

IAEA Safety Standards

for protecting people and the environment

Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material (2012 Edition)

Specific Safety Guide

No. SSG-33



IAEA

International Atomic Energy Agency



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IAEA SAFETY STANDARDS AND RELATED PUBLICATIONS

IAEA SAFETY STANDARDS

Under the terms of Article III of its Statute, the IAEA is authorized to establish or adopt standards of safety for protection of health and minimization of danger to life and property, and to provide for the application of these standards.

The publications by means of which the IAEA establishes standards are issued in the **IAEA Safety Standards Series**. This series covers nuclear safety, radiation safety, transport safety and waste safety. The publication categories in the series are **Safety Fundamentals**, **Safety Requirements** and **Safety Guides**.

Information on the IAEA's safety standards programme is available on the IAEA Internet site

<http://www-ns.iaea.org/standards/>

The site provides the texts in English of published and draft safety standards. The texts of safety standards issued in Arabic, Chinese, French, Russian and Spanish, the IAEA Safety Glossary and a status report for safety standards under development are also available. For further information, please contact the IAEA at: Vienna International Centre, PO Box 100, 1400 Vienna, Austria.

All users of IAEA safety standards are invited to inform the IAEA of experience in their use (e.g. as a basis for national regulations, for safety reviews and for training courses) for the purpose of ensuring that they continue to meet users' needs. Information may be provided via the IAEA Internet site or by post, as above, or by email to Official.Mail@iaea.org.

RELATED PUBLICATIONS

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Reports on safety in nuclear activities are issued as **Safety Reports**, which provide practical examples and detailed methods that can be used in support of the safety standards.

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Security related publications are issued in the **IAEA Nuclear Security Series**.

The **IAEA Nuclear Energy Series** comprises informational publications to encourage and assist research on, and the development and practical application of, nuclear energy for peaceful purposes. It includes reports and guides on the status of and advances in technology, and on experience, good practices and practical examples in the areas of nuclear power, the nuclear fuel cycle, radioactive waste management and decommissioning.

SCHEDULES OF PROVISIONS
OF THE IAEA REGULATIONS
FOR THE SAFE TRANSPORT
OF RADIOACTIVE MATERIAL
(2012 EDITION)



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The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world".

IAEA SAFETY STANDARD SERIES No. SSG-33

SCHEDULES OF PROVISIONS OF THE IAEA REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL (2012 EDITION)

SPECIFIC SAFETY GUIDE

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2015

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tel.: +43 1 2600 22417
email: sales.publications@iaea.org
<http://www.iaea.org/books>

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Printed by the IAEA in Austria
February 2015
STI/PUB/1666

IAEA Library Cataloguing in Publication Data

Schedules of provisions of the IAEA regulations for the safe transport of radioactive material (2012 edition). — Vienna : International Atomic Energy Agency, 2015.
p. ; 24 cm. — (IAEA safety standards series, ISSN 1020-525X ; no. SSG-33)
STI/PUB/1666
ISBN 978-92-0-104214-9
Includes bibliographical references.

1. Radioactive substances — Transportation — Safety measures. 2. Radioactive substances — Safety regulations. 3. Radioactive substances — Security measures.
I. International Atomic Energy Agency. II. Series.

IAEAL

15-00953

FOREWORD

by Yukiya Amano
Director General

The IAEA's Statute authorizes the Agency to “establish or adopt... standards of safety for protection of health and minimization of danger to life and property” — standards that the IAEA must use in its own operations, and which States can apply by means of their regulatory provisions for nuclear and radiation safety. The IAEA does this in consultation with the competent organs of the United Nations and with the specialized agencies concerned. A comprehensive set of high quality standards under regular review is a key element of a stable and sustainable global safety regime, as is the IAEA's assistance in their application.

The IAEA commenced its safety standards programme in 1958. The emphasis placed on quality, fitness for purpose and continuous improvement has led to the widespread use of the IAEA standards throughout the world. The Safety Standards Series now includes unified Fundamental Safety Principles, which represent an international consensus on what must constitute a high level of protection and safety. With the strong support of the Commission on Safety Standards, the IAEA is working to promote the global acceptance and use of its standards.

Standards are only effective if they are properly applied in practice. The IAEA's safety services encompass design, siting and engineering safety, operational safety, radiation safety, safe transport of radioactive material and safe management of radioactive waste, as well as governmental organization, regulatory matters and safety culture in organizations. These safety services assist Member States in the application of the standards and enable valuable experience and insights to be shared.

Regulating safety is a national responsibility, and many States have decided to adopt the IAEA's standards for use in their national regulations. For parties to the various international safety conventions, IAEA standards provide a consistent, reliable means of ensuring the effective fulfilment of obligations under the conventions. The standards are also applied by regulatory bodies and operators around the world to enhance safety in nuclear power generation and in nuclear applications in medicine, industry, agriculture and research.

Safety is not an end in itself but a prerequisite for the purpose of the protection of people in all States and of the environment — now and in the future. The risks associated with ionizing radiation must be assessed and controlled without unduly limiting the contribution of nuclear energy to equitable and sustainable development. Governments, regulatory bodies and operators everywhere must ensure that nuclear material and radiation sources are used beneficially, safely and ethically. The IAEA safety standards are designed to facilitate this, and I encourage all Member States to make use of them.

THE IAEA SAFETY STANDARDS

BACKGROUND

Radioactivity is a natural phenomenon and natural sources of radiation are features of the environment. Radiation and radioactive substances have many beneficial applications, ranging from power generation to uses in medicine, industry and agriculture. The radiation risks to workers and the public and to the environment that may arise from these applications have to be assessed and, if necessary, controlled.

Activities such as the medical uses of radiation, the operation of nuclear installations, the production, transport and use of radioactive material, and the management of radioactive waste must therefore be subject to standards of safety.

Regulating safety is a national responsibility. However, radiation risks may transcend national borders, and international cooperation serves to promote and enhance safety globally by exchanging experience and by improving capabilities to control hazards, to prevent accidents, to respond to emergencies and to mitigate any harmful consequences.

States have an obligation of diligence and duty of care, and are expected to fulfil their national and international undertakings and obligations.

International safety standards provide support for States in meeting their obligations under general principles of international law, such as those relating to environmental protection. International safety standards also promote and assure confidence in safety and facilitate international commerce and trade.

A global nuclear safety regime is in place and is being continuously improved. IAEA safety standards, which support the implementation of binding international instruments and national safety infrastructures, are a cornerstone of this global regime. The IAEA safety standards constitute a useful tool for contracting parties to assess their performance under these international conventions.

THE IAEA SAFETY STANDARDS

The status of the IAEA safety standards derives from the IAEA's Statute, which authorizes the IAEA to establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property, and to provide for their application.

