.2.2.2
4	2.7.2.4.1.2
5	4.1.9.2.5
6	7.1.8.2
7	5.1.5.3.1
8	5.1.5.3.4
9	X
10	7.1.8.3.3
11	7.1.8.4.2
12	6.4.8.6
13	6.4.11.2
14	6.4.15.4

SSR-6 Figure	UN Model Regulations
1	Figure 5.2.1
2	5.2.2.2.2 No. 7A
3	5.2.2.2.2 No. 7B
4	5.2.2.2.2 No. 7C
5	5.2.2.2.2 No. 7E
6	5.3.1.2.2 Figure 5.3.1 No. 7D
7	5.3.2.1.3, Figure 5.3.3