



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE**

Memphis, 30 April to 4 May 2007

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009/2010 Edition

2.1: Part 1 — General

**DRAFT AMENDMENTS TO THE TECHNICAL INSTRUCTIONS TO
ALIGN TO THE UN RECOMMENDATIONS — PART 1**

(Presented by the Secretary)

SUMMARY

This working paper contains draft amendments to Part 1 of the Technical Instructions (Chapters 1, 2 and new Chapter 6) to reflect the decisions taken by the UN Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals at its third session (Geneva, 15 December 2006).

The DGP-WG is invited to agree to the draft amendments in this working paper.

Part 1

GENERAL

Chapter 1

SCOPE AND APPLICABILITY

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1.3 DANGEROUS GOODS PACKAGES OPENED BY CUSTOMS AND OTHER AUTHORITIES

- ≠ Any package opened during an inspection must, before being forwarded to the consignee, be restored by qualified persons to a condition that complies with these Instructions.

Editorial Note.— Section 1.4 moved to new Chapter 6:

~~1.4 TRANSPORT OF RADIOACTIVE MATERIAL~~

~~1.4.1 General~~

~~1.4.1.1 These Instructions establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These Instructions are based on the IAEA *Regulations for the Safe Transport of Radioactive Material* (ST 1), IAEA, Vienna (1996). Explanatory material on TS R 1 can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* (1996 Edition), Safety Standard Series No. ST 2, IAEA, Vienna.~~

~~1.4.1.2 The objective of these Instructions is to protect persons, property and the environment from the effects of radiation during the transport of radioactive material. This protection is achieved by requiring:~~

- ~~a) containment of the radioactive contents;~~
- ~~b) control of external 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 the limits of the contents for packages and aircraft and to the performance standards, which are applied to package designs depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing requirements on the design and operation of packages and on the maintenance of the packagings, including consideration of the nature of the radioactive contents. Finally, they are satisfied by requiring administrative controls including, where appropriate, approval by competent authorities.~~

~~1.4.1.3 These Instructions apply to the transport of radioactive material by air, including transport that is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in transit storage, unloading and receipt at the final destination of the radioactive material and packages. A graded approach is applied to the performance standards in these Instructions that is characterized by three general severity levels:~~

- ~~a) routine conditions of transport (incident free);~~
- ~~b) normal conditions of transport (minor mishaps); and~~
- ~~c) accident conditions of transport.~~

1.4.2 Radiation protection programme

~~— 1.4.2.1 The transport of radioactive material must be subject to a radiation protection programme, which must consist of systematic arrangements aimed at providing adequate consideration of radiation protection measures.~~

~~— 1.4.2.2 The nature and extent of the measures to be employed in the programme must be related to the magnitude and likelihood of radiation exposure. The programme must incorporate the requirements in 1.4.2.3 to 1.4.2.5, 7;2.9.1.1; 7;2.9.1.2 and applicable emergency response procedures. Programme documents must be available, on request, for inspection by the relevant competent authority.~~

~~≠ — 1.4.2.3 Doses to persons must be below the relevant dose limits. Protection and safety must be optimized in order that the magnitude of individual doses, the number of persons exposed, and the likelihood of incurring exposure must be kept as low as reasonably achievable, economic and social factors being taken into account, with the restriction that the doses to individuals be subject to dose constraints. A structured and systematic approach must be adopted and must include consideration of the interfaces between transport and other activities.~~

~~≠ — 1.4.2.4 Workers must receive appropriate training concerning radiation protection including the precautions to be observed in order to restrict their occupational exposure and the exposure of other persons who might be affected by their actions.~~

~~≠ — 1.4.2.5 For occupational exposure arising from transport activities, where it is assessed that the effective dose:~~

~~— a) is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring must be conducted; and~~

~~— b) is likely to exceed 6 mSv in a year, individual monitoring must be conducted.~~

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

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

1.4.3 Quality assurance

~~Quality assurance programmes based on international, national or other standards acceptable to the competent authority must be established and implemented for the design, manufacture, testing, documentation, use, maintenance and inspection of all special form radioactive material, low dispersible radioactive material and packages, and for transport and in-transit storage operations to ensure compliance with the relevant provisions of these Instructions. Certification that the design specification has been fully implemented must be available to the competent authority. The manufacturer, consignor or user must be prepared to provide facilities for competent authority inspection during manufacture and use and to demonstrate to any cognizant competent authority that:~~