With a view to ensuring the protection of people and the environment from harmful effects of ionizing radiation, the IAEA safety standards establish fundamental safety principles, requirements and measures to control the radiation exposure of people and the release of radioactive material to the environment, to restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation, and to mitigate the consequences of such events if they were to occur. The standards apply to facilities and activities that give rise to radiation risks, including nuclear installations, the use of radiation and radioactive sources, the transport of radioactive material and the management of radioactive waste.

Safety measures and security measures¹ have in common the aim of protecting human life and health and the environment. Safety measures and security measures must be designed and implemented in an integrated manner so that security measures do not compromise safety and safety measures do not compromise security.

The IAEA safety standards reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation. They are issued in the IAEA Safety Standards Series, which has three categories (see Fig. 1).

Safety Fundamentals

Safety Fundamentals present the fundamental safety objective and principles of protection and safety, and provide the basis for the safety requirements.

Safety Requirements

An integrated and consistent set of Safety Requirements establishes the requirements that must be met to ensure the protection of people and the environment, both now and in the future. The requirements are governed by the objective and principles of the Safety Fundamentals. If the requirements are not met, measures must be taken to reach or restore the required level of safety. The format and style of the requirements facilitate their use for the establishment, in a harmonized manner, of a national regulatory framework. Requirements, including numbered ‘overarching’ requirements, are expressed as ‘shall’ statements. Many requirements are not addressed to a specific party, the implication being that the appropriate parties are responsible for fulfilling them.

¹ See also publications issued in the IAEA Nuclear Security Series.

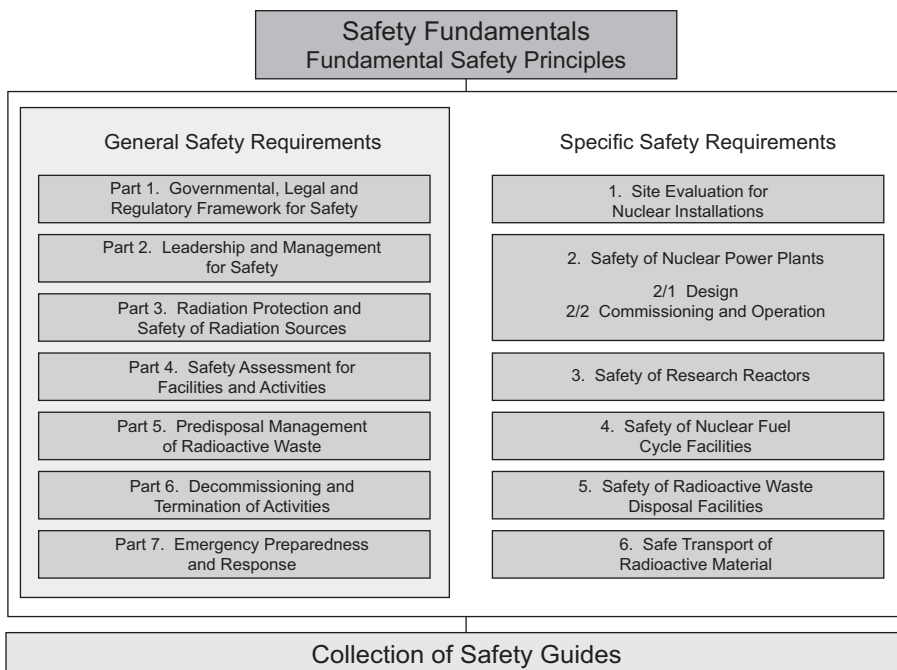


FIG. 1. The long term structure of the IAEA Safety Standards Series.

Safety Guides

Safety Guides provide recommendations and guidance on how to comply with the safety requirements, indicating an international consensus that it is necessary to take the measures recommended (or equivalent alternative measures). The Safety Guides present international good practices, and increasingly they reflect best practices, to help users striving to achieve high levels of safety. The recommendations provided in Safety Guides are expressed as ‘should’ statements.

APPLICATION OF THE IAEA SAFETY STANDARDS

The principal users of safety standards in IAEA Member States are regulatory bodies and other relevant national authorities. The IAEA safety standards are also used by co-sponsoring organizations and by many organizations that design, construct and operate nuclear facilities, as well as organizations involved in the use of radiation and radioactive sources.

The IAEA safety standards are applicable, as relevant, throughout the entire lifetime of all facilities and activities — existing and new — utilized for peaceful purposes and to protective actions to reduce existing radiation risks. They can be used by States as a reference for their national regulations in respect of facilities and activities.

The IAEA's Statute makes the safety standards binding on the IAEA in relation to its own operations and also on States in relation to IAEA assisted operations.

The IAEA safety standards also form the basis for the IAEA's safety review services, and they are used by the IAEA in support of competence building, including the development of educational curricula and training courses.

International conventions contain requirements similar to those in the IAEA safety standards and make them binding on contracting parties. The IAEA safety standards, supplemented by international conventions, industry standards and detailed national requirements, establish a consistent basis for protecting people and the environment. There will also be some special aspects of safety that need to be assessed at the national level. For example, many of the IAEA safety standards, in particular those addressing aspects of safety in planning or design, are intended to apply primarily to new facilities and activities. The requirements established in the IAEA safety standards might not be fully met at some existing facilities that were built to earlier standards. The way in which IAEA safety standards are to be applied to such facilities is a decision for individual States.

The scientific considerations underlying the IAEA safety standards provide an objective basis for decisions concerning safety; however, decision makers must also make informed judgements and must determine how best to balance the benefits of an action or an activity against the associated radiation risks and any other detrimental impacts to which it gives rise.

DEVELOPMENT PROCESS FOR THE IAEA SAFETY STANDARDS

The preparation and review of the safety standards involves the IAEA Secretariat and four safety standards committees, for nuclear safety (NUSSC), radiation safety (RASSC), the safety of radioactive waste (WASSC) and the safe transport of radioactive material (TRANSSC), and a Commission on Safety Standards (CSS) which oversees the IAEA safety standards programme (see Fig. 2).

All IAEA Member States may nominate experts for the safety standards committees and may provide comments on draft standards. The membership of the Commission on Safety Standards is appointed by the Director General and

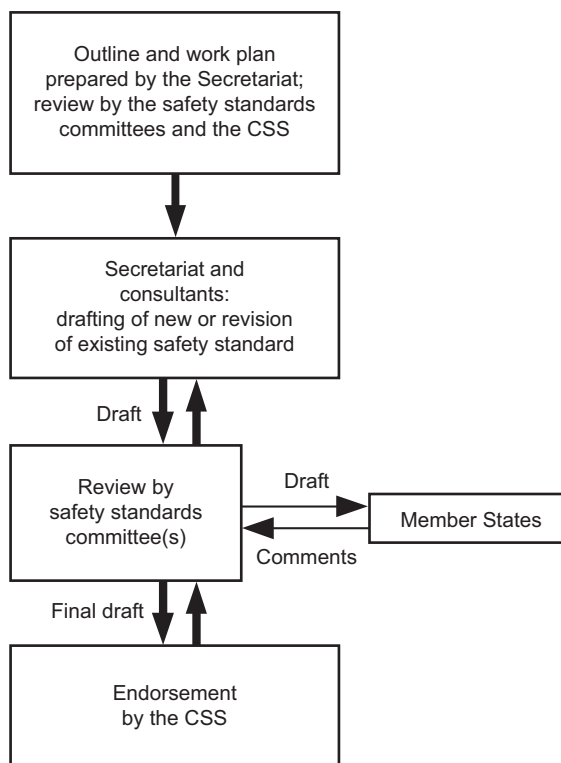


FIG. 2. The process for developing a new safety standard or revising an existing standard.

includes senior governmental officials having responsibility for establishing national standards.

A management system has been established for the processes of planning, developing, reviewing, revising and establishing the IAEA safety standards. It articulates the mandate of the IAEA, the vision for the future application of the safety standards, policies and strategies, and corresponding functions and responsibilities.

INTERACTION WITH OTHER INTERNATIONAL ORGANIZATIONS

The findings of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the recommendations of international expert bodies, notably the International Commission on Radiological Protection (ICRP), are taken into account in developing the IAEA safety standards. Some

safety standards are developed in cooperation with other bodies in the United Nations system or other specialized agencies, including the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, the International Labour Organization, the OECD Nuclear Energy Agency, the Pan American Health Organization and the World Health Organization.

INTERPRETATION OF THE TEXT

Safety related terms are to be understood as defined in the IAEA Safety Glossary (see <http://www-ns.iaea.org/standards/safety-glossary.htm>). Otherwise, words are used with the spellings and meanings assigned to them in the latest edition of The Concise Oxford Dictionary. For Safety Guides, the English version of the text is the authoritative version.

The background and context of each standard in the IAEA Safety Standards Series and its objective, scope and structure are explained in Section 1, Introduction, of each publication.

Material for which there is no appropriate place in the body text (e.g. material that is subsidiary to or separate from the body text, is included in support of statements in the body text, or describes methods of calculation, procedures or limits and conditions) may be presented in appendices or annexes.

An appendix, if included, is considered to form an integral part of the safety standard. Material in an appendix has the same status as the body text, and the IAEA assumes authorship of it. Annexes and footnotes to the main text, if included, are used to provide practical examples or additional information or explanation. Annexes and footnotes are not integral parts of the main text. Annex material published by the IAEA is not necessarily issued under its authorship; material under other authorship may be presented in annexes to the safety standards. Extraneous material presented in annexes is excerpted and adapted as necessary to be generally useful.

CONTENTS

1. INTRODUCTION	1
Background (1.1–1.7)	1
Objective (1.8)	2
Scope (1.9–1.10)	2
Structure (1.11–1.13)	2
2. DEFINITIONS AND CLASSIFICATION (2.1)	3
Definitions (2.2)	3
Classification (2.3–2.7)	6
Schedule for UN 2908: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — EMPTY PACKAGING	13
Schedule for UN 2909: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM	18
Schedule for UN 2910: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — LIMITED QUANTITY OF MATERIAL	23
Schedule for UN 2911: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — INSTRUMENTS or ARTICLES	28
Schedule for UN 2912: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-excepted ...	33
Schedule for UN 2913: RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), non-fissile or fissile-excepted	44
Schedule for UN 2915: RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non-fissile or fissile-excepted	55

Schedule for UN 2916: RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non-fissile or fissile-excepted	65
Schedule for UN 2917: RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non-fissile or fissile-excepted	77
Schedule for UN 2919: RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non-fissile or fissile-excepted	89
Schedule for UN 2977: RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE	101
Schedule for UN 2978: RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted	114
Schedule for UN 3321: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non-fissile or fissile-excepted	127
Schedule for UN 3322: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non-fissile or fissile-excepted	138
Schedule for UN 3323: RADIOACTIVE MATERIAL, TYPE C PACKAGE, non-fissile or fissile-excepted	149
Schedule for UN 3324: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE	161
Schedule for UN 3325: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), FISSILE	173
Schedule for UN 3326: RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE	185
Schedule for UN 3327: RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form	198

Schedule for UN 3328: RADIOACTIVE MATERIAL,
TYPE B(U) PACKAGE, FISSILE 209

Schedule for UN 3329: RADIOACTIVE MATERIAL,
TYPE B(M) PACKAGE, FISSILE 222

Schedule for UN 3330: RADIOACTIVE MATERIAL,
TYPE C PACKAGE, FISSILE 235

Schedule for UN 3331: RADIOACTIVE MATERIAL,
TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE 247

Schedule for UN 3332: RADIOACTIVE MATERIAL,
TYPE A PACKAGE, SPECIAL FORM,
non-fissile or fissile-excepted 259

Schedule for UN 3333: RADIOACTIVE MATERIAL,
TYPE A PACKAGE, SPECIAL FORM, FISSILE 270

Schedule for UN 3507: URANIUM HEXAFLUORIDE,
RADIOACTIVE MATERIAL, EXCEPTED PACKAGE,
less than 0.1 kg per package, non-fissile or fissile-excepted. 281

REFERENCE..... 287

CONTRIBUTORS TO DRAFTING AND REVIEW 289

1. INTRODUCTION

BACKGROUND

1.1. The Regulations for the Safe Transport of Radioactive Material (IAEA Safety Standards Series No. SSR-6, 2012 Edition) [1], henceforth called ‘the Regulations’, establish standards of safety that 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. Protection from harmful effects of radiation during the transport of radioactive material is achieved by means of a combination of limitations on the contents of a package according to the quantity and type of radioactivity, the package design, and certain simple handling, storage and stowage precautions that are to be followed during transport.

1.2. While some provisions of the Regulations concern administrative controls (e.g. the requirement for the carrier to apply segregation to limit the radiation level in occupied areas), the main reliance is placed on provisions relating to the package, the responsibility for which rests primarily with the consignor of the package.

1.3. The Regulations are structured topically in terms of definitions, general provisions, activity limits and classification, requirements and controls for transport, requirements for radioactive materials and for packagings and packages, test procedures, and approval and administrative requirements.

1.4. The Regulations are supplemented by Safety Guides that provide recommendations on meeting the requirements of the Regulations.

1.5. This Safety Guide is prepared on the basis of the Regulations. It reproduces certain parts of the Regulations in a user friendly format for specified types of consignments, classified according to their associated UN numbers, but does not contain any additional requirements. Details, in particular of design, construction and testing of packagings, are omitted.

1.6. Although much of the information may not apply, a user desiring to transport a particular type of consignment of radioactive material would need to study and assimilate requirements from all sections of the Regulations. This Safety Guide aims to aid such users by providing a consolidation of certain requirements of the Regulations for each type of radioactive material, package or shipment. Once a consignor has properly classified the radioactive material

to be shipped (following the recommendations provided in Section 2 and Fig. 1, on pp. 10 and 11), the appropriate UN number can be assigned and the specific requirements for shipment can be found in the corresponding schedule. References are provided so that the Regulations can be readily consulted when necessary.