~~— a) the manufacturing methods and materials used are in accordance with the approved design specifications; and~~

~~— b) all packagings are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant requirements and specifications, even after repeated use.~~

~~Where competent authority approval is required, such approval must take into account and be contingent upon the adequacy of the quality assurance programme.~~

1.4.4 Special arrangement

~~≠ — 1.4.4.1 Special arrangement means those provisions, approved by the competent authority, under which consignments of radioactive material that do not satisfy all the applicable requirements of these Instructions may be transported.~~

~~≠ — 1.4.4.2 Consignments for which conformity with any provision applicable to Class 7 is impracticable must not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the Class 7 provisions of these Instructions is impracticable and that the requisite standards of safety established by these Instructions have been demonstrated through alternative means, 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~~

~~must be at least equivalent to that which would be provided if all the applicable requirements had been met. For consignments of this type, multilateral approval must be required.~~

1.4.5 Non-compliance

~~In the event of a non-compliance with any limit in these Instructions applicable to radiation level or contamination:~~

- ~~a) the shipper must be informed of the non-compliance by the operator if the non-compliance is identified during transport;~~
- ~~b) the shipper and the operator must be informed of the non-compliance by the consignee if the non-compliance is identified at receipt;~~
- ~~c) the operator, shipper or consignee, as appropriate, must:

 - ~~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 similar circumstances that led to the non-compliance; and~~
 - ~~iv) communicate to the relevant competent authority(ies) the causes of the non-compliance and corrective or preventative actions taken or to be taken; and~~~~
- ~~d) the communication of the non-compliance to the shipper and relevant competent authority(ies), respectively, must be made as soon as practicable and it must be immediate whenever an emergency exposure situation has developed or is developing.~~

4.5.1.4 RELATIONSHIP TO ANNEX 18

ICAO Standards and Recommended Practices related to the transport of dangerous goods are contained in Annex 18 to the Convention on International Civil Aviation. These Instructions contain the detailed technical material needed to support the broad provisions of Annex 18 (with Amendments 1 to 8) in order to provide a fully comprehensive set of international regulations.

4.6.1.5 REQUESTS FOR AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Any request for an amendment to the Technical Instructions must be submitted to the appropriate national authority. Requests for amendments should include the following information:

- a) the text or substance of the amendment proposed or identification of the provision the petitioner seeks to have repealed, as appropriate;
 - b) a statement of the interest of the petitioner in the action requested; and
 - c) any information and arguments to support the action sought.
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Chapter 2

LIMITATION OF DANGEROUS GOODS ON AIRCRAFT

Parts of this Chapter are affected by State Variations CA 5, CA 9, DQ 3, FR 8, GB 5, JP 23, NL 2, US 2, VC 4; see Table A-1

2.1 DANGEROUS GOODS FORBIDDEN FOR TRANSPORT BY AIR UNDER ANY CIRCUMSTANCE

Editorial Note.— The following amendments are included in a proposed addendum to the 2007-2008 edition (DGP-WG/06-WP/28 and DP/3 refers).

Any article or substance which, as presented for transport, is liable to explode, dangerously react, produce a flame or dangerous evolution of heat or dangerous emission of toxic, corrosive or flammable gases or vapours under conditions normally encountered in transport must not be carried on aircraft under any circumstance.

Note 1.— *Certain dangerous goods known to meet the description above have been included in the Dangerous Goods List (Table 3-1) with the word "Forbidden" shown in columns 2 and 3. It must be noted, however, that it would be impossible to list all dangerous goods which are forbidden for transport by air under any circumstance. Therefore, it is essential that appropriate care be exercised to ensure that no goods meeting the above description are offered for transport.*

Note 2.— 2.1 is intended to include articles being returned to the manufacturer for safety reasons.

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2.3 ~~DANGEROUS GOODS IN AIRMAIL~~ TRANSPORT OF DANGEROUS GOODS BY POST

2.3.1 In accordance with the Universal Postal Union (UPU) Convention, dangerous goods as defined in these Instructions, with the exception of those listed below, are not permitted in the mail transported internationally. Appropriate national postal authorities should ensure that the provisions of the UPU Convention are complied with in relation to the international transport of dangerous goods by air.