1.7. In order to reflect the mandatory status of the Regulations and to comply with the IAEA requirements on the preparation of Safety Guides, and without diluting their status, the word “shall” in the Regulations, where it needs to be reflected in this Safety Guide, has been replaced by the words “is required to” or “requirements apply”, while the phrase “shall not” in the Regulations has been replaced by the words “is not allowed”. In the event of a conflict or anomaly between the provisions of the Regulations and this Safety Guide, the requirements in the Regulations apply. For regulatory purposes, reference should be made to the detailed provisions of the Regulations.

OBJECTIVE

1.8. The objective of this Safety Guide is to provide information to aid users in determining the correct package type and the appropriate operational and administrative requirements to be applied.

SCOPE

1.9. This Safety Guide can be used for all transport of radioactive material. It contains 26 schedules corresponding to the UN numbers and associated proper shipping names for the radioactive material to be shipped.

1.10. The user’s attention is drawn to the fact that there may be deviations (i.e. exceptions and additions) from the Regulations necessitated by national and modal regulations and carrier restrictions, which are not reflected in this Safety Guide.

STRUCTURE

1.11. Section 2 describes how the material is to be classified and assigned to the appropriate UN number with the associated proper shipping name. The Safety Guide further contains 26 schedules corresponding to the number of UN numbers and associated proper shipping names for the radioactive material to be shipped.

1.12. The schedules are set out in numerical order according to the UN number. The information provided in each schedule follows the sequence of the work involved in transporting radioactive material.

1.13. Each schedule has the same eight subjects:

- (1) General provisions;
- (2) Contents limits for packages;
- (3) Contamination;
- (4) Maximum radiation levels;
- (5) Categories of packages and overpacks;
- (6) Marking and labelling;
- (7) Requirements before shipment;
- (8) Provisions concerning transport operations.

2. DEFINITIONS AND CLASSIFICATION

2.1. This section defines terms that are necessary for the purposes of this Safety Guide and describes how radioactive material should be classified and assigned the appropriate UN number and associated proper shipping name.

DEFINITIONS

2.2. The following definitions are taken from the Regulations and reproduced here for the convenience of the user.

Contamination

Contamination shall mean the presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm² for beta and gamma emitters and *low toxicity alpha emitters*, or 0.04 Bq/cm² for all other alpha emitters.

Exclusive use

Exclusive use shall mean the sole use, by a single consignor, of a conveyance or of a large freight container, in respect of which all initial, intermediate and

final loading and unloading and shipment are carried out in accordance with the directions of the consignor or consignee, where so required by the Regulations.

Fissile nuclides and fissile material

Fissile nuclides shall mean uranium-233, uranium-235, plutonium-239 and plutonium-241. *Fissile material* shall mean a material containing any of these *fissile nuclides*. Excluded from the definition of *fissile material* are the following:

- (a) Natural uranium or depleted uranium that is unirradiated;
- (b) Natural uranium or depleted uranium that has been irradiated in thermal reactors only;
- (c) Material with *fissile nuclides* less than a total of 0.25 g;
- (d) Any combination of (a), (b) and (c).

These exclusions are only valid if there is no other material with *fissile nuclides* in the *package* or in the consignment if shipped unpackaged.

Low dispersible radioactive material

Low dispersible radioactive material shall mean either a solid *radioactive material* or a solid *radioactive material* in a sealed capsule that has limited dispersibility and is not in powder form.

Low specific activity material

Low specific activity (LSA) material shall mean *radioactive material* that by its nature has a limited specific activity, or *radioactive material* for which limits of estimated average specific activity apply. External shielding materials surrounding the *LSA material* shall not be considered in determining the estimated average specific activity.

Low toxicity alpha emitters

Low toxicity alpha emitters are: natural uranium, depleted uranium, natural thorium, uranium-235, uranium-238, thorium-232, thorium-228 and thorium-230 when contained in ores or physical and chemical concentrates; or alpha emitters with a half-life of less than 10 days.

Package

Package shall mean the complete product of the packing operation, consisting of the packaging and its contents prepared for transport. The types of *packages* covered by the Regulations that are subject to the activity limits and material restrictions of Section IV of the Regulations and meet the corresponding requirements are:

- (a) Excepted *package*;
- (b) Industrial *package* Type 1 (Type IP-1);
- (c) Industrial *package* Type 2 (Type IP-2);
- (d) Industrial *package* Type 3 (Type IP-3);
- (e) Type A *package*;
- (f) Type B(U) *package*;
- (g) Type B(M) *package*;
- (h) Type C *package*.

Packages containing *fissile material* or uranium hexafluoride are subject to additional requirements.

Radioactive material

Radioactive material shall mean any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in paras 402–407 of the Regulations.

Special form radioactive material

Special form radioactive material shall mean either an indispersible solid *radioactive material* or a sealed capsule containing *radioactive material*.

Surface contaminated object

Surface contaminated object (SCO) shall mean a solid object that is not itself radioactive but which has *radioactive material* distributed on its surface.

Unilateral approval

Unilateral approval shall mean an approval of a design that is required to be given by the competent authority of the country of origin of the design only.

CLASSIFICATION

2.3. Radioactive material is required to be assigned one of the UN numbers specified in Table 1. The UN number assigned depends on the activity level of the radionuclides contained in the package, the fissile or non-fissile properties of these radionuclides, the type of package, and the nature or form of the radioactive contents of the package, or special arrangements governing the transport operation.

TABLE 1. UN NUMBERS AND RELATED PARAGRAPH NUMBERS OF THE REGULATIONS (2012 EDITION)

UN No.	PROPER SHIPPING NAME and description	Paragraphs in which contents limits and basic requirements are established
EXCEPTED PACKAGES		
2908	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — EMPTY PACKAGING	417, 427, 515, 516
2909	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM	426, 516
2910	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — LIMITED QUANTITY OF MATERIAL	417, 424, 515, 516
2911	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — INSTRUMENTS or ARTICLES	417, 423, 515, 516
3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted	417, 425, 516
LOW SPECIFIC ACTIVITY (LSA) MATERIAL		
2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-excepted	409(a), 411, 417
3321	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non-fissile or fissile-excepted	409(b), 410, 411, 417
3322	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non-fissile or fissile-excepted	409(c), 410, 411, 417

TABLE 1. UN NUMBERS AND RELATED PARAGRAPH NUMBERS OF THE REGULATIONS (2012 EDITION) (cont).

UN No.	PROPER SHIPPING NAME and description	Paragraphs in which contents limits and basic requirements are established
3324	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE	409(b), 410, 411, 417, 418
3325	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), FISSILE	409(c), 410, 411, 417, 418
SURFACE CONTAMINATED OBJECTS (SCOs)		
2913	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), non-fissile or fissile-excepted	413, 414, 417, 520
3326	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE	413, 414, 417, 418
TYPE A PACKAGES		
2915	RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non-fissile or fissile-excepted	417, 429(b), 430
3327	RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form	417, 418, 429(b), 430
3332	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non-fissile or fissile-excepted	415, 417, 429(a), 430
3333	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE	415, 417, 418, 429(a), 430
TYPE B(U) PACKAGES		
2916	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non-fissile or fissile-excepted	417, 432, 433
3328	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE	417, 418, 431–433

TABLE 1. UN NUMBERS AND RELATED PARAGRAPH NUMBERS OF THE REGULATIONS (2012 EDITION) (cont).

UN No.	PROPER SHIPPING NAME and description	Paragraphs in which contents limits and basic requirements are established
TYPE B(M) PACKAGES		
2917	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non-fissile or fissile-excepted	417, 432, 433
3329	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE	417, 418, 432, 433
TYPE C PACKAGES		
3323	RADIOACTIVE MATERIAL, TYPE C PACKAGE, non-fissile or fissile-excepted	417, 432
3330	RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSILE	417, 418, 432
SPECIAL ARRANGEMENT		
2919	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non-fissile or fissile-excepted	310, 417
3331	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE	310, 417, 418
URANIUM HEXAFLUORIDE		
2977	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE	417–420
2978	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted	417, 419(b), 420

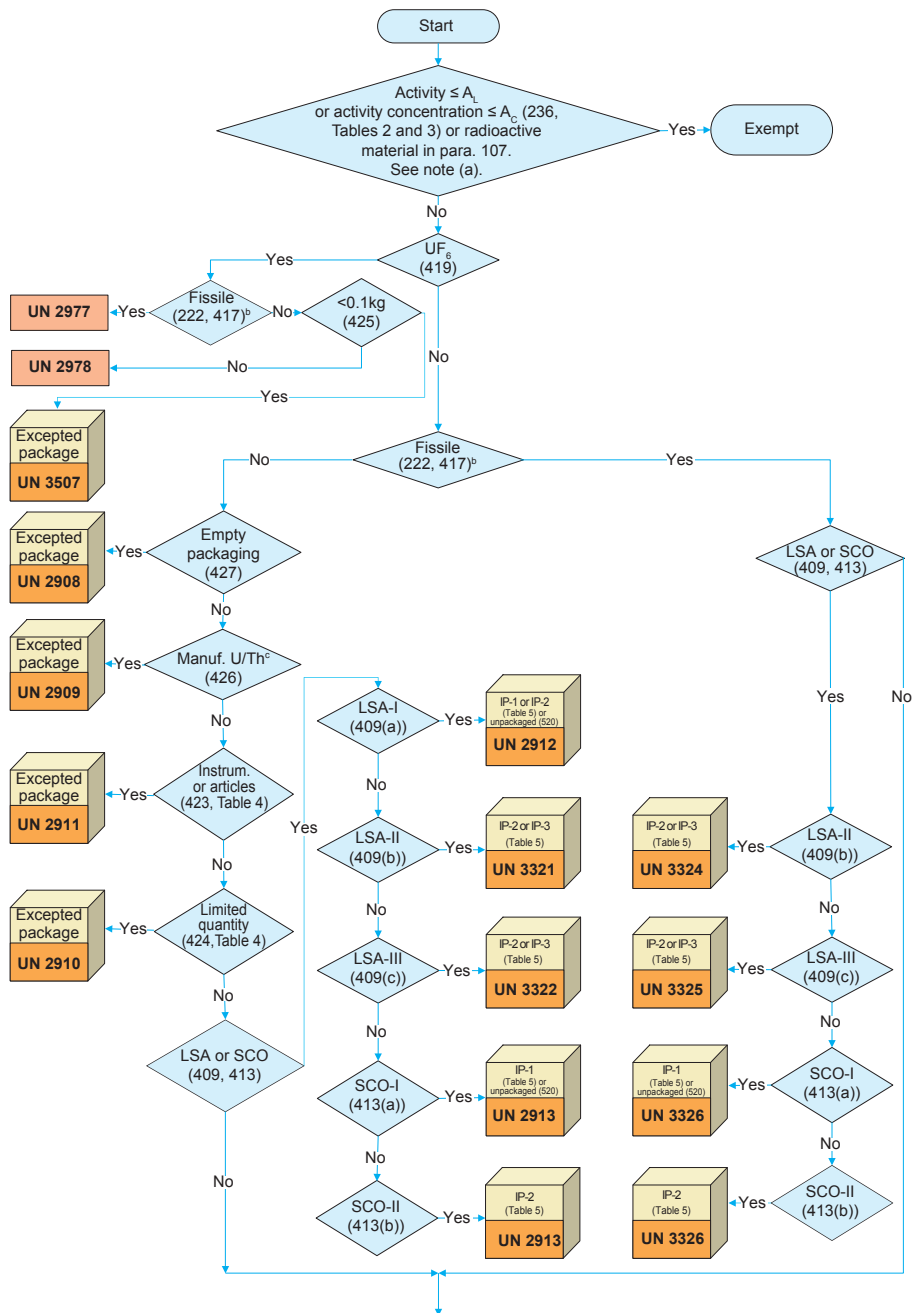
2.4. In all cases of international transport of packages requiring approval of design or shipment by the competent authority for which different approval types apply in the different countries concerned by the shipment, the UN number, proper shipping name, categorization, labelling and marking are required to be in accordance with the certificate of the country of origin of the design.