≠ 2.3.2 The following dangerous goods may be acceptable in international mail for air carriage subject to the provisions of the appropriate national postal authorities concerned and these Instructions which relate to such material:

- a) patient specimens as defined in 2;6.3.1.4 provided that they are classified, packed and marked as required by 2;6.3.2.3.6;
- b) infectious substances assigned to category B (UN 3373) only, when packed in accordance with the requirements of Packing Instruction 650, and solid carbon dioxide (dry ice) when used as a refrigerant for UN 3373; and
- c) radioactive material, the activity of which does not exceed one-tenth of that listed in Table 2-4215.

Note.— The Acts of the Universal Postal Union do not apply to the domestic transport of dangerous goods by mail. Domestic transport of dangerous goods in the mail are subject to the provisions of the appropriate national authorities.

2.4 DANGEROUS GOODS IN EXCEPTED QUANTITIES

Editorial Note.— See DGP-WG/06-WP/9 for proposed reformatting of excepted quantities.

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Chapter 3

GENERAL INFORMATION

Parts of this Chapter are affected by State Variation BE 1; see Table A-1

3.1 DEFINITIONS

3.1.1 The following is a list of definitions of commonly used terms in these Instructions. Definitions of terms which have their usual dictionary meanings or are used in the common technical sense are not included. Definitions of additional terms used solely in conjunction with radioactive material are contained in 2;~~7~~7.1.3.

Aerosols or aerosol dispensers. Non-refillable receptacles meeting the requirements of 6;3.2.7, made of metal, glass or plastic and containing a gas, compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.

Animal material. Animal carcasses, animal body parts, or animal foodstuffs.

Appropriate national authority. Any authority designated, or otherwise recognized, by a State to perform specific functions related to provisions contained in these Instructions.

Approval. An authorization issued by the appropriate national authority for:

- a) transport of those entries listed in Table 3-1 as forbidden on passenger and/or cargo aircraft to which Special Provision A1, A2 or A109 has been assigned in column 7; or
- b) other purposes as specified in these Instructions.

Note.— Unless otherwise indicated, approval is only required from the State of Origin.

Insert the following definition (Approval) (moved from current 2;7.2):

Approval: For the transport of Class 7 material:

≠ **Multilateral approval.** The approval by the relevant competent authority of the country of origin of the design or shipment, as applicable, and also, where the consignment is to be transported through or into any other country, approval by the competent authority of that country. The term “through or into” specifically excludes “over”, i.e. the approval and notification requirements must not apply to a country over which radioactive material is carried in an aircraft, provided that there is no scheduled stop in that country.

Unilateral approval. The approval of a design which is required to be given by the competent authority of the country of origin of the design only.

End of inserted text.

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Competent authority. Any ~~national~~ body or authority designated or otherwise recognized as such for any purpose in connection with these Instructions.

Note. — This applies to radioactive material only.

Compliance assurance. A systematic programme of measures applied by an appropriate authority which is aimed at ensuring that the provisions of these Instructions are met in practice.

Composite packagings. Packagings consisting of an outer packaging and an inner receptacle so constructed that the inner receptacle and the outer packaging form an integral packaging. Once assembled, it remains thereafter an integrated single unit; it is filled, stored, transported and emptied as such.

Note.— Composite packagings for the purpose of these Instructions are regarded as single packagings.

Insert the following two definitions (confinement and containment systems) (moved from current 2;7.2):

Confinement system. For the transport of Class 7 material. The assembly of fissile material and packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety.

Containment system. The assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport.

End of inserted text.

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Critical temperature. The temperature above which the substance cannot exist in the liquid state.

Insert the following definition (Criticality safety index) (moved from current 2;7.2):

Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material. A number which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material.

End of inserted text.

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Dangerous goods security. Measures or precautions to be taken by operators, shippers and others involved in the transport of dangerous goods aboard aircraft to minimize theft or misuse of dangerous goods that may endanger persons or property.

Insert the following definition (Design) (moved from current 2;7.2):

Design. The description of special form radioactive material, low dispersible radioactive material, package or packaging which enables such items to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

End of inserted text.

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Exception. A provision in these Instructions which excludes a specific item of dangerous goods from the requirements normally applicable to that item.

Insert the following definition (Exclusive use) (moved from current 2;7.2):

Exclusive use. For the transport of Class 7 material. The sole use, by a single consignor, of an aircraft or of a large freight container, in respect of which all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the consignor or consignee.