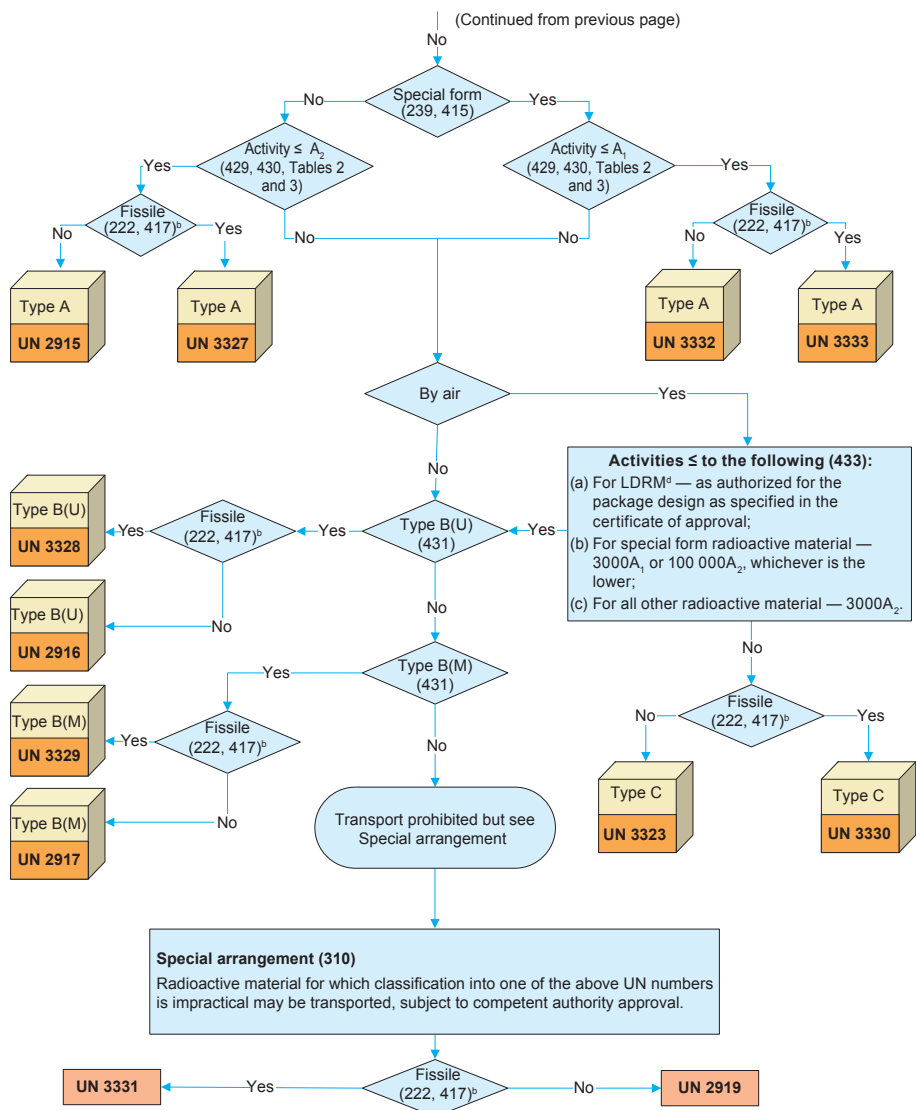
2.5. A flow diagram for classification of radioactive material to the appropriate UN number is provided in Fig. 1 to aid the assignment process. The objective of the flow diagram is not to indicate all possible options allowed by the regulations, nor to incorporate all of the detailed requirements and limits. Rather, it has to be seen as a tool to indicate the most suitable or optimized option for classification.

2.6. It is clear that it has to be verified that all of the requirements, limitations and prescriptions related to the UN number assigned can be complied with. If not, an alternative UN number will need to be assigned.

2.7. It is possible that for specific cases more than one UN number may be appropriate. In such cases, the choice of UN number would be left to the operator or consignor. Two examples of such situations are set out in the following:

- (1) Some radioactive material may meet the criteria for both “limited quantity” and “LSA or SCO”. If the radioactive material is not fissile, following the route of the diagram — and assuming the material is not empty packaging, manufactured uranium or thorium, or enclosed in or included as a component part of an instrument or article — the first decision box encountered is “limited quantity”. If this option is selected, the material could be classified as UN 2910 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — LIMITED QUANTITY OF MATERIAL. This option has minimal administrative burden and requirements for the package but the activity of such an excepted package is required to be very low. However, this is not the only option for the package. Rather, the choice may be made to proceed to the decision box “LSA or SCO”. The material will now be classified as LSA or SCO (depending on the case) and can be shipped unpackaged in a larger amount as LSA-I or SCO-I without the restriction on the activity limit that is a requirement for excepted packages. However, the option “LSA or SCO” may incur a higher administrative burden that will need to be considered.
- (2) If the amount of LSA material is such that the radiation level at 3 m from the unshielded material exceeds 10 mSv/h, then the consignor has the choice of limiting the amount of LSA material per package accordingly and classifying the package as an industrial package (IP), or using a Type B package, and assigning the appropriate UN number according to the choice made.





^a AL — activity limit for an exempt consignment; AC — activity concentration limit for exempt material; paragraph and table numbers refer to the Regulations [1].

^b Fissile excepted by para. 417(a)–(f) should be treated as ‘No’.

^c Articles manufactured from natural uranium, depleted uranium or natural thorium.

^d Low dispersible radioactive material.

FIG. 1. Flow diagram for the classification of radioactive material with the appropriate UN number.

SCHEDULE FOR UN 2908

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — EMPTY PACKAGING

Paragraph(s) of the Regulations [1]	Subject
1. GENERAL PROVISIONS	
110, 507	Other dangerous properties of contents and transport with other dangerous goods.
301–303	General provisions for radiation protection.
304, 305	Emergency response.
306	Management system.
311–315	Training.
502, 503	Requirements before each shipment.
515	Requirements — general. If the excepted package is contaminated with fissile material, one of the fissile exceptions provided by para. 417 is required to be applied. Fissile material excepted under para. 417(f) is required to comply with para. 606 and requires multilateral approval by the competent authority in each State.
607–618	Design requirements for the packaging and the package.
619–621	Additional design requirements — air transport.
636	Minimum dimensions of a package containing fissile excepted material.

819 Transitional arrangements for packages designed under the provisions of the 1985 or 1985 (As Amended 1990) Editions of the Regulations.

2. CONTENTS LIMITS FOR PACKAGES

Only contamination is allowed (see below).

417 If the package is contaminated by fissile material, one of the fissile exceptions provided by para. 417 is required to be applied.

422(a), 427 Classification as an excepted package.

3. CONTAMINATION

427(c) Non-fixed contamination on the internal surfaces is not allowed to exceed 100 times the levels specified in para. 508.

427(d) Any labels that may have been displayed in conformity with para. 538 are required to be removed or covered.

508 Non-fixed contamination on the external surfaces of any package is required to be kept as low as practicable and is not allowed to exceed the following limits, averaged over any area of 300 cm² of any part of the surface:

(a) Beta, gamma and low toxicity alpha emitters, 4 Bq/cm²;

(b) All other alpha emitters, 0.4 Bq/cm².

4. MAXIMUM RADIATION LEVELS

516 The radiation level at any point on the external surface of an excepted package is not allowed to exceed 5 µSv/h.

5. CATEGORIES OF PACKAGES AND OVERPACKS

Not applicable.

6. MARKING AND LABELLING

- 507 Packages, freight containers and overpacks containing materials having other dangerous properties (e.g. corrosiveness) are also required to be marked and labelled as required by the relevant transport regulations.
- 531 Each package is required to be marked with an identification of either the consignor or the consignee, or both.
- 531–533 All package markings are required to be legible and durable, and are required to be on the outside of the packaging.
- 532 Packages are required to bear the mark “UN 2908”.
- 533 Packages with a gross mass exceeding 50 kg are required to be marked with their permissible gross mass on the outside of the packaging.
- 545 It is the consignor’s responsibility to comply with the requirements of marking, labelling and placarding.
- 581(c)–(e) A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

7. REQUIREMENTS BEFORE SHIPMENT

- 502, 503(a) Before each shipment of any package, the following requirements apply:
- (i) For any package, it is required to ensure that all the requirements specified in the relevant provisions of the Regulations have been satisfied.
 - (ii) It is required to ensure that lifting attachments that do not meet the requirements of para. 608 of the Regulations have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with para. 609 of the Regulations.

546(a) The transport documents with each consignment (consignment notes) are required to include the identification of the consignor and the consignee, including their names and addresses, and the UN number UN 2908.

8. PROVISIONS CONCERNING TRANSPORT OPERATIONS

8.1. Modal requirements

580 A consignment may be accepted for domestic movement by national postal authorities, subject to such additional requirements as those established in para. 580 of the Regulations and as prescribed by the authorities.

581 A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

8.2. Placarding

507, 545 Placards may be required for other dangerous properties of the contents, but not for the radioactive properties.

8.3. Stowage during transport, storage in transit and segregation

Not applicable.

8.4. Damaged or leaking packages

511 Movement of packages that are damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport.

8.5. Decontamination

505 Tanks and intermediate bulk containers used for the transport of radioactive material are not allowed to be used for storage or transport of other goods, unless decontaminated below one tenth of the levels specified in paras 508 and 509 of the Regulations.

8.6. Other provisions

309 In the event of non-compliance, appropriate actions are required to be taken as soon as possible, including communication and remedy.

427(a), (b) Transport of empty packaging is subject to additional requirements.

582 Customs operations may be carried out only in a place where adequate means of controlling radiation exposure are provided.

583 Where a consignment is undeliverable, appropriate actions are required to be taken as soon as possible.

SCHEDULE FOR UN 2909

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM

Paragraph(s) of the Regulations [1]	Subject
1. GENERAL PROVISIONS	
110, 507	Other dangerous properties of contents and transport with other dangerous goods.
301–303	General provisions for radiation protection.
304, 305	Emergency response.
306	Management system.
311–315	Training.
502, 503	Requirements before each shipment.
515	Requirements — general.
607–618	Design requirements for the packaging and the package.
619–621	Additional design requirements — air transport.
801	The consignor is required to demonstrate on request that the package design complies with all applicable competent authority requirements.
819	Transitional arrangements for packages designed under the provisions of the 1985 or 1985 (As Amended 1990) Editions of the Regulations.

2. CONTENTS LIMITS FOR PACKAGES

- 422(c), 426 Classification as an excepted package.
- 426 There is no limit on the quantity of material; the contents limits are on the type of material and on the outer surface of the material.

3. CONTAMINATION

- 508 Non-fixed contamination on the external surfaces of any package is required to be kept as low as practicable and is not allowed to exceed the following limits, averaged over any area of 300 cm² of any part of the surface:
- (a) Beta, gamma and low toxicity alpha emitters, 4 Bq/cm²;
(b) All other alpha emitters, 0.4 Bq/cm².

4. MAXIMUM RADIATION LEVELS

- 516 The radiation level at any point on the external surface of an excepted package is not allowed to exceed 5 µSv/h.

5. CATEGORIES OF PACKAGES AND OVERPACKS

Not applicable.

6. MARKING AND LABELLING

- 507 Packages, freight containers and overpacks containing materials having other dangerous properties (e.g. corrosiveness) are also required to be labelled as required by the relevant transport regulations.
- 531 Each package is required to be marked with an identification of either the consignor or consignee, or both.

- 531–533 All package markings are required to be legible and durable, and are required to be on the outside of the packaging.
- 532 Packages are required to bear the mark “UN 2909”.
- 533 Packages with a gross mass exceeding 50 kg are required to be marked with their permissible gross mass on the outside of the packaging.
- 545 It is the consignor’s responsibility to comply with the requirements of marking, labelling and placarding.
- 581(c)–(e) A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

7. REQUIREMENTS BEFORE SHIPMENT

- 502, 503(a) Before each shipment of any package, the following requirements apply:
- (i) For any package, it is required to ensure that all the requirements specified in the relevant provisions of the Regulations have been satisfied.
 - (ii) It is required to ensure that lifting attachments that do not meet the requirements of para. 608 of the Regulations have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with para. 609 of the Regulations.
- 546(a) The transport documents with each consignment (consignment notes) are required to include the identification of the consignor and consignee, including their names and addresses, and the UN number UN 2909.

8. PROVISIONS CONCERNING TRANSPORT OPERATIONS

8.1. Modal requirements

580 A consignment may be accepted for domestic movement by national postal authorities, subject to such additional requirements as those established in para. 580 of the Regulations and as prescribed by the authorities.

581 A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

8.2. Placarding

507 Placards may be required for other dangerous properties of the contents, but not for the radioactive properties.

545 Consignor's responsibilities.

8.3. Stowage during transport, storage in transit and segregation

Not applicable.

8.4. Damaged or leaking packages

511 Movement of packages that are damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport.

8.5. Decontamination

Not applicable.

8.6. Other provisions

- 309 In the event of non-compliance, appropriate actions
are required to be taken as soon as possible, including
communication and remedy.
- 582 Customs operations may be carried out only in a place
where adequate means of controlling radiation exposure are
provided.
- 583 Where a consignment is undeliverable, appropriate actions
are required to be taken as soon as possible.

SCHEDULE FOR UN 2910

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — LIMITED QUANTITY OF MATERIAL

Paragraph(s) of the Regulations [1]	Subject
1. GENERAL PROVISIONS	
110, 507	Other dangerous properties of contents and transport with other dangerous goods.
301–303	General provisions for radiation protection.
304, 305	Emergency response.
306	Management system.
311–315	Training.
424(a)	Retention of contents under routine conditions of transport.
502, 503	Requirements before each shipment.
515	Requirements — general. If the excepted package contains fissile material, one of the fissile exceptions provided by para. 417 is required to be applied. Fissile material excepted under para. 417(f) is required to comply with para. 606 and requires multilateral approval by the competent authority in each State.
607–618	Design requirements for the packaging and the package.
619–621	Additional design requirements — air transport.

- 636 Minimum dimensions of a package containing fissile excepted material.
- 801 The consignor is required to demonstrate on request that the package design complies with all applicable competent authority requirements.
- 819 Transitional arrangements for packages designed under the provisions of the 1985 or 1985 (As Amended 1990) Editions of the Regulations.

2. CONTENTS LIMITS FOR PACKAGES

- 417 If the package contains fissile material, one of the fissile exceptions provided by para. 417 of the Regulations is required to be applied.
- Fissile material excepted under para. 417(f) is required to comply with para. 606 and requires multilateral approval by the competent authority in each State.
- 422(d), 424, Table 4 The activity limits in Table 4 of the Regulations are required to be met.
- 424(b) The package is required to be marked “RADIOACTIVE” on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or on the outside of the package, when it is impractical to mark an internal surface.
- 424(c) For transport by post, the total activity in each package is not allowed to exceed one tenth of the relevant limit specified in Table 4 of the Regulations.

3. CONTAMINATION

508 Non-fixed contamination on the external surfaces of any package is required to be kept as low as practicable and is not allowed to exceed the following limits, averaged over any area of 300 cm² of any part of the surface:

- (a) Beta, gamma and low toxicity alpha emitters, 4 Bq/cm²;
- (b) All other alpha emitters, 0.4 Bq/cm².

4. MAXIMUM RADIATION LEVELS

516 The radiation level at any point on the external surface of an excepted package is not allowed to exceed 5 µSv/h.

5. CATEGORIES OF PACKAGES AND OVERPACKS

Not applicable.

6. MARKING AND LABELLING

507 Packages, freight containers and overpacks containing materials having other dangerous properties (e.g. corrosiveness) are also required to be marked and labelled as required by the relevant transport regulations.

531 Each package is required to be marked with an identification of either the consignor or the consignee, or both.

531–533 All package markings are required to be legible and durable, and are required to be on the outside of the packaging.

532 Packages are required to bear the mark “UN 2910”.

533 Packages with a gross mass exceeding 50 kg are required to be marked with their permissible gross mass on the outside of the packaging.

545 It is the consignor's responsibility to comply with the requirements of marking, labelling and placarding.

581(c)–(e) A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

7. REQUIREMENTS BEFORE SHIPMENT

502, 503(a) Before each shipment of any package, the following requirements apply:

- (i) For any package, it is required to ensure that all the requirements specified in the relevant provisions of the Regulations have been satisfied.
- (ii) It is required to ensure that lifting attachments that do not meet the requirements of para. 608 of the Regulations have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with para. 609 of the Regulations.

546(a) The transport documents with each consignment (consignment notes) are required to include the identification of the consignor and consignee, including their names and addresses, and the UN number UN 2910.

8. PROVISIONS CONCERNING TRANSPORT OPERATIONS

8.1. Modal requirements

580 A consignment may be accepted for domestic movement by national postal authorities, subject to such additional requirements as those established in para. 580 of the Regulations and as prescribed by the authorities.

581 A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

8.2. Placarding

507 Placards may be required for other dangerous properties of the contents, but not for the radioactive properties.

545 Consignor's responsibilities.

8.3. Stowage during transport, storage in transit and segregation

Not applicable.

8.4. Damaged or leaking packages

511 Movement of packages that are damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport.

8.5. Decontamination

Not applicable.

8.6. Other provisions

309 In the event of non-compliance, appropriate actions are required to be taken as soon as possible, including communication and remedy.

582 Customs operations may be carried out only in a place where adequate means of controlling radiation exposure are provided.

583 Where a consignment is undeliverable, appropriate actions are required to be taken as soon as possible.

SCHEDULE FOR UN 2911

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE — INSTRUMENTS or ARTICLES

**Paragraph(s) of
the Regulations [1]**

Subject

1. GENERAL PROVISIONS

110, 507	Other dangerous properties of contents and transport with other dangerous goods.
301–303	General provisions for radiation protection.
304, 305	Emergency response.
306	Management system.
311–315	Training.
502, 503	Requirements before each shipment.
515	Requirements — general. If the excepted package contains fissile material, one of the fissile exceptions provided by para. 417 is required to be applied. Fissile material excepted under para. 417(f) is required to comply with para. 606 and requires multilateral approval by the competent authority in each State.
607–618	Design requirements for the packaging and the package.
619–621	Additional design requirements — air transport.
636	Minimum dimensions of a package containing fissile excepted material.

801 The consignor is required to demonstrate on request that the package design complies with all applicable competent authority requirements.

819 Transitional arrangements for packages designed under the provisions of the 1985 or 1985 (As Amended 1990) Editions of the Regulations.

2. CONTENTS LIMITS FOR PACKAGES

417 If the package contains fissile material, one of the fissile exceptions provided by para. 417 of the Regulations is required to be applied.

Fissile material excepted under para. 417(f) is required to comply with para. 606 and requires multilateral approval by the competent authority in each State.

422(b), 423, Table 4 The activity limits in Table 4 of the Regulations are required to be met.

The active material is required to be completely enclosed by non-active components (a device performing the sole function of containing radioactive material is not allowed to be considered to be an instrument or manufactured article).

423(a) The radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not allowed to exceed 0.1 mSv/h.

3. CONTAMINATION

508 Non-fixed contamination on the external surfaces of any package is required to be kept as low as practicable and is not allowed to exceed the following limits, averaged over any area of 300 cm² of any part of the surface:

- (a) Beta, gamma and low toxicity alpha emitters, 4 Bq/cm²;
- (b) All other alpha emitters, 0.4 Bq/cm².

4. MAXIMUM RADIATION LEVELS

516 The radiation level at any point on the external surface of an excepted package is not allowed to exceed 5 $\mu\text{Sv/h}$.

5. CATEGORIES OF PACKAGES AND OVERPACKS

Not applicable.

6. MARKING AND LABELLING

423(b) The instrument or article is required to be marked “RADIOACTIVE”, except for radioluminescent timepieces or devices or certain consumer products as specified in para. 423(b) of the Regulations.

507 Packages, freight containers and overpacks containing materials having other dangerous properties (e.g. corrosiveness) are also required to be marked and labelled as required by the relevant transport regulations.

531 Each package is required to be marked with an identification of either the consignor or consignee, or both.

531–533 All package markings are required to be legible and durable, and are required to be on the outside of the packaging.

532 Packages are required to bear the mark “UN 2911”.

533 Packages with a gross mass exceeding 50 kg are required to be marked with their permissible gross mass on the outside of the packaging.

545 It is the consignor’s responsibility to comply with the requirements of marking, labelling and placarding.

581(c)–(e) A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

7. REQUIREMENTS BEFORE SHIPMENT

- 502, 503(a) Before each shipment of any package, the following requirements apply:
- (i) For any package, it is required to ensure that all the requirements specified in the relevant provisions of the Regulations have been satisfied.
 - (ii) It is required to ensure that lifting attachments that do not meet the requirements of para. 608 of the Regulations have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with para. 609 of the Regulations.
- 546(a) The transport documents with each consignment (consignment notes) are required to include the identification of the consignor and the consignee, including their names and addresses, and the UN number UN 2911.

8. PROVISIONS CONCERNING TRANSPORT OPERATIONS

8.1. Modal requirements

- 580, Table 4 A consignment may be accepted for domestic movement by national postal authorities, subject to such additional requirements as those established in para. 580 of the Regulations and as prescribed by the authorities.
- 581, Table 4 A consignment may be accepted for international movement by post, subject to such additional requirements as those established in para. 581 of the Regulations and as prescribed by the Acts of the Universal Postal Union.

8.2. Placarding

- 507 Placards may be required for other dangerous properties of the contents, but not for the radioactive properties.
- 545 Consignor's responsibilities.

8.3. Stowage during transport, storage in transit and segregation

Not applicable.

8.4. Damaged or leaking packages

511 Movement of packages that are damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport.

8.5. Decontamination

Not applicable.

8.6. Other provisions

309 In the event of non-compliance, appropriate actions are required to be taken as soon as possible, including communication and remedy.

582 Customs operations may be carried out only in a place where adequate means of controlling radiation exposure are provided.

583 Where a consignment is undeliverable, appropriate actions are required to be taken as soon as possible.