End of inserted text.

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Freight container. See unit load device.

Note.— For the definition of freight container for radioactive material, see 2;7-2 7.1.3.

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Maximum net mass. The maximum net mass of contents in a single packaging or maximum combined mass of inner packagings and the contents thereof expressed in kilograms.

Insert the following definition (Maximum normal operating pressure) (moved from current 2;7.2):

Maximum normal operating pressure. For the transport of Class 7 material. The maximum pressure above atmospheric pressure at mean sea level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

End of inserted text.

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Package. The complete product of the packing operation, consisting of the packaging and its contents prepared for transport.

— *Note.*— *For radioactive material, see 2;7.2.*

Packaging. One or more receptacles and any other components or materials necessary for the receptacles to perform their containment and other safety functions.

[Note.— For radioactive material, see 2;7-2 7.1.3.]

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Quality assurance. A systematic programme of controls and inspections applied by any organization or body which is aimed at providing adequate confidence that the standard of safety prescribed by these Instructions is achieved in practice.

Insert the following two definitions (radiation level and radioactive contents) (moved from current 2;7.2):

Radiation level. For the transport of Class 7 material. The corresponding dose rate expressed in millisieverts per hour.

Radioactive contents. For the transport of Class 7 material. The radioactive material together with any contaminated or activated solids, liquids, and gases within the packaging.

End of inserted text.

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Recycled plastic material. Material recovered from used industrial packagings that has been cleaned and prepared for processing into new packagings. The specific properties of the recycled material used for production of new packagings must be assured and documented regularly as part of a quality assurance programme recognized by the appropriate national authority. The quality assurance programme must include a record of proper pre-sorting and verification that each batch of recycled plastic material has the proper melt flow rate, density, and tensile yield strength, consistent with that of the design type manufactured from such recycled material. This necessarily includes knowledge about the packaging material from which the recycled plastic has been derived, as well as awareness of the prior contents of those packagings if those prior contents might reduce the capability of new packagings produced using that material. In addition, the packaging manufacturer's quality assurance programme must include performance of the mechanical design type test in Part 6, Chapter 4 on packagings manufactured from each batch of recycled plastic material. In this testing, stacking performance may be verified by appropriate dynamic compression testing rather than static load testing.

Note.— ISO 16103:2005 "Packaging — Transport packages for dangerous goods — Recycled plastics material". provides additional guidance on procedures to be followed in approving the use of recycled plastics material.

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Test pressure. The required pressure applied during a pressure test for qualification or re-qualification.

Insert the following definition (Transport index assigned to a package, overpack or freight container) (moved from current 2;7.2):

Transport index (TI) assigned to a package, overpack or freight container. For the transport of Class 7 material, A₁ number which is used to provide control over radiation exposure.

End of inserted text.

- + **UNECE.** The United Nations Economic Commission for Europe (UNECE, Palais des Nations, 8-14 avenue de la Paix, CH-1211 Geneva 10, Switzerland)

Unit load device. Any type of freight container, aircraft container, aircraft pallet with a net or aircraft pallet with a net over an igloo.

Note 1.— An overpack is not included in this definition.

Note 2.— A freight container for radioactive material is not included in this definition (see 2;7.2.1.3).

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Chapter 5

DANGEROUS GOODS SECURITY

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Table 1-5. Indicative list of high consequence dangerous goods

Class 1 Division 1.1 explosives
Class 1 Division 1.2 explosives
Class 1 Division 1.3 compatibility group C explosives
<u>Class 1 Division 1.4 UN Nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456 and 0500</u>
<u>Class 1 Division 1.5 explosives</u>
Division 2.3 toxic gases (excluding aerosols)
<u>Class 3 and Division 4.1 desensitized explosives</u>
Division 6.1 substances of Packing Group 1; except when transported under the excepted quantity provisions in 2.4
≠ Division 6.2 infectious substances of Category A (UN Nos. 2814 and 2900)
Class 7 radioactive materials in quantities greater than 3000 A ₁ (special form) or 3000 A ₂ , as applicable in Type B and Type C packages.

Insert new Chapter 6

Editorial Note.— This new chapter consolidates material concerning Class 7 from Part 1, Chapter 3 and Part 2, Chapter 7 of the 2007-2008 Edition of the TIs.

Chapter 6

GENERAL PROVISIONS CONCERNING CLASS 7

Parts of this Chapter are affected by State Variations ...

1.4 TRANSPORT OF RADIOACTIVE MATERIAL

1.4.1 6.1 General Scope and application

1.4.1.1 These Instructions establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These Instructions are based on the IAEA *Regulations for the Safe Transport of Radioactive Material* (ST-1), (2005 Edition), Safety Standards Series No. TS-R-1, IAEA, Vienna (1996/2005). Explanatory material on TS-R-1 can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* (1996 Edition), Safety Standard Series No. TS-G-1.1 (ST-2), IAEA, Vienna.

1.4.1.2 The objective of these Instructions is to protect persons, property and the environment from the effects of radiation during the transport of radioactive material. This protection is achieved by requiring:

- a) containment of the radioactive contents;
- b) control of external 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 the limits of the contents for packages and aircraft and to the performance standards, which are applied to package designs depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing requirements on the design and operation of packages and on the maintenance of the packagings, including consideration of the nature of the radioactive contents. Finally, they are satisfied by requiring administrative controls including, where appropriate, approval by competent authorities.

1.4.1.3 These Instructions apply to the transport of radioactive material by air, including transport that is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of the radioactive material and packages. A graded approach is applied to the performance standards in these Instructions that is characterized by three general severity levels:

- a) routine conditions of transport (incident free);
- b) normal conditions of transport (minor mishaps); and
- c) accident conditions of transport.

Editorial Note.— The following is moved from Part 2, Chapter 7.

~~7.1.2.6.1.4~~ The ~~se~~ following radioactive materials are not included in Class 7 for the purposes of these Instructions ~~do not apply to~~:

- a) radioactive material implanted or incorporated into a person or live animal for diagnosis or treatment;
- b) radioactive material in consumer products which have received regulatory approval, following their sale to the end user;
- ≠ c) natural material and ores containing naturally occurring radionuclides which are either in their natural state or have only been processed for purposes other than for extraction of the radionuclides, and are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in ~~7.7.2.1 b)~~ 2.7.2.2.1 b) or calculated in accordance with ~~7.7.2.2~~ 2.7.2.2 to ~~7.7.2.6~~ 7.2.2.6;
- d) non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit specified in the definition of contamination in ~~7.2.7.1~~.

6.1.5 Specific provisions for the transport of excepted packages

~~7.9.4.6.1.5.1~~ Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles as specified in 2.7.2.4.1.2 ~~7.7.1.2~~ and empty packagings as specified in ~~7.9.6~~ may be transported under the following conditions:

- a) the applicable requirements specified in 1.4.2; Introductory Chapter, 4.2, ~~2.7.9.2~~, and, ~~2.7.2.4.1.2.2 to 7.2.4.1.2.6~~ (as applicable), ~~2.7.9.3 to 2.7.9.6, 4.9.1.2, 5.2.4.2, 5.2.2.2, 5.2.4.1.1, 5.2.4.5 a) and e); 5.3.2.11 e), 5.4.1.4.1 a), 5.4.4, 7.3.2.2 and 7.4.4~~;
- b) the requirements for excepted packages specified in 6;7.3;
- c) if the excepted package contains fissile material, one of the fissile exceptions provided by ~~6.7.4.2~~ 2.7.2.3.5 must apply and the requirement of 6;7.6.2 must be met; and
- d) the requirements in 1;2.3, if transported by post.

~~6.1.5.2~~ The following provisions do not apply to excepted packages and the controls for transport of excepted packages: 1.5, [2.7.4.1], 2.7.2.3.3.2, 4.9.1.3, 4.9.1.4, 4.9.1.6, 4.9.1.7, 5.1.6.3, 5.3.2.6, 5.4.1.5.7.1, 5.4.1.5.7.2, 5.4.1.6.1, 6.7.5.1, [7.1.7.5.1], [7.1.7.5.3 to 7.1.7.5.5], [7.1.8.1.1], [7.1.8.1.3], [7.1.8.3.1] and [7.1.8.6.1].

Editorial Note.— The following is moved from Part 1, Chapter 1.

~~4.4.2.6.2~~ Radiation protection programme

~~4.4.2.6.2.1~~ The transport of radioactive material must be subject to a radiation protection programme, which must consist of systematic arrangements aimed at providing adequate consideration of radiation protection measures.

- ≠ ~~4.4.2.6.2.2~~ Doses to persons must be below the relevant dose limits. Protection and safety must be optimized in order that the magnitude of individual doses, the number of persons exposed, and the likelihood of incurring exposure must be kept as low as reasonably achievable, economic and social factors being taken into account, and doses to persons must be below the relevant dose limits, with the restriction that the doses to individuals be subject to dose constraints. A structured and systematic approach must be adopted and must include consideration of the interfaces between transport and other activities.

~~4.4.2.6.2.3~~ The nature and extent of the measures to be employed in the programme must be related to the magnitude and likelihood of radiation exposure. The programme must incorporate the requirements in ~~1.4.2.3~~ 6.2.2, 1.6.2.4 to 1.4.2.5 6.2.7, ~~7.2.9.1.1; 7.2.9.1.2~~ and applicable emergency response procedures. Programme documents must be available, on request, for inspection by the relevant competent authority.

- ≠ ~~4.4.2.6.2.4~~ For occupational exposure arising from transport activities, where it is assessed that the effective dose:
 - a) is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring must be conducted; and
 - b) is likely to exceed 6 mSv in a year, individual monitoring must be conducted.

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

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

6.2.5 In the event of accidents or incidents during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, must be observed to protect 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". Safety Standard Series No. TS-G-1.2 (ST-3), IAEA, Vienna (2002).

6.2.6 Emergency procedures must take into account 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 an accident.

- ≠ ~~1.4.2.4~~6.2.7 Workers must receive appropriate training concerning the radiation protection hazards involved including and the precautions to be observed in order to ensure restriction on of their occupational exposure and the exposure that of other persons who might be affected by their actions.

~~1.4.3~~6.3 Quality assurance

Quality assurance programmes based on international, national or other standards acceptable to the competent authority must be established and implemented for the design, manufacture, testing, documentation, use, maintenance and inspection of all special form radioactive material, low dispersible radioactive material and packages, and for transport and in-transit storage operations to ensure compliance with the relevant provisions of these Instructions. Certification that the design specification has been fully implemented must be available to the competent authority. The manufacturer, consignor or user must be prepared to provide facilities for competent authority inspection during manufacture and use and to demonstrate to any cognizant competent authority that:

- a) the manufacturing methods and materials used are in accordance with the approved design specifications; and
- b) all packagings are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant requirements and specifications, even after repeated use.

Where competent authority approval is required, such approval must take into account and be contingent upon the adequacy of the quality assurance programme.

~~1.4.4~~6.4 Special arrangement

- ≠ ~~1.4.4.1~~6.4.1 Special arrangement means those provisions, approved by the competent authority, under which consignments of radioactive material that which do not satisfy all the applicable requirements of these Instructions applicable to radioactive material may be transported.

- ≠ ~~1.4.4.2~~6.4.2 Consignments for which conformity with any provision applicable to Class 7 is impracticable must not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the Class 7 provisions of these Instructions is impracticable and that the requisite standards of safety established by these Instructions have been demonstrated through alternative means, 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 must be at least equivalent to that which would be provided if all the applicable requirements had been met. For [international] consignments of this type, multilateral approval must be required.

6.5 Radioactive material possessing other dangerous properties

6.5.1 In addition to the radioactive and fissile properties, any subsidiary risk of the contents of a package, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness, must also be taken into account in the documentation, packing, labelling, marking, placarding, stowage, segregation and transport, in order to be in compliance with all relevant provisions for dangerous goods of these Instructions.

~~1.4.5~~6.6 Non-compliance

In the event of a non-compliance with any limit in these Instructions applicable to radiation level or contamination:

- a) the shipper must be informed of the non-compliance:

- 1) by the operator if the non-compliance is identified during transport; or
- ~~b2) by the consignee shipper and the operator must be informed of the non-compliance by the consignee if the non-compliance is identified at receipt;~~
- e**b**) the operator, shipper or consignee, as appropriate, must:
- 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 similar circumstances that led to the non-compliance; and
 - iv) communicate to the relevant competent authority(ies) the causes of the non-compliance and corrective or preventative actions taken or to be taken; and
- ≠ e**c**) the communication of the non-compliance to the shipper and relevant competent authority(ies), respectively, must be made as soon as practicable and it must be immediate whenever an emergency exposure situation has developed or is developing.
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— END